



CMD 25-H9.REF3 CNSC Staff Submission

Reference Package 3 for CMD 25-H9 CNSC Staff Submission on Denison Mines Licence Application to Prepare Site and Construct the Wheeler River Project

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| Public hearing date | 08 December 2025 |
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| Summary | This document contains documents referenced in the Environmental Assessment Report appended to 25-H9, to be placed on the Record for the proceeding. |
| Actions required | There are no actions requested of the Commission. This CMD is in support of the actions and recommendations set out in CNSC staff CMD 25-H9. |



CMD 25-H9.REF3 Soumission par le personnel de la CCSN

Références liées 3 au CMD 25-H9 Soumission par le personnel de la CCSN la demande de Denison Mines visant à préparer le site du projet de Wheeler River et à entamer les activités de construction

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|----------------------------|--|
| Classification | Choisir un niveau de classification |
| Type de CMD | Références |
| Numéro de CMD | CMD 25-H9.REF3 |
| CMD Original | CMD 25-H9 |
| Date de l'audience | 08 décembre 2025 |
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| Résumé | Ce document contient les documents cités dans le rapport d'évaluation environnementale annexé à 25-H9, qui seront versés au dossier de l'instance. |
| Mesures requises | Aucune mesure n'est requise de la Commission. Le présent CMD appuie les mesures et les recommandations énoncées dans le CMD CMD 25-H9 du personnel de la CCSN. |



CMD 25-H9.REF3

Reference Package 3 for CMD 25-H9 CNSC Staff Submission on Denison Mines Licence Application to Prepare Site and Construct the Wheeler River Project

Signed by:

X

Dana Beaton
Director General, DERPA



Wheeler River Project

Provincial Technical Proposal and Federal Project
Description



Denison Mines Corp.
May 2019

Wheeler River Project

Provincial Technical Proposal and
Federal Project Description

Project Summary

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Summary

Wheeler River Project

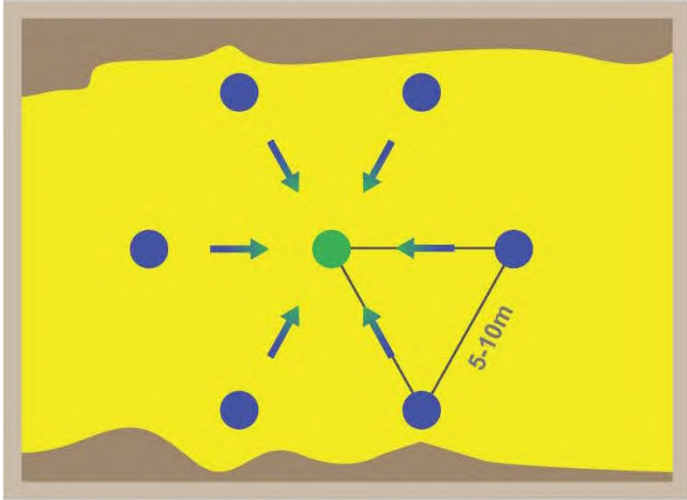
The Wheeler River Project (Wheeler or the Project) is a proposed uranium mine and processing plant in northern Saskatchewan, Canada. It is located in a relatively undisturbed area of the boreal forest about 4 km off of Highway 914 and approximately 35 km north-northeast of the Key Lake uranium operation.

Wheeler is a joint venture project owned by Denison Mines Corp. (Denison) and JCU (Canada) Exploration Company Ltd. (JCU). Denison owns 90% of Wheeler and is the operator, while JCU owns 10%. Denison is a uranium exploration and development company with interests focused in the Athabasca Basin region of northern Saskatchewan, Canada with a head office in Toronto, Ontario and technical office in Saskatoon, Saskatchewan. Historically Denison has had over 50 years of uranium mining experience in Saskatchewan, Elliot Lake, Ontario, and in the United States. Today, the company is part owner (22.5%) of the McClean Lake Joint Venture which includes the operating McClean Lake uranium mill in northern Saskatchewan.

To advance the Project, Denison is applying an innovative approach to uranium mining in Canada called in situ recovery (ISR). The use of ISR mining at Wheeler means that there will be no need for a large open pit mining operation or multiple shafts to access underground mine workings; no workers will be underground as the ISR process is conducted from surface facilities. While this mining method has been used extensively on an international basis and currently accounts for more than 50% of global uranium production, it has not previously been used in Canada for uranium mining. Denison has done significant research on international uranium ISR operations to understand best practices and incorporate lessons learned into the design of Wheeler. In order to implement ISR at Wheeler, Denison will apply existing technologies to eliminate the typical challenges experienced at some international uranium ISR operations.

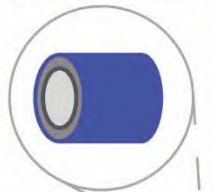
ISR mining at Wheeler will involve injecting a mining solution into the uranium deposit through a series of cased drill holes (about 4 to 8 inches in diameter) called injection wells (Figure A). The mining solution proposed for Wheeler is a low pH or acidic mining solution. As the mining solution passes from the injection wells through the uranium deposit it dissolves the uranium and leaves virtually all other minerals in the host rock in place. Once dissolved, the uranium rich mining solution is recovered and pumped back up to surface through another set of cased drill holes called recovery wells. The combination of injection and recovery wells is called a wellfield. Denison anticipates the wellfield will have the general arrangement of one recovery well in the centre surrounded by 6-8 injection wells with about 10 m spacing between wells. With these configuration options, the final wellfield may include approximately 310 wells over a 90 m x 900 m area.

TOP VIEW OF A SINGLE WELL FIELD



- INJECTION WELL WITH MINING SOLUTION
- RECOVERY WELL WITH URANIUM RICH SOLUTION

PIPE WITH SECONDARY CONTAINMENT

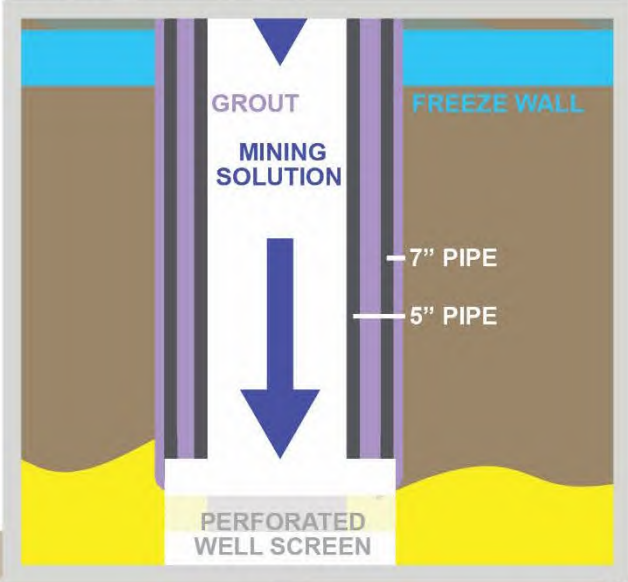


PUMPHOUSE

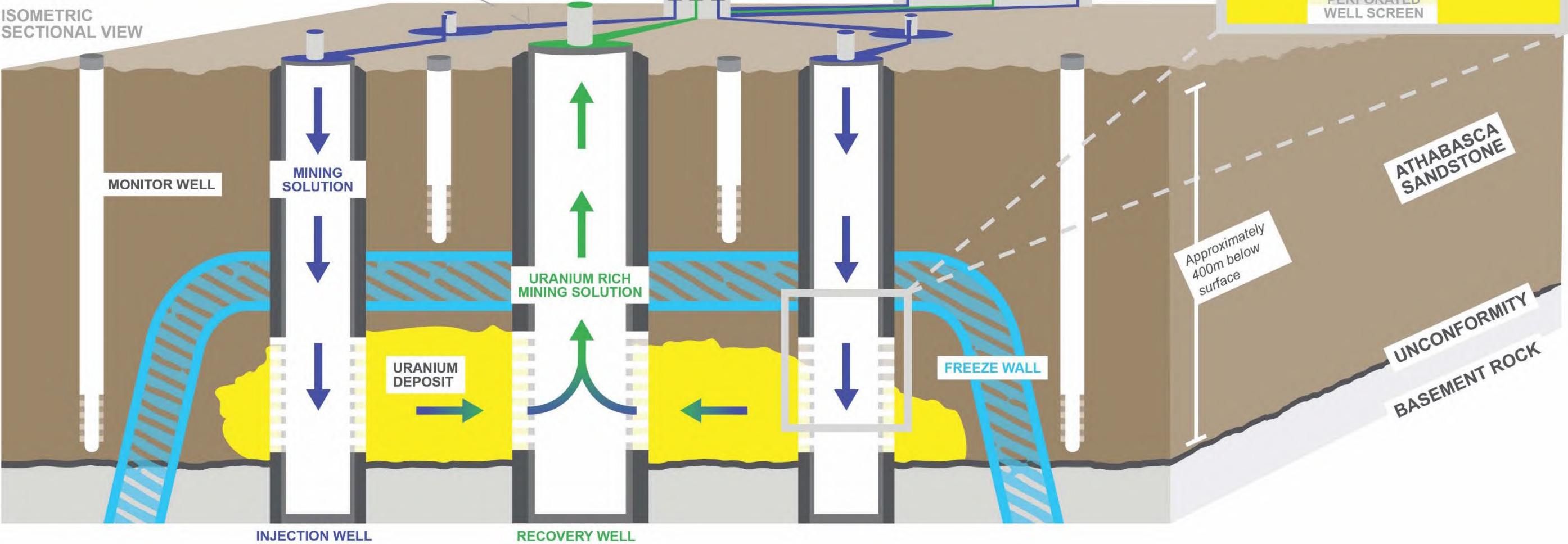
URANIUM PROCESSING PLANT

WELL CLOSE-UP

See well installation process

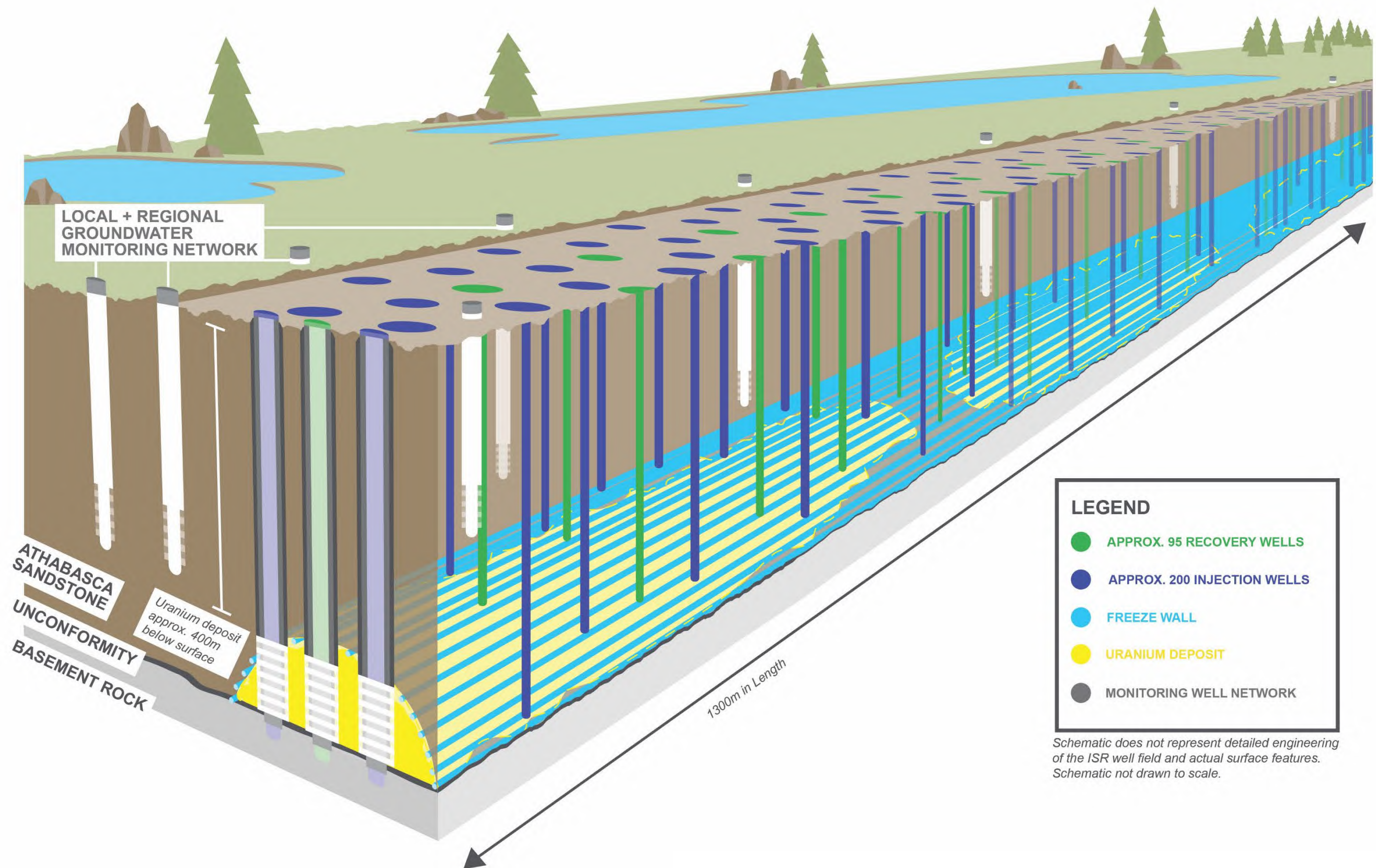


ISOMETRIC SECTIONAL VIEW



Schematic does not represent detailed engineering of the ISR well field and its components. Schematic not drawn to scale.

Criticism of international ISR operations largely involves the containment of mining solution and the interaction of the mining solution with groundwater. At Wheeler, in order to contain the solution within the uranium deposit and maximize recovery as well as prevent interaction of the mining solution with surrounding groundwater, Denison will create an isolated mining chamber using conventional ground freezing technology. Ground freezing will establish an impermeable barrier above and on all sides of the mining chamber, with the existing impermeable basement rock acting as a bottom barrier. The approximate dimensions of the mining chamber are 100 m wide x 30 m high x 1,300 m long and it will be located approximately 400 m below the surface (Figure B).



Once on surface, the uranium rich mining solution recovered from the wellfield will be pumped to the on-site processing plant. Inside the processing plant a relatively simple precipitation process will be used to separate the uranium from the mining solution. Once the uranium is removed, the mining solution is refortified with reagents and returned to the wellfield for re-injection and further mining. The process is a closed loop system with potentially no need for treated effluent discharge to the environment. The uranium will be dried, packaged and trucked off site, destined for eventual use in a nuclear power plant.

Once sold and refined off-site, the uranium will be used as fuel for nuclear power plants. Denison estimates that the uranium produced from Wheeler can be used to power 1 million modern homes for approximately 160 years with minimal greenhouse gas emissions. This highlights the importance of the Project at a time when reducing global greenhouse gas emissions are of the utmost importance in the battle against climate change.

In addition to ISR mining and uranium processing, the Project will also require construction, operation, and decommissioning of a number of supporting components. This includes a short (7 km) access road from Highway 914 to the site, an accommodation complex, operations centre, airstrip, a 5 km long road from the site to the airstrip, site roads, a lined pad for storage of impurities from the processing plant and mineralized drill cuttings from wellfield development, water treatment ponds, potable, sewage, and waste water treatment plants. Power will be supplied to Wheeler by connecting into the existing provincial power line along Highway 914 with emergency generators available as a back-up power supply.

The main phases of the Project are construction, operation, decommissioning and post-decommissioning. The Project is subject to both a federal and provincial environmental impact assessment and various licences and permits will also be needed. Following receipt of regulatory approvals, construction would last for approximately two years and may start as early as 2022. Production activities commence following commissioning of the facilities and would last up to 20 years with a production rate of up to 12 M lbs U₃O₈ per year. Decommissioning is expected to last for five years. The five main decommissioning activities include: mining chamber remediation, decontamination, asset removal, demolition and disposal, and reclamation. Closure of the entire Project will be completed in accordance with all provincial and federal regulations and guidance documents with the fundamental considerations being to ensure physical and chemical stability of the site in order to protect human health and the environment. A five-year post-decommissioning phase will serve to monitor Wheeler and confirm that it is acceptable for either direct release back to the Crown with no future use restrictions or acceptance into the provincial Institutional Control Program for decommissioned sites.

Existing Environment

The Project is located in the Wheeler River Upland Landscape Area of the Athabasca Plain Ecoregion. Exploration activity has occurred in the area over the past 40 years. There are recreational, industrial and traditional land use leases nearby; however, the nearest permanent residences are about 150 km away. The Slush Lake Reserve registered to the English River First Nation, which has no permanent residents, is located approximately 15 km west of Wheeler.

Denison initiated a comprehensive biophysical environmental data collection program in 2016 to characterize the existing or baseline conditions. A robust dataset of atmospheric, hydrogeological, aquatic, and terrestrial data has been collected for the Wheeler site, local and regional study areas and targeted data collection is ongoing. The biophysical environment data collection program to date has focused on defining existing conditions for: air quality (radon and dust), groundwater quality, groundwater levels, surface water quality, lake levels, lake bathymetry, stream flow, sediment quality, aquatic habitats, benthic invertebrates (communities and chemistry), plankton, fish (communities, spawning habitat, and tissue chemistry), amphibians, birds, small mammals, semi-aquatic furbearers, large mammals, ecosite mapping, vegetation (communities and chemistry), soil quality, and wildlife habitat.

Wheeler is located in the Treaty 10 area and the local and regional area surrounding the proposed Project has been claimed by four distinct Indigenous communities as partially or entirely falling within their traditional territories, where traditional land use activities have been historically or are currently practiced. These groups consist of the English River First Nation and the Kineepik, Sipishik and A La Baie Métis locals of the communities of Pinehouse, Beauval and Ile a la Crosse, respectively. Traditional land use activities practiced within the local and regional area of the Project consist of subsistence hunting and fishing, seasonal harvesting of native plants for food and medicinal purposes. During the open water season the rivers and lakes in the area serve as transportation routes to and from areas for harvest of plants and game as well as preferred campsites and cabins. During the winter months the frozen lakes, river banks and muskegs are used as transportation routes to cabins, trap lines and preferred hunting areas. Heritage resource surveys completed at Wheeler to date identified one artifact and the Project has been redesigned to avoid the location of the artifact find.

Overall, Denison believes the baseline biophysical and human environments in the Project areas have been adequately characterized to support the completion of an environmental impact assessment and support future environmental monitoring programs.

Potential Effects

ISR mining, as proposed for the Project, results in a uranium mining and uranium processing Project with no tailings, a relatively small surface disturbance footprint, minimal volumes of clean waste rock (all in the form of drill cuttings), minimal volumes of waste rock (mineralized drill cuttings from wellfield development), minimal generation of other contaminated wastes, near zero carbon emissions and limited (if any) water treatment and discharge. Wheeler will be designed to contain all hazardous materials and careful consideration will be taken to ensure contaminated areas are kept separate from non-contaminated areas. Through Project design, implementation of best management practices, and application of other mitigation measures, Denison will strive to minimize interactions of the Project with the biophysical and human environments throughout all phases of the Project.

The main potential Project effects on the biophysical environment are expected to be: changes in air quality from various emission sources including the processing plant; changes in air quality if radon and radon progeny degas from the uranium rich mining solution; potential changes in groundwater quality from mining solution excursions or the potential discharge of treated effluent to groundwater; changes in water quality, sediment quality, and possibly other aquatic components from the potential discharge of treated effluent to a surface water body; direct loss of wildlife habitat; and indirect effects on wildlife through sensory disturbance. However, Denison anticipates that none of these potential effects will be significant and overall the Project does not pose any long-term risks to the biophysical environment.

The Project's potential effect on the socio-economic component of the human environment is expected to be positive. Wheeler will employ approximately 300 people during two years of construction and about 100 to 150 people during operations. Business opportunities will be available for supplies and services. Any potential effects on traditional land use activities will be limited to the site and local study areas and these effects will be short term and limited to the construction and operating phase of the Project. After decommissioning is completed, access to the site and the ability to practice traditional activities such as fishing and hunting will be fully restored. No effects on traditional land use are expected to occur in the regional study area. Potential effects on workers from a conventional health and safety standpoint will be similar to other mining and industrial sites and Denison expects these effects can be mitigated through management and development of a strong safety culture. Potential effects on workers from radiological exposures will be minimized through Project design measures and closely monitored and managed through implementation of a Radiation Safety Management Program.

In the EIA, Denison will demonstrate that the Project can be constructed, operated, and decommissioned with no significant adverse effects on the biophysical and human environments. Potential effects of the Project will be rigorously and transparently assessed and presented in the EIA. This includes the completion of a human health and ecological risk assessment to demonstrate

the overall low impacts of the Project. The EIA will also outline details of an effective monitoring program. Monitoring will be required to provide proof that the Project is operating legally and within the bounds of its licence obligations.

Engagement

Denison recognizes the importance of engaging with local and Indigenous communities, residents, businesses, organizations, land users and the various regulatory authorities, collectively referred to as 'Stakeholders.' Since 2016 Denison had been engaging with Stakeholders in an ongoing effort to build positive relationships with all parties. Broadly speaking, Denison has categorized the stakeholders into three categories:

- Indigenous communities
- Regulatory authorities
- The general public

Denison has engaged with Stakeholders to provide Project updates and collect input that has been incorporated into the Project's design. This approach is expected to continue. Further, Indigenous Knowledge has been integrated into the baseline data collection programs to ensure appropriate scientific data is collected in key areas to allow for a robust assessment of potential Project interactions as part of the environmental impact assessment.

Denison and several local Indigenous and non-Indigenous communities have executed mutual Memorandums of Understanding (MOU) regarding the Project. These non-binding MOUs formalize the signing parties' intent to work together in a spirit of mutual respect and cooperation to collectively identify practical means by which to avoid, mitigate, or otherwise address potential impacts of the Project upon the exercise of Indigenous rights, Treaty rights, and interests. In addition, the MOUs outline the signing parties' intent to work together to ensure that benefits will flow from the Wheeler River project, provide a process for continued Project engagement and information-sharing about the project, and establish a relationship to identify business, employment and training opportunities for the parties with respect to the Project.

Denison is proud of the relationships it has established with all Stakeholders, and looks forward to continuing to build upon those relationships through an ongoing engagement program as Wheeler advances.

Sommaire

Projet Wheeler River

Le projet Wheeler River (Wheeler ou, le Projet) comprend une mine d'uranium et une usine de traitement proposées dans le nord de la Saskatchewan, au Canada. Il se situe dans une zone relativement peu perturbée de la forêt boréale, à environ 4km de l'autoroute 914 et à environ 35km au nord-nord-est du site d'exploitation d'uranium de Key Lake.

Wheeler est un projet de coentreprise appartenant à Denison Mines Corp. (Denison) et à JCU (Canada) Exploration Company Ltd. (JCU). Denison détient 90% de Wheeler et en est opérateur, tandis que JCU en détient 10%. Denison est une compagnie d'exploration et de développement d'uranium dont les intérêts sont concentrés dans la région du Bassin Athabasca dans le nord de la Saskatchewan au Canada, avec son bureau primaire à Toronto, Ontario et un bureau technique à Saskatoon, Saskatchewan. Denison a plus de 50 ans d'expérience historique dans l'extraction d'uranium en Saskatchewan, à Elliot Lake en Ontario, et aux États-Unis. Présentement, la compagnie est propriétaire (22.5%) de la coentreprise McClean Lake qui comprend l'usine de traitement d'uranium au nord de la Saskatchewan.

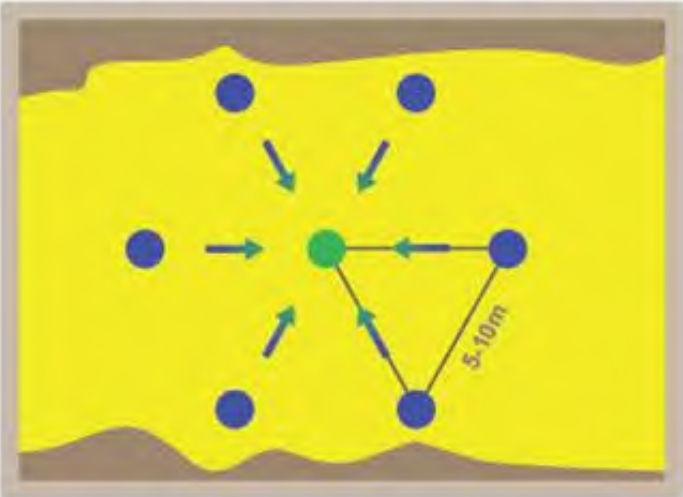
Pour faire avancer le projet, Denison applique une nouvelle méthode à l'extraction de l'uranium au Canada qui appelée récupération in situ (RIS). L'utilisation de l'exploitation minière de RIS à Wheeler signifie qu'il ne sera plus nécessaire de recourir à une grande exploitation à ciel ouvert ou aux infrastructures pour accéder les travaux d'une mine souterraine; il n'aura aucun ouvrier sous terre puisque le processus de RIS est mené à partir d'installations de surface. Bien que cette méthode d'exploitation minière ait été largement utilisée à l'échelle internationale et représente présentement plus de 50% de la production mondiale d'uranium, elle n'était auparavant pas utilisée au Canada pour l'extraction d'uranium. Denison a effectué d'importantes recherches sur les opérations internationales de RIS pour l'uranium afin de bien comprendre les meilleures pratiques et d'intégrer les leçons apprises à la conception de Wheeler. Afin de mettre en œuvre la RIS à Wheeler, Denison utilisera les technologies existantes pour éliminer les défis typiques rencontrés à quelques opérations internationales de RIS d'uranium.

L'exploitation par RIS à Wheeler impliquera l'injection d'une solution d'exploitation minière dans le gisement d'uranium à travers une série de trous de forage tubés (d'un diamètre de 4 à 8 pouces) appelés puits d'injection (Figure B). La solution minière proposée pour Wheeler est une solution à pH bas ou acide. Lorsque la solution minière passe des puits d'injection à travers le gisement d'uranium, elle dissout l'uranium et laisse pratiquement tous les autres minéraux dans la roche hôte.

Une fois dissoute, la solution minière, riche en uranium, est récupérée et remontée à la surface par un autre ensemble de trous de forage tubés appelés puits de récupération. La combinaison des puits d'injection et de récupération s'appelle un champ de captage. Denison prévoit que le champ

de captage aura la configuration générale d'un puits de récupération au centre entouré de 6 à 8 puits d'injection espacés d'environ 10 m. Avec ces options de configuration, le champ de captage final pourra inclure environ 310 puits sur une aire de 90m x 900m.

VUE DU HAUT D'UN SEUL CHAMP DE CAPTAGE



- PUIITS D'INJECTION AVEC SOLUTION D'EXPLOITATION MINIÈRE
- PUIT DE RÉCUPÉRATION AVEC SOLUTION RICHE EN URANIUM

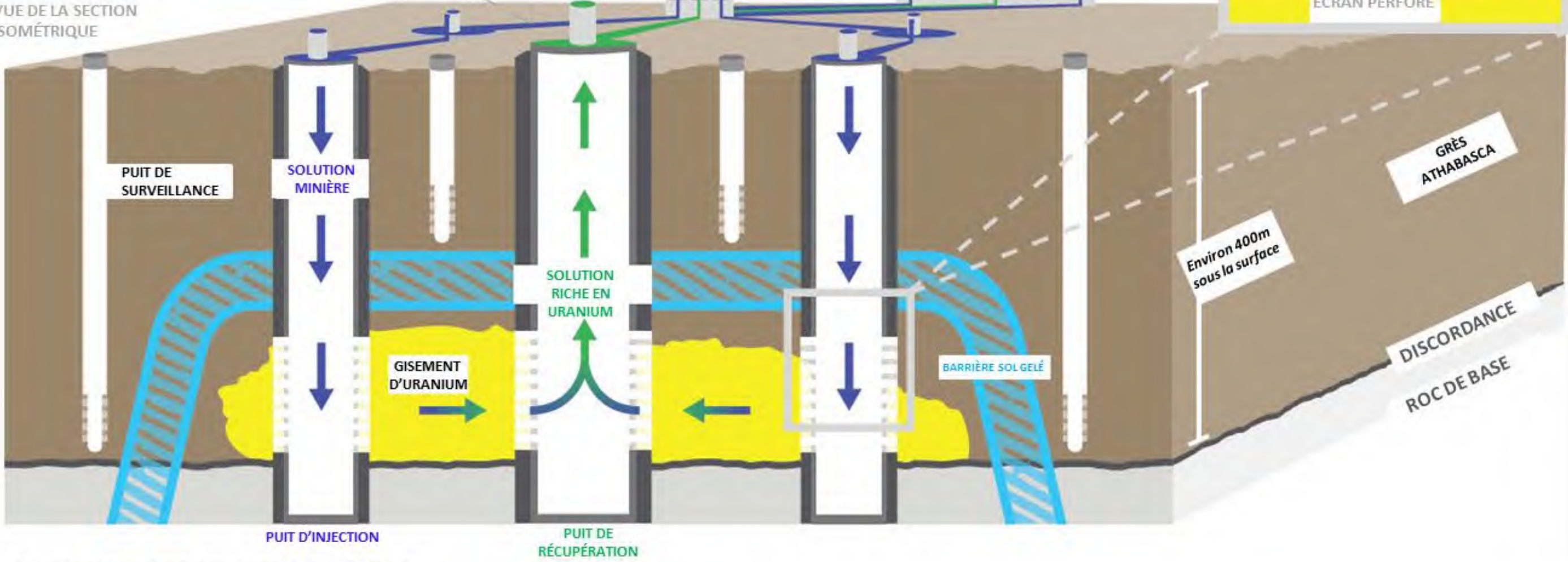
TUYAU AVEC CONFINEMENT
SECONDAIRE



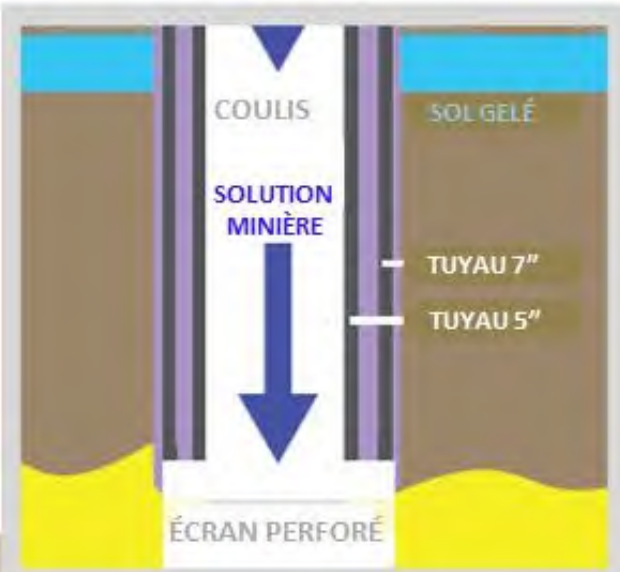
STATION DE POMPAGE

USINE DE TRAITEMENT
D'URANIUM

VUE DE LA SECTION
ISOMÉTRIQUE



VUE PLUS DÉTAILLÉE D'UN PUIT
Voir processus d'installation de puit



Le schéma ne représente pas une ingénierie détaillée du champ de puits RIS et de ses composantes. Schéma pas dessiné à l'échelle.

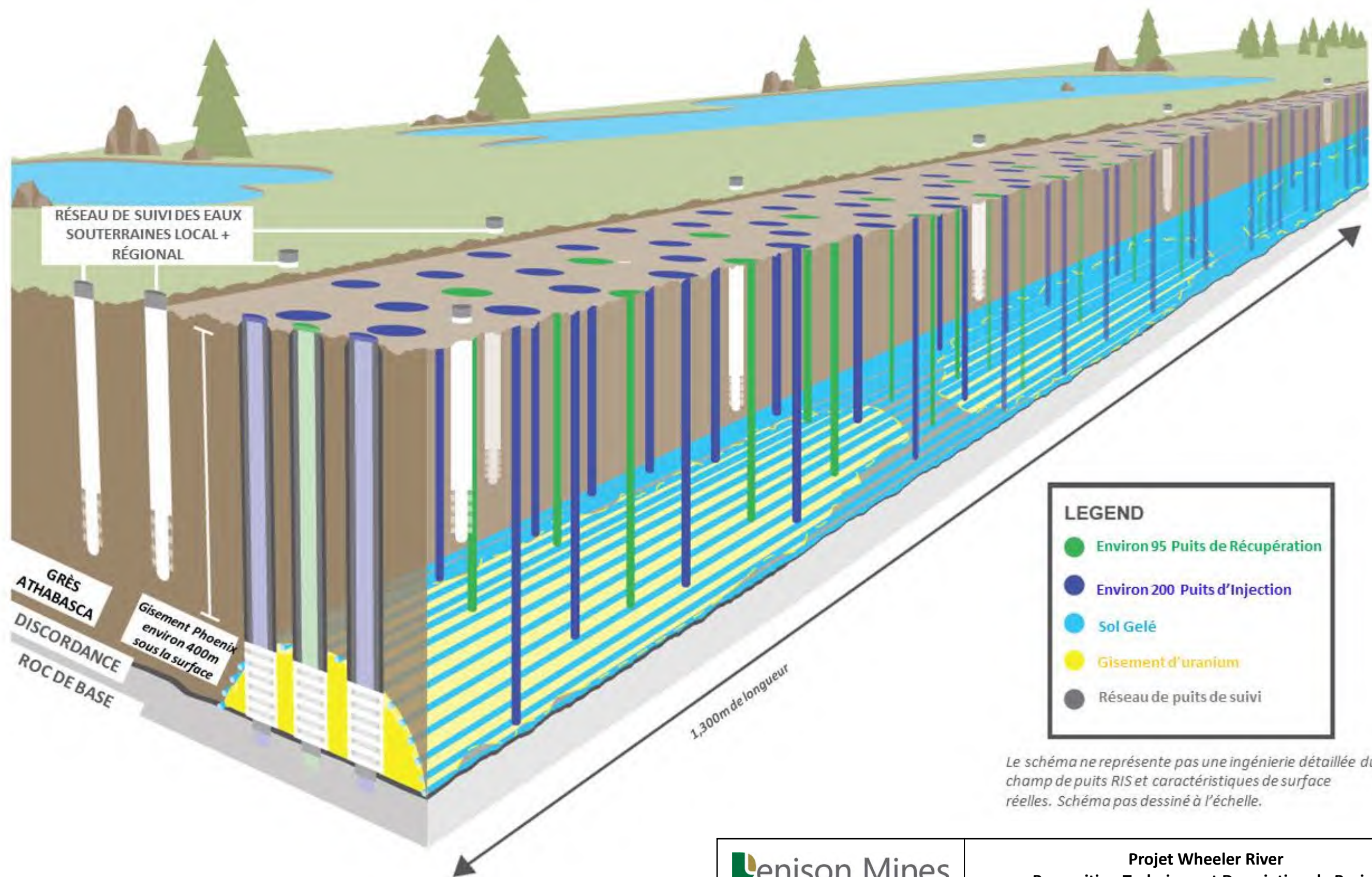
Enison Mines

Projet Wheeler River
Proposition Technique et Description de Projet

Figure A: Aperçu du Processus de Récupération In-Situ (RIS)

Mai 2019

Les critiques des opérations internationales de RIS concernent largement le confinement de la solution minière et l'interaction entre la solution minière avec les eaux souterraines. À Wheeler, afin de contenir la solution dans le gisement d'uranium, et d'optimiser la récupération ainsi que d'empêcher l'interaction de la solution minière avec les eaux souterraines environnantes, Denison créera une chambre d'extraction isolée utilisant la technologie conventionnelle de congélation du sol. La congélation du sol établira une barrière imperméable au-dessus et de tous les côtés de la chambre d'extraction, avec le roc de base servant de barrière inférieure. La chambre d'extraction minière se situera à environ 400 m sous la surface (Figure B) et les dimensions approximatives mesurent 100 m de large x 30 m de haut x 1,300 m de long.



Une fois à la surface, la solution minière riche en uranium récupérée du champ de captage sera pompée vers l'usine de traitement sur site. À l'intérieur de l'usine, un processus de précipitation relativement simple sera utilisé pour séparer l'uranium de la solution minière. Une fois que l'uranium est extrait, la solution minière est reconditionnée avec des réactifs et renvoyée au champ de captage pour être réinjectée et extraite. Le processus suit un système en boucle fermée qui ne nécessite, potentiellement, aucun rejet d'effluent traité dans l'environnement. L'uranium sera séché, emballé et acheminé par camion hors site, destiné à être utilisé dans une centrale nucléaire.

Une fois vendu et raffiné hors site, l'uranium sera utilisé comme combustible pour les centrales nucléaires. Denison estime que l'uranium produit par Wheeler peut servir à alimenter 1 million de foyers modernes pendant environ 160 ans avec des émissions minimales de gaz à effet de serre. Cela souligne l'importance du projet à un moment où la réduction des émissions mondiales de gaz à effet de serre revêt une importance capitale dans la lutte contre le changement climatique.

En plus des activités d'extraction (RIS) et de traitement d'uranium, le projet nécessitera également la construction, l'exploitation, et le déclasséement d'un certain nombre de composantes de support. Cela comprend un court chemin d'accès (7 km) allant de l'autoroute 914 jusqu'au site, un complexe d'hébergement, un centre d'opérations, une piste d'atterrissage, une route de 5 km allant du site à la piste d'atterrissage, des routes de chantier, une plateforme couverte de doublure pour le stockage de résidus de l'usine de traitement et des déblais de forage minéralisés provenant de la mise en valeur des champs de captage, des bassins de traitement d'eau, et des usines de traitement (eau potable et eaux usées). L'électricité sera fournie à Wheeler par une connexion à la ligne électrique provinciale existante le long de l'autoroute 914 avec des génératrices de secours disponibles comme source d'alimentation secondaire.

Les phases principales du projet sont la construction, l'exploitation, le déclasséement, et le post-déclasséement. Le projet est assujéti à une évaluation des impacts sur l'environnement au niveau fédéral ainsi que provincial, et divers permis et licences seront également nécessaires. Après avoir reçu les approbations réglementaires, la construction durerait environ deux ans et pourrait commencer dès 2022. Les activités de production débutent suivant la mise en service des installations et dureraient jusqu'à 20 ans, avec un taux de production pouvant atteindre 12M lb U_3O_8 par an. Le déclasséement devrait durer cinq ans. Les cinq principales activités de déclasséement sont les suivantes : assainissement de la chambre d'extraction, décontamination, élimination des actifs, démolition et élimination, et réhabilitation. La clôture de l'ensemble du projet sera effectuée conformément à tous les règlements et directives provinciaux et fédéraux, les considérations fondamentales étant d'assurer la stabilité physique et chimique du site afin de protéger la santé humaine ainsi que l'environnement. Suivant le déclasséement, une phase de cinq ans servira à surveiller Wheeler et à confirmer qu'il est acceptable de le restituer soit directement à la Couronne sans restrictions d'utilisation futures, ou au programme provincial de contrôle des établissements pour les sites déclassés.

Environnement Existant

Le projet est situé dans la région paysagère des hautes terres de la rivière Wheeler de l'écorégion de la plaine Athabasca. Des activités d'exploration ont eu lieu dans la région au cours des 40 dernières années. Il y a des utilisations récréatives, industrielles et traditionnelles des terres à proximité; cependant, les résidences permanentes les plus proches sont à environ 150 km du site. La réserve de Slush Lake, appartenant aux Premières Nations d'English River, qui n'a pas de résidents permanents, est située à environ 15 km à l'ouest de Wheeler.

Denison a lancé un programme complet de collecte de données biophysiques sur l'environnement en 2016 afin de caractériser les conditions existantes ou de base. Un ensemble de données robustes de données atmosphériques, hydrogéologiques, aquatiques, et terrestre a été collecté pour le site Wheeler; les zones d'étude locales et régionales et une collecte de données plus spécifiques est toujours en cours. À ce jour, le programme de collecte de données sur l'environnement biophysique s'est concentré sur la définition des conditions existantes pour : la qualité de l'air (radon et particules), la qualité des eaux souterraines, le niveau des eaux souterraines, la qualité des eaux de surface, les niveaux des lacs, la bathymétrie des lacs, le débit des cours d'eau, la qualité des sédiments, les habitats aquatiques, les invertébrés benthiques (communautés et chimie), plancton, poissons (communautés, habitat de frai, chimie des tissus), amphibiens, oiseaux, petits mammifères, animaux à fourrure semi-aquatiques, grands mammifères, cartographie d'éco-sites, végétation (communautés et chimie), qualité du sol, et habitat faunique.

Wheeler est situé dans la zone du Traité 10 et quatre communautés d'autochtones distincts ont prétendu que la zone locale et régionale entourant le projet proposé appartenait en tout ou en partie à leurs territoires traditionnels, ou des activités traditionnelles d'utilisation des terres ont anciennement été ou sont présentement pratiquées. Ces groupes comprennent la Première Nation English River et les habitants de Kineepik, Sipishik, et À La Baie Métis des communautés de Pinehouse, Beauval, et Île à la Crosse respectivement. Les activités traditionnelles d'utilisation des terres pratiquées dans la zone locale et régionale du projet comprennent la chasse et la pêche de subsistance, et la récolte saisonnière de plantes indigènes à des fins alimentaire et médicinales. Pendant la saison des eaux libres, les rivières et les lacs de la région servent de voies de transport pour la récolte de plantes et de gibier, ainsi que pour les sites de campings et chalets préférés. Pendant les mois d'hiver, les lacs gelés, berges des rivières, et muskegs sont utilisés comme voies de transport vers les cabanes, les lignes de piégeage, et les zones de chasse préférés. Les enquêtes sur les ressources patrimoniales réalisées à Wheeler à ce jour ont permis d'identifier un artefact et le projet a été repensé afin d'éviter l'emplacement de la découverte de l'artefact.

En tout, Denison estime que les facteurs biophysiques et humains de l'environnement dans la zone du projet ont été correctement caractérisés pour appuyer la réalisation d'une évaluation de l'impact sur l'environnement ainsi que les programmes de suivi environnemental à venir.

Effets Potentiels

L'exploitation minière RIS, telle que proposée pour le projet, aboutit à un projet d'extraction et de traitement d'uranium sans résidus, avec une empreinte de perturbation de surface relativement petite, des volumes minimaux de stériles propres (tous sous la forme de déblais de forage), des volumes minimaux de stériles (déblais de forage minéralisés provenant du développement du champ de captage), volumes minimaux d'autres déchets contaminés, près de zéro émissions de gaz à effet de serre, et un traitement et rejet minimal d'eau (le cas échéant). Wheeler sera conçu pour contenir toutes les matières dangereuses et un soin particulier sera pris pour s'assurer que les zones contaminées sont séparées des zones non contaminées. Par la conception du projet, la mise en œuvre des meilleures pratiques de gestion et l'application d'autres mesures d'atténuation, Denison s'efforcera de minimiser les interactions du projet avec les environnements biophysiques et humains au cours de toutes les phases du projet.

Les principaux effets potentiels du projet sur l'environnement biophysique devraient être les suivants : modifications de la qualité de l'air provenant de diverses sources d'émission, y compris l'usine de traitement; des changements dans la qualité de l'air si le radon et les descendants du radon proviennent de la solution minière riche en uranium; les changements potentiels dans la qualité des eaux souterraines résultants d'excursions de solutions minières ou le rejet potentiel d'effluent traités dans les eaux souterraines; les changements dans la qualité de l'eau, la qualité des sédiments et éventuellement d'autres composantes aquatiques dus au rejet potentiel d'effluents traités dans un plan d'eau de surface; perte directe d'habitat faunique; et, effets indirects sur la faune par des perturbations sensorielles. Cependant, Denison prévoit qu'aucun de ces effets potentiels seront significatifs et que en tout, le projet ne pose aucun risque à long terme pour l'environnement biophysique.

L'effet potentiel du projet sur la composante socio-économique de l'environnement humain est prévu d'être positif. Wheeler emploiera environ 300 personnes pendant deux ans de construction et entre 100-150 personnes durant les opérations. Des opportunités seront disponibles pour les fournisseurs de services et de matériaux. Tous les effets potentiels sur les activités d'utilisation traditionnelle des terres seront limités au site et aux zones d'étude locales. Ils seront de courte durée et limités à la phase de construction et d'exploitation du projet. Une fois que le déclassement est terminé, l'accès au site et la possibilité de pratiquer des activités traditionnelles telles que la pêche et la chasse seront entièrement rétablis. Aucun effet sur l'utilisation traditionnelle des terres ne devrait se produire dans la zone d'étude régionale. Les effets potentiels sur les travailleurs du point de vue santé et sécurité seront similaires à ceux d'autres sites miniers et industriels, et Denison s'attend à ce que ces effets puissent être atténués grâce à la gestion et au développement d'une forte culture de sécurité. Les effets potentiels des expositions radiologiques sur les travailleurs seront minimisés grâce aux mesures de conception du projet, suivis de près et gérés par la mise en œuvre d'un Programme de Gestion de la Protection contre la Radiation.

Dans le cadre de l'évaluation des impacts environnementaux (EIE), Denison démontrera que le projet peut être construit, exploiter, et déclasser sans aucun effet négatif important sur les environnements biophysique et humain. Les effets potentiels du projet seront évalués et présentés de manière rigoureuse et transparente dans l'EIE. Cela comprend la réalisation d'une Évaluation des Risques pour la Santé Humaine et l'Environnement afin de démontrer les faibles impacts du projet au complet. L'EIE indiquera également les détails d'un programme de suivi efficace. La surveillance sera nécessaire pour fournir la preuve que le projet fonctionne légalement et dans les limites de ses obligations en matière de licence.

Engagement

Denison reconnaît l'importance de s'impliquer avec les communautés locales et autochtones, les résidents, les entreprises, les organisations, les utilisateurs des terres, et les diverses autorités de réglementation, ci-après dénommés « Parties Prenantes ». Depuis 2016, Denison engageait les parties prenantes dans leur effort continu d'établir des relations positives avec toutes les parties. De manière générale, Denison a classé les parties prenantes en trois catégories :

- Communautés autochtones
- Autorités réglementaires
- Public général

Denison s'est engagé auprès des parties prenantes pour fournir des mises à jour du projet et collecter des informations qui ont été intégrés à la conception du projet. Cette approche est prévue de se poursuivre. De plus, le savoir autochtone a été intégré dans les programmes de collecte de données de base afin de garantir la collecte de données scientifiques appropriées dans des domaines clés, afin de permettre une évaluation robuste des interactions potentielles du projet dans le cadre de l'évaluation de l'impact sur l'environnement. Denison est fière des relations établies avec les communautés et réjouit de pouvoir continuer à améliorer ces relations et ces avantages pour les communautés par moyen du programme en cours de participation des parties prenantes à mesure que Wheeler avance.

Denison et plusieurs communautés locales autochtones et non-autochtone ont conclu des accords de principe ou des protocoles d'entente mutuels. Ces protocoles d'entente non-contraignant formalisent l'intention des signataires de travailler ensemble dans un esprit de respect mutuel et de coopération pour identifier collectivement des moyens pratiques permettant d'éviter, d'atténuer, ou adresser des impacts potentiels du projet sur l'exercice des droits autochtones, droits issus de traités, et domaines d'intérêt mutuels. De plus, les accords de principe et protocoles d'entente décrivent l'intention des signataires de travailler ensemble pour assurer que les avantages découleront du projet Wheeler River, fourniront un processus permettant de poursuivre l'engagement du projet et le partage d'informations sur celui-ci, et établiront une relation en vue de définir des opportunités d'affaires d'emploi et de formation pour les parties liées au projet.

Denison est fier de la relation établie avec toutes les parties prenantes, et se réjouit de continuer à développer ces relations par moyen d'un programme d'engagement en cours à mesure que le projet Wheeler avance.

Yati nedué holj

Wheeler desé t'a Lak'e ho'é ghoñj

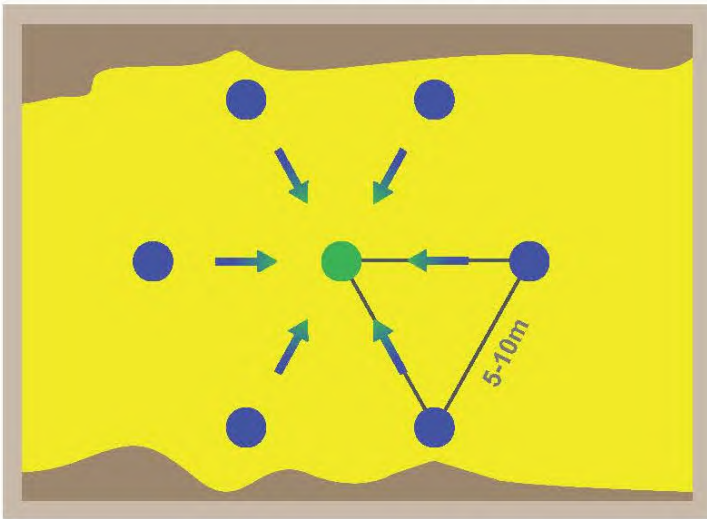
Ku jeja Wheeler des nare tsamba k'e gha yati k'i (Wheeler huto Lak'e k'esi hudzi si) yunadhe tsamba k'e chu t'a begodher betué hujj k'onj ha yati ho'é si jediri Saskatchewan, Canada hots'j yutthj ts'en. Ja t'ok'é ho'é hadé dechën yaghé 4 km hulta tulu 914 ga chu nasí ts'en 35 km Key Lake tsamba k'e uranium operation hots'j.

Wheeler tsamba k'é k'i Denison Mines Corp. hots'j tsamba k'é hoza zefts'enj k'é si. (Denison) chu JCU (Canada) tthe kadanetá dene Exploration Company Ltd hulyé k'i. (JCU). Ja Denison k'i 90% bets'j hultá si jediri Wheeler lak'e hadé bets'en jasí het'el si, ku JCU 10% bets'j si. Denison wídjna kqñ tthe kanetá dene si uranium exploration chu tsamba k'e nupa ha jedisi yutthën nene Athabasca Basin k'eyaghe nadanetá Saskatchewan, Canada yutthën hots'en Toronto ts'en bets'j perihl'is ku nedhe hoza, Ontario ts'en hu Saskatoon, Saskatchewan tth'í wílaghe bets'j perihl'is ku hozasí. Ku yunj jediri Denison k'i 50 nene hudher k'adané wídjna kqñ tthe kadanjta si jeja Saskatchewan chu Elliot Lake, Ontario ts'en, United States Beschogh nene tth'í nare. Ku dühj dzjne k'e (22.5%) hulta McClean Lake Joint Venture hel hozasí tsamba k'e hujj chu t'ok'e tthenadzis ku McClean Lake hozasí yutthën Saskatchewan be hekoth sí.

Ku jediri tsamba k'e nup'a ha nainá hadé, Denison jediri yati thetsj si horegodhe wídjna kqñé hichú ha Canada nask'athé ha jediri t'atthé ho'é ha tthot'jne ja in situ recovery hulyé nyaghe ts'jdhulé ja hadzi ha (ISR) hulyé si. Ku jediri ISR beghaladá k'i Wheeler tsamba k'e bek'enats'edé hadé noka nj ghalada hailé ha jeyi chu nyaghe ts'en tth'í beghalada hailé há; dene tth'í nyaghe ts'en la k'é nadé hailé ha jediri ISR jasí ahot'j dé noka hut'a jasí á hut'a ha. Ku jediri jasí t'oreja k'i njbane dene jaj yet'arat'j si dühj k'asjñe 50% haneft'é wídjna kqñ tthe nałsı si dühj, k'anj hujj t'atthé bet'oreja ha Canada nask'athé hadé. Denison hotié jediri basé nadanetá si t'at'u jediri jasie bet'oreja ISR bebası tsamba k'e nup'a jeja Wheeler tsamba k'e nup'a ha. Ku jediri ISR Wheeler lak'e nup'a hadé, Denison hotié jediri k'esi jasí k'enats'edı t'at'ú yet'odoreja si k'esi yek'enadé ha t'ok'e ISR tsamba k'e daholá si bası.

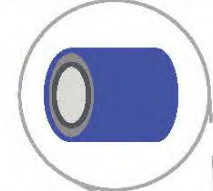
Ku jediri ISR t'a tthe ghaladá k'i Wheeler tsamba k'e k'i dot'ú hasj naidisłnj nyaghe ts'en hedzelı ha ts'jdhulé yé t'ok'é wídjna kqñ tthe hujj ts'en (ku jeyi ts'jdhulé nyajja k'i 4 hots'j 8 lacheth hots'en harelaya ha) ku jeyi beyedziłr injection wells hulyé (A hultá k'é). Ku jeja tthe ghalada ha k'i beye k'estes tué pH natserhilé t'oreja ha jediri k'estes tué bet'a tthe nałx há. Ku t'ohó jediri k'estes tué tthe njı hajá dé wídjna kqñ tthe nałx há jeyer t'aghé dé zedıdné ts'jdhulé yé yudaghé ts'en hedzeł há. Ku jeyi nats'en nj ghaladá k'i nyaghe ts'en ts'jdhulé well fields hulyé si. Denison hadanjdhën hı jediri ts'jdhul hujj k'é benaré 6-8 hutó nyaghe ts'en k'etes tué hedzelı k'é injection wells hujj begá k'asjñe 10 m begesé hoza há t'ok'é ts'jdhulé naré. Ku jeyi kot'ú hoza dé horelyj nj k'é, k'asjñe 310 nyaghe ts'en ts'jdhulé hujj ha 90 m x 900 m haghelya nj k'é.

Yudaghé hots'ı t'ok'é ts'ıdhulé nıyırá t'ahot'ı



- T'ok'é nıyaghé ts'ın naidıslıne beyet'ır
- Nıyaghé hots'ı t'ok'e ııdına kın tthé tué nats-er hadzıl ts'ıdhul chogh yé

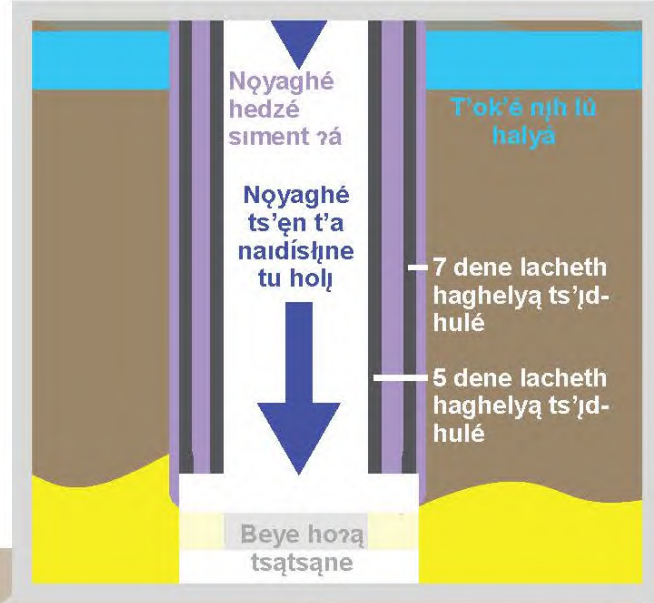
Ts'ıdhulé beye nah hultá ıasie hel



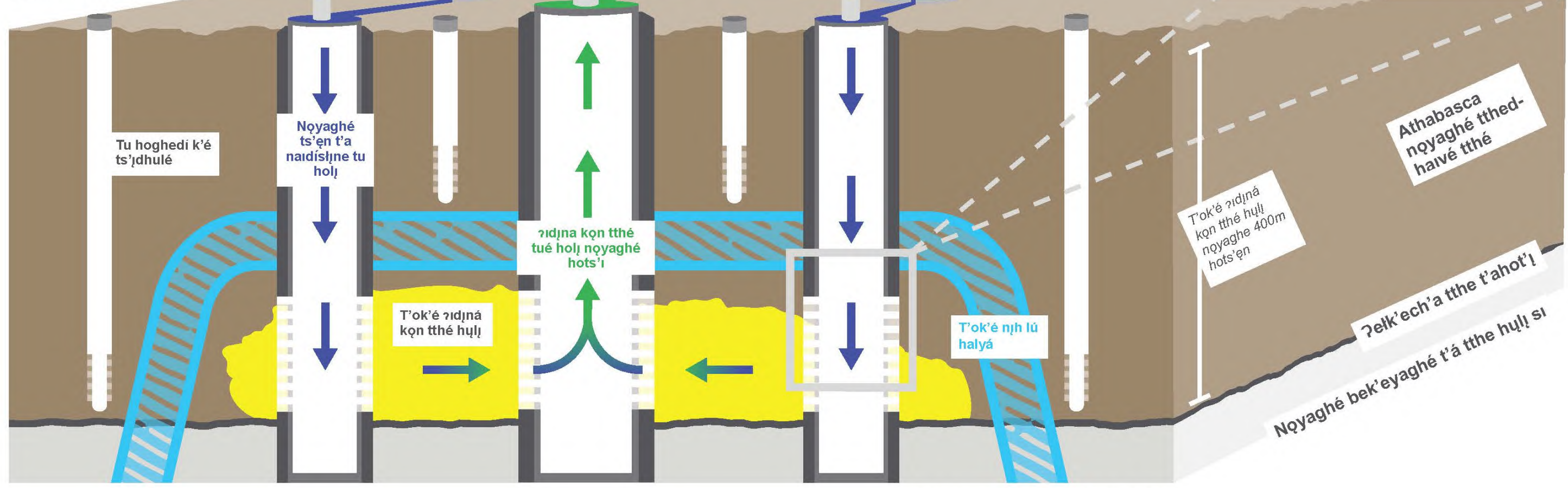
Tu hedzel kué

ııdına kın tthé t'ok'é nadaret'ır

Nıyaghé ts'ıdhulé t'ahot'ı bets'ıdhulé



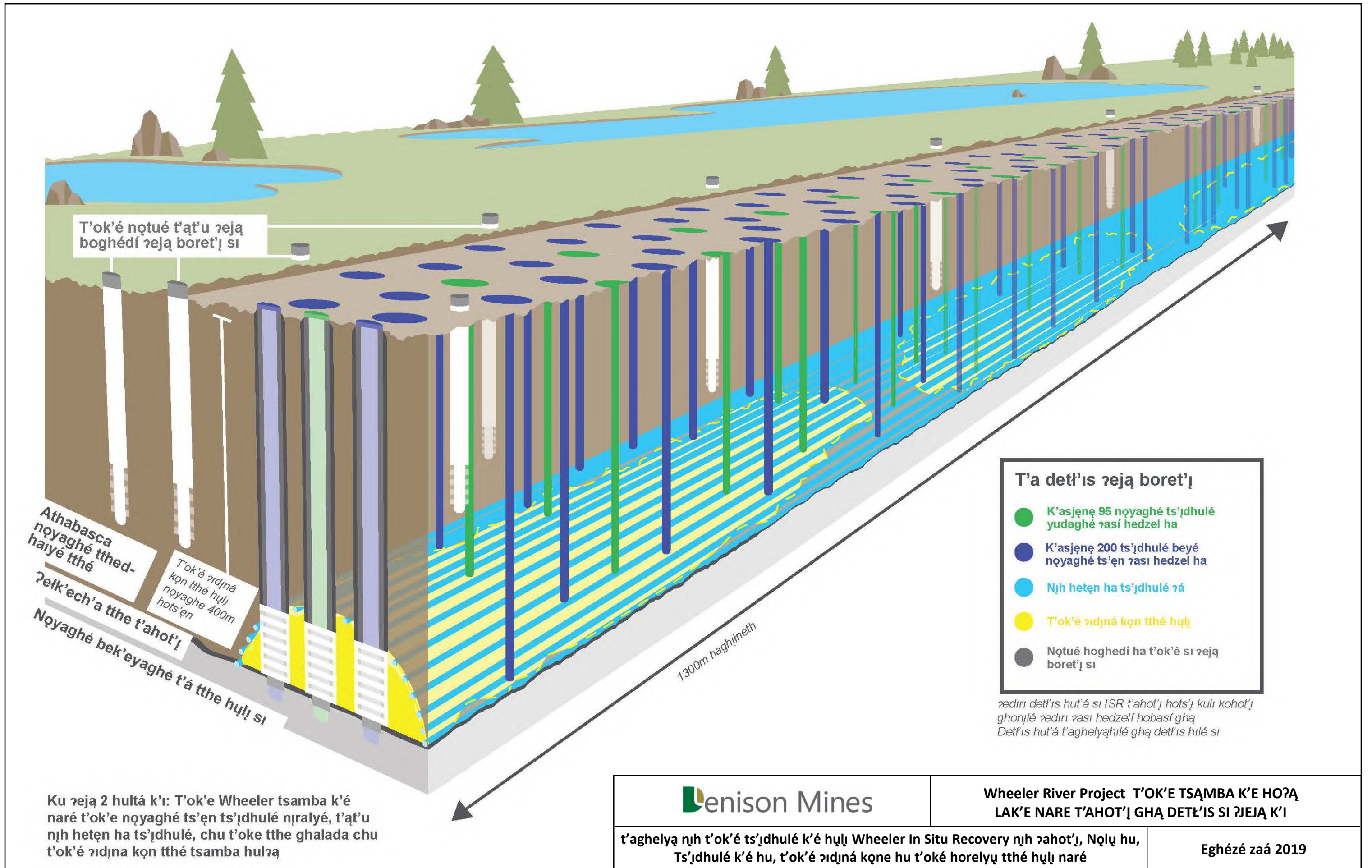
Benare hots'ı t'ahot'ı



1 hulta: nıyaghé t'at'u hedzel t'ahot'ı

ıedırı det'ı sı hut'a sı ISR t'ahot'ı hots'ı kılı kohot'ı ghonıle ıedırı ıası hedzelı hobası gha
Hobenaré begha det'ı sı hut'a koghelyá hıle sı

Njh bñj t'at'é ʔa nñj ʔediri ISR tthé hılchú daızı dayattı hadé t'ok'é beghaladá k'ı t'á tu bet'orıdher t'ok'e bek'onı chú ʔeyı t'u k'ı t'ok'é nqtué hẹjı sı tthı heř ʔeltat'ır ghonı bası. ʔeyı ʔa ʔejä Wheeler tsamba k'é hołé k'ı t'á tu hujı sı hotié boghédı hası, kur t'a nqyaghé ʔıdıná kqn tué hujı sı hotié horelyu degħaré hadzıř ha hozeldzaı ha nqtué heř hujı ch'á, Denison horelyu nj heten halé há benaré t'at'ú njh heten k'enats'édé k'esı. Ku ʔeyı njh heten dé benqsé ʔası huht'ır ha dué sı t'ok'é ʔası hujı honaré beyaghé tthé hujı tthı bet'oreʔá ha. Ku ʔeyı t'aghelyä k'ı 100 m harıřkoth chu x 30 m hanareřhá x 1,300 m haghıřneth hu 400 m nqyaghé ts'ęn hujı há (B hultá boreř'j k'é).



Ku nqdaghé ts'én hedzel dé, t'a beyé ɔɔɔɔɔ kɔn tué hɔɔɔ sɔ beyé natser sí kú ɔeyer hots'ɔ t'ok'é selyé kué hɔɔɔ sɔ nɔt'ír ha. Ku ɔeyer ɔɔɔ t'á tu chɔ ɔɔɔɔɔ kɔn hɔɔɔ sɔ ɔetɔh'así halyé há ɔasí horɔchahílé sɔ ɔeyí k'í. Ku ɔɔɔɔɔ kɔn hɔɔɔɔ dé, t'á tu bēghódhé sɔ beyé naɔɔɔɔɔɔ hanalyé hú nɔyaghé ts'én hedzel ha bet'oreɔá nadɔɔ há. Ku ɔeyí k'esí bet'oreɔá ɔá nqdaghé ts'én tu ch'ele nɔɔɔí haíle ha hoket'á bet'oreɔá há. Ku t'á ɔɔɔɔ kón bet's'ɔ hɔɔɔ ha.

ɔa ɔɔɔɔ ɔɔɔɔɔ kɔn tthé naní t'ághé dé, t'á ɔɔɔɔ kɔn tthé hɔɔ sɔ nɔh bɔnɔ ɔɔɔɔ kɔn t'ulé ye kɔn heɔtsí ha bet'oreɔá hasɔ yunadhé dé. Denison hots'ɔ dene hadanɔdhen hu t'á ɔɔɔɔ kɔn tthé hɔɔ sɔ k'asɔenɔ 1 ɔimillion dene kué ye kɔn heɔtsí há yunadhé 160 nɔnɔ hots'én bet's'ɔ horetth'agh tth'í ɔhɔlé heɔ. ɔeyí ɔa t'at'é ɔa bet'oreɔá ha korɔjala dɔhɔ bet'á horetth'agh boreɔnɔ ɔa hɔlé ha ɔa yunadhé dé nɔh k'é honɔɔhɔ ch'á.

Ku ɔedɔɔ ISR tthé k'enats'éde hel t'at'ú beghaladá chu hoɔé basí hadé, ɔedɔɔ tsamba k'é hoɔé chu beghaladá hu t'ohó belághé nɔnɔdher dé nɔh senalyé tth'í hoɔɔlá yunadhé dé. T'a ɔasí hadé tulú nedué (7 km) hoɔé t'ok'é 914 tulú hulta hots'ɔ t'ok'é tsamba k'e ts'én, dene naradé ha yoh hoɔé hu t'ok'é ɔasí het'el hots'ɔ hu, dziret'ái k'é hu, tulú 5 km lak'e hots'ɔ dziret'ái k'é ts'én, tsamba k'e naré tulú hú, tu k'é hoɔé ɔejedheth bebɔné hu t'ok'é tu ch'ele bek'oní chu tthe heldeth bezasé k'onɔ t'oho ttheheldeth hots'ɔ, tu soreldhen k'e hu, tu ts'edɔ k'é hu, tu ch'ele k'onɔ k'é hu, tu soreldhen kué hu. Ku dɔhɔ ɔɔɔɔ kɔn t'ulé hɔɔɔ 914 hulta ts'ɔdhɔlé ku t'axɔa netthath dé tsɔtsɔne het'el ha hɔɔ kɔn heɔtsí ha.

Ku ɔejɔ lak'e bonɔdher dé ɔetk'ɔnɔ donódhí ha, lak'e honaré ɔasí hoɔé tthé hu, la k'e beghalada, belághé nɔnɔdher dé ɔasí nanelyé ha, ku ɔeyí nodher dé nɔh sehenɔt'á ha. Ku nɔhts'én k'oldé nahts'én hots'ɔ bet'esí ɔasí boghedí hoɔɔ province chu Canada hots'ɔ k'oldé nɔh t'at'ú bet'ahot'ɔ ha bel sehúlyé hoɔɔ hotthé ɔasí bonɔdhí ts'én tth'ú. ɔa horelyɔ ɔasí senɔnɔdher dé, tsamba k'e naré ɔasí hoɔé naké nɔnɔ hots'én 2022 nɔnɔ honɔdhér k'é. Ku t'oho la honɔdher t'ághé dé tthé tsamba 20 nɔnɔ hots'én hoɔɔ ha ɔɔɔ nɔnɔn k'e 12 M ɔimillion haɔɔdath U₃O₈ ɔɔɔɔ kɔn tthé ɔes delthhogh hoɔé ha. Ku belághé t'ághé dé ɔɔɔɔ nɔnɔ ts'én nɔh sehenɔt'á ha. Ku ɔeyer nɔnɔdher dé ɔedɔɔ ɔɔɔɔghé ɔasíe tthere bek'enats'éde ha: t'ok'é tthé tsamba hɔɔɔ sɔ nɔyaghé senahúlyé ha, ɔasí borneɔnɔ dɔɔyé hu, la yué tth'í dɔɔyé ha hú, ɔasí nanélyé chu senɔɔyé, ɔeyí chu nɔh sehenɔt'á ha. Ku ɔeyer nɔnɔdhé dé t'at'ú nɔh sehenɔt'á hoɔɔ k'í hotié degharé t'a ɔasí hoghedí k'e hoɔɔ province chu Federal nɔhts'én k'oldé bet'esí yunadhé dene ɔeyer honaré hoɔɔ ɔesorané ch'á nɔh tth'í hotié besúdí hoɔɔ ɔa. Ku ɔeyí nodher t'ághé de ɔɔɔɔ nɔnɔ hots'én nɔh boghedí ha Wheeler des honare t'ok'é la k'é ghɔlé naré t'at'ú ɔasí senalyá walí sɔ ha net'ɔ ha ku nezɔ dé nɔhts'én k'oldé bet's'én benaredí ha yunadhé bek'e yatí theɔɔlé dé nɔh benaredí ha kɔt'ú boghedí ha province hots'ɔ k'oldé bet's'én.

Ku dūhū nih k'é t'áhúŶ

Ku Ŷediri tsamba k'e nūťá Wheeler des nare yudaghe ts'ēn nih k'e Ŷasi k'enats'edé ha Athabasca Plain Ecoregion t'āt'ú nih hudzí honaré. Hotthe yuné 40 nēnē Ŷazí tthe kadanáhotŶ sī Ŷeyer honaré. Ŷeyer honaré kōn k'é chu jeth kuē dahóla sī Ŷeyi chu tsamba k'é tth'I dahóla sī bets'Ŷdhilé ts'ēn chu nānī dene nih k'é nakoreldé sī ku dene naradé hadé ŶejŶ hots'Ŷ 150 km hanŶthá naradé sī. Ku Ŷediri Slush Lake Reserve BeghāŶch'ere bets'Ŷ nih hudzai hūŶŶ English River First Nation hulyé k'í bek'é dene narade hilé 15 km theŶŶ Wheeler ts'Ŷdhilé.

Denison yunī 2016 nēnē k'é hotié degharé nih k'e t'a Ŷasi hūŶŶ sī nadanetá ha yek'Ŷdēt nih horelyū hāt'ere nadanetá ha dūhū t'a yatí hūŶŶ sī ŶēŶa nŶŶŶ ha. Degharé hok'enats'Ŷdé sī nŶts'í hu, tu ye hu, té. Hu chu nōk'é t'a Ŷasi hūŶŶ horelyū ŶejŶ Wheeler honaré bek'enats'Ŷdé sī, ku Ŷeyer honaré chu bets'Ŷdhilé hel halyá sī dūhū ts'ēn bek'enats'edé. Ku horelyū nih hu yedá hu te. Yaghé ts'ēn hu horelyū ha net'Ŷ hoŶŶ: nŶts'í beyé (radon naidisŶne chu ts'er), nōtué beyé t'ahūťé hu, nōtué narŶthá nelŶŶ hū, nōdaghé t'a tu hūŶŶ sī t'āt'é hu, tu dathela t'a hūŶŶ sī tarŶthá hu, tu tarŶthá sī basí hu, t'a ts'ēn tu daŶŶ, tet'aghé t'a Ŷasi hūŶŶ sī net'Ŷ hu, te t'a Ŷasi daghená, te tarŶthá ts'ēn t'a Ŷasi daghēna (t'aneťé chu t'āt'é hūŶŶ sī), te hots'Ŷ gu chu Ŷué (t'a Ŷué hūŶŶ hu t'ok'é hedel chu betthēn t'āt'é), ts'aílí chu gu hu, ŶŶyesé, tech'adiēŶasé, nōk'é tsadheth t'a ŶēŶ'ech'a hūŶŶ, tech'adié nedhe, nih k'e t'ahuŶŶ beghŶ t'a yatí hūŶŶ t'āchā ŶēŶ'ech'a (t'ok'é hūŶŶ chu t'aneťé hūŶŶ sī), nŶh t'āt'é hu tech'adié t'a hūŶŶ sī t'ok'é naradé.

Wheeler tsamba k'e t'a nŶh k'é hūŶŶ sī Treaty sōlaghe tsamba nalyá 10 hulta k'eyaghé sī ku t'a dene yets'Ŷdhilé naradé sī dŶghí ŶēŶ'ech'a dene xaiyorŶla hots'Ŷ sī t'a nŶh Ŷeyer honaré nih t'odoreŶŶ sī, yunīsī chu dūhū ŶēŶ'esī yek'e naradaí sī. Ku Ŷediri nānī dene k'í BeghāŶch'ere hot'Ŷne English River First Nation chu Ŷena hots'Ŷ denē Kineepik, Sipishik chu begharék'Ŷ dene A La Baie dene chu Pinehouse hots'Ŷ Ŷena chu Beauval chu kuē Ile a la Crosse, hel sí. Ku t'Ŷ dene Ŷeyer honaré t'a nŶh t'odoreŶŶ sī horelyū ŶēŶ'ech'a Ŷasié ha naralyé chu Ŷue kadanŶdhen hu jíé chu nōts'Ŷ naidié horelyū t'a hūŶŶ sī kodoreŶŶ sī nŶh dānéť'ú. SŶne dé t'a des hu tú hūŶŶ sī dene ts'Ŷyé yek'e dzirédit sī Ŷasi kodoreŶŶ ha naidié chu tech'adié chu doreŶ'Ŷ huto nōŶŶsé bekoē dahóla naradé nŶ dāť'ú. Ku xaiyé nŶŶŶdher dé t'a des hu tu daítŶ sī, dene yek'e dziredit nadŶŶ sī nakoreldé ha, nōnīsī bekoē dahóla ts'ēn chu ŶŶdzúsé datheťá chu naralzé há t'ok'é horelyū ts'ēn. Ku yunīsī denenŶzasé t'a ŶŶŶghé hulŶásí Wheeler nare t'ok'é húlŶŶ sī ts'Ŷdhilé Ŷasi hoťé hailé bet'á hulŶá ch'á.

Ŷa horelyū Ŷasi net'Ŷ, Denison hots'Ŷ dene hadāŶdhen hu t'a yatí holŶ sī k'eneťé sī dūhū bet'a nŶh Ŷahót'Ŷ ha Ŷerihť'is nedhe hoťé t'āt'ú nŶh t'oredhí ha ŶejŶ tsamba k'e hoťé honaré hotie t'āt'ú holé ha k'eneťé yatí holŶ sī la ts'iranŶ ha.

Ku nŶh k'é ŶedŶahúné ghonŶ há

ISR gharé nōyaghé ts'Ŷdhúlé t'oreŶá k'í Ŷediri tsamba k'e hoťé k'í bet'á tthé tsamba hŶchú chu ŶŶŶná kōn Ŷes delthhogh hoťé tthēnadzīs kuē hedŶ, nŶh tth'í necha Ŷahot'Ŷ hailé tthé tth'í ŶŶ hūŶŶ hailé (t'a hūŶŶ sī tthenaldeth zasé hut'á hasŶ), tthé tth'í ŶŶ nŶŶé hailé (t'ok'é nōyaghé ts'Ŷdhúlé nŶŶé sī bezasé

hut'a hųlų hası), ku horelyų t'á Țası boreŋų ha lȚ hailé ha (ku hųlų dé) tu soreldhęn chu t'a nıdıt hut'á. Wheeler la k'é t'a hoŋé hadé horelyų t'a Țası boreŋų sı hotié bek'ónų ha nųtyé ha Țeyer honaré t'a nųh bet'ahót'Ųlę ts'Țdhılé Țası nųlyé ch'á. T'Țt'ú tsamba k'e hoŋé hadé, hotié Țası hoghédı Țası k'enadé sughuá tth'ı Țası hoŋé hu, Denison degharé nųh ghadalaná ha Țası nodhı ch'á bek'e horelyų sughuá halyé dé dué hané hailé yunadhé de, Denison hotié nųh hoghéŋų ha dene yets'Țdhılé tth'ı hoȚųh hailé la bonȚdher tŲȚaghé dé.

Ku t'a Țasıe boghedı hadé Țedıřı tsamba k'é Ța nųh hobası t'a Țası Țedų hané Țedıřı net'Ų hoȚȚ: nųts'ı t'a Țeyer naré hųlų sı yası Țedų hané ghónų t'ok'é nȚyaghé hots'Ų tu hut'ır bet'á; bet'á Țedų hané ghonų beye naidıŋné radon chu naidıŋné radon progeny degas hulyé beyé hųlų de t'a nȚyaghé ȚıdȚná kȚn tthé tué natser dé; nȚtué t'a hųlų sı Țeyer honaré Țedų hané ghonų t'a nȚyaghé tu yudá t'axȚ tu soreldhen kuȚ tu hut'ır nųt'ır de Țeyer gá; t'ok'é tech'adıé daghéna dȚȚas ghonų tsamba k'e nųt'Ț Țá; Țeyı chu tech'adıé Țeyer naré naradé ȚejȚ Țası k'enats'edé Ța dȚȚas ghonų. Kulı, Denison hots'Ų dene hadanȚdhen hu Țedıřı Țasıe behayaȚı bet'a doȚȚnzı Țedų hailé t'ok'é nųh Țahot'Ų ha.

Ku Țedıřı la k'e hoŋé hobası dene ha la hoŋé chu Țası k'enats'edé hadé nezų ha bet'oreȚá ha. Wheeler lak'e k'asȚęnȚ 300 dene lak'e nadáreŲȚá t'oho hoŋé de nak'e nęnȚ huk'é ku Țeyı belȚaghé nųȚȚdher dé k'asȚęnȚ 100-150 hots'ęn dene ȚejȚ Țeghadalaná ha. Ku nȚȚ dene Țedıřı lak'e naré Țeghadalana hodorelȚųh dé dene ha hoȚȚ ha. Ța Țedıřı la nųt'a k'ı bet'a dene tȚ yet'oreŲá ha tsamba chogh hoŋé ha Țá bet'á la chu dene yenaré Țeghadalaná ha yutthęn Saskatchewan hots'Ų dene xa t'Ț dene Țeyer honaré naradé dųhų ba horená hoȚȚ dé. Ku t'Ț dene Țeyer honaré nųh Țarat'Ų sı doȚȚsı horȚchá hailé nųh necha bet'oreȚa hailé Ța tsamba k'é nųt'á ha. Yunadhé t'oho la k'é Țenahút'é tŲȚaghe nųh senųt'Ț dé nųh hotthé bet'ahot'Ų nųh k'esı hoȚȚ nadȚ ha dene yek'e nakoreldé ha. Ku dųhų t'a yatı holȚ k'ı dene t'Ț nųh Țarat'Ų sı ba dué hailé ha. Ku t'Ț dene lak'e nadareŲȚá k'ı hotié boghedı ha t'ok'e Dennison bets'Ų tsamba k'e dene hoghedı k'esı hı ha hotie dene la k'e hoghedı yatı gharé. Ku Țedıřı ȚıdȚná kȚn tthé behodhele dene yets'Țdhılé hoȚųh hoȚȚhılé t'Țt'ú Țası holȚ begharé dene hoghedı ha Țedıřı Radiation Safety Management Program ȚerıhtŲ'is nedhé hogharé t'á boghedı ha tsamba k'e naré dene xa.

Ța Țedıřı nųh ghaladářıhtŲ'is EIA k'e, Denison degharé yatı theŲtsȚ sı t'at'ú sughuá Țası k'enadé Țedıřı lak'e heŲtsı ha k'ı chu yeghalaná hu t'oho belȚaghé dé nųh t'Țt'ú senaıyılé ha bet'a nųh chu dene ha dué hailé. Ku t'a Țası bet'a t'ahuȚȚ hotié Țedıřı nųh bası EIA ȚerıhtŲ'is holȚ sı hotié holȚ dene nalé tth'ı thelá ha. Ku Țeyı t'a yatı holȚ sı dene hel t'ahuȚȚ bası yatı kodorelȚųh sı (HHERA hulyé) bet'á dene ha t'ahuȚȚ ha betth'ı hu beŲ t'anodhı ghonų bası. Ku Țedıřı EIA ȚerıhtŲ'is nedhe k'e t'Țt'ú nųh ghaladá boghedı dȚȚ ghȚ holȚ sı. Ku nųh hoghedı dé t'Țt'ú Țeghalada sı hotié nųh k'é Țası heŲtsı hoȚȚ sı beghare nųt'Ț sı k'esı hoȚȚ tȚ kulı bedȚ ha dué sı, Țeyı ha hotié boghedı sı.

DenedédŲne chu nȚȚı dene Țeyer honaré t'Țt'ú beŲ yatı nųt'a ha

Denison hotie Țedıřı k'olyȚ sı dene t'Ț Țeyer honaré naradé sı beŲ yatı hoketŲȚ ts'ęn, t'Ț Țası k'e naradé hu, dene t'Ț Țası beŲ hoŋé bası chu t'Ț nųh Țarat'Ų sı Țeyer honaré hots'Ų. Yunı 2016 nęnȚ hots'Ų

Denison hots'Ŷ dene Ŷeyer honaré denedédŶne chu honésí dene hel nadayaŶŶí nŶ sughua nŶŶá k'enadé ha. HorelyŶ honet'Ŷ hadé, Denison Ŷediri taghe Ŷasí yatí theŶts'Ŷ sí Ŷeyí basí:

- T'ok'e denedédŶne naradé
- T'at'u k'oldé bet'esí nŶ ts'Ŷn k'oldé
- Honezí Ŷeyer honaré dene naradé

Denison hotié dene heŶ Ŷasí k'enadé sí Ŷeyer honaré nŶ Ŷarat'Ŷ sí basí t'oho La k'e Project basí yatí godhé holŶ dé kudāne dene ts'Ŷn yatí nŶt'a t'ahot'Ŷ basí. Ku Ŷeyí k'esí Ŷasí hoté dé dene beyatíé tth'Ŷ beghorēt'a ha t'a nŶ basí yatí hoté huk'e dé Ŷeyí hogharé yunaghé nŶ k'e t'at'u ŶedŶ ghonŶ kat'u hotié boghedí ha honŶdhēn Ŷá.

Denison chu nŶnŶ haiyórŶla dahóla sí ŶeŶa limarshŶŶasé datheŶtsŶ nŶ Memorandum of Understanding hulyé t'at'ú ŶeŶa sughuá hoŶŶá ha (MOU). Ku Ŷediri yatí nedhe MOU holŶ k'Ŷ dŶhŶ ŶeŶneredí ha holŶ yunadhé bet'a limarshí nedhe hoté ha Ŷeyer dé Denison hots'Ŷ dene hotié dene sughuá senŶŶá k'enadé Ŷejā Wheeler tsamba k'e nŶt'a ts'Ŷn tth'ú. Denison hots'Ŷ dene Ŷeyer honaré dene heŶ k'adāne holā nadaŶŶí sí dŶhŶ hots'Ŷn begharé t'at'ú tsamba k'e hoté dāŶ ha begharé yatí holŶ sí tsamba naŶya yatíé tth'Ŷ narayis hilé hu t'at'u dene heŶ sughua hoŶŶasí sí k'e hoŶŶ ha.. Dene t'ā nŶ Ŷarat'Ŷ behonié gharé Ŷasí holŶ sí nŶ basí ŶerihŶŶis nedhe MOU holŶ nŶ yé bet'orŶdher sí hotié horelyŶ yatí ŶeŶa nŶlyá Ŷa ŶŶŶaghé yatí nedhe holŶ sí dene horelyŶ ŶeŶts'edarŶŶ Ŷá. Denison hots'Ŷ hotié danŶdhēn sí dŶhŶ ts'Ŷn t'at'ú dene heŶ ŶeghadalaŶna ghā sughuá dene heŶ hoŶŶá danŶdhēn sí yunadhe dene heŶ hotié Ŷasíé k'enadé hodorelŶŶ tsamba k'e nŶt'á hots'Ŷn Ŷejā Wheeler tsamba k'e nŶt'a hots'Ŷn.

Denison benŶk'esí chu Ŷediri ghā sughua nŶdhēn sí t'at'ú dene hel Ŷasí k'endaradé yunadhé tsamba k'e nŶt'a ts'Ŷn tth'ú Ŷejā Wheeler naré t'at'ú sughua Ŷasí k'enadé sí k'e hoŶŶ ha yunadhé Ŷediri la k'e nŶt'a ts'Ŷn tth'ú

MAMOY ITWIWIN

WHEELER SEPIY ISICIKIWIN

Ikote ooko kakesi othethihtuhkwaw ewi – paskihtenuhkwaw moonuhisooneyawan ooko moonuhisooneyawewi kimanuhk ohci ooko Denison Mines ka – itihchik. Ikote isi kewetinohk, tepukohp tipuhuskan puskeskunuhk, nisto – mitunuw – neyanunosap kachimasiki tipuhuskanu, puhki kewetinohk isi menu nuwuch poko machi – kesikunohk, Apihtukuhikuni – Sakuhikunihk, (Key Lake) ohchi.

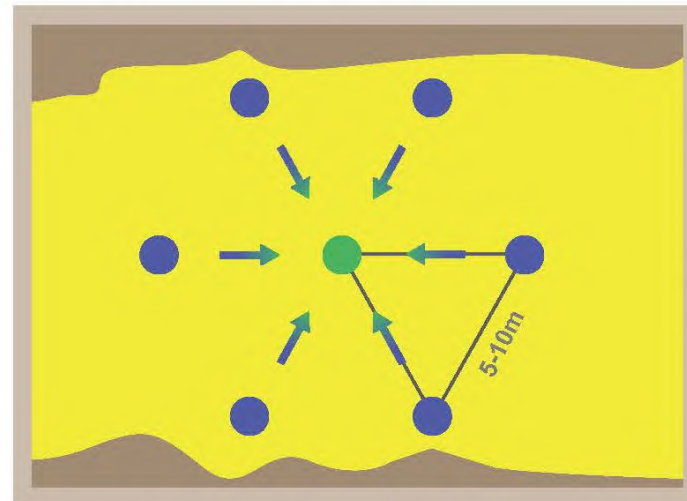
Oma Wheeler Sepiy Sakamocikiwin masiniykan oci Uranium Monahahk soniyowan ikwa kisinihkiw waskiykan oti kewitinok om a tihpahaskan Saskatchewan, Canada. Ita oma kawi isicikik ita eka ipiskicikatik uski, nantow niyo tipahaskan oci kici miskank 914 ikwa nantow nistomintanow-niyanosap cipahskans kewitinohk- macikisikani ita Key Lake mikwa atoskaniwik.

Wheeler oho i wihci cesikimacik ikwa Denison Mines Corp. ikwa JCU(Canada) Exploration Company. Denison mamowe kikac-mitatomintano 90% tipiytamok Wheeler ikwa kotakwak mitatat 10% poko. Denison oho kapi itonako Uranium ikwa kotaka otosikwina i opinaki oti kewitinok Athabasca. Mikwac Toronto, Ontario ikw ota Saskatoon kayacik. Elliot sakiykan, Ontario ikwa mina Kicimohkiman uski ayowak. Mikwac wiya paki tipiytamok McClean Lake Uranium nantow nistanow-nisisap 22% oti kewiytinok.

Oti nikan titastikicik, Denison oho iwi pitos wepinikic to monahoht awa usini ikwa itamok situ recovery(ISR). Yakoma kawi iyki moya ta misi monatikewak akwaci atamik tisi monatikicik, maka waskitc titakamikan. Sasiy iki kita patamok kotaka iskiya akamaski isi atosikicik. Osam poko niyano-mitanow-50% iko sawa isotinit awa Uranium. Ikosi kwa Wheeler oma kawiyask soki waskawistamok ikosoma ka wi iswipitcikik.

ISR monahikiwin, Wheeler ta kotwi paham nipi ita oci kaki poskwahiykicik, nantow niyo isko iynaniw mihcicin poskawa ita monahopana ikwa nipi potsikinamok ikwa i tikawpawit awa asini ikwa kitwam nipi otinamok waskiykanisi wipahoyt. Mamawi nistow mintatomitanow mina mitat pohskwa tositawak mina 90m X 900m tawatikan tositawak (figure A) tapasiniykan.

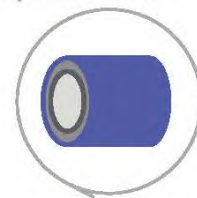
Tuhkohch ohchi ikosi e-isinakwuhk



Puhki tuhkohch ikwu menu puhki pimich ohchi ka-isinakwuhk oomu moonuhi-sooneyawan

- Ikotu oomu kakotawe'puhikatek tihkapawuchikun itamuskumik isi itah itu ka-uyat unu uranium.
- Ikotu ka-uti mawusukwuskinék eyuko oomu ka-wuthuwepuhikatek usiskewapoy itu ka-kikih pimihkeyuyat uwu usiniy (Uranium)

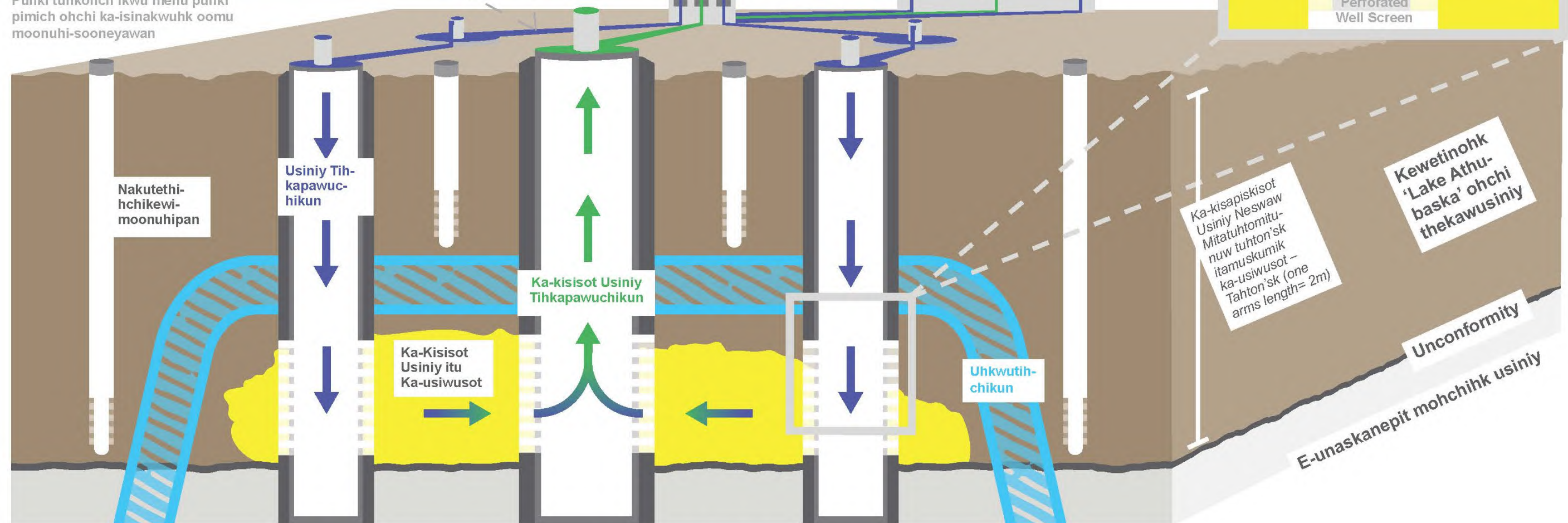
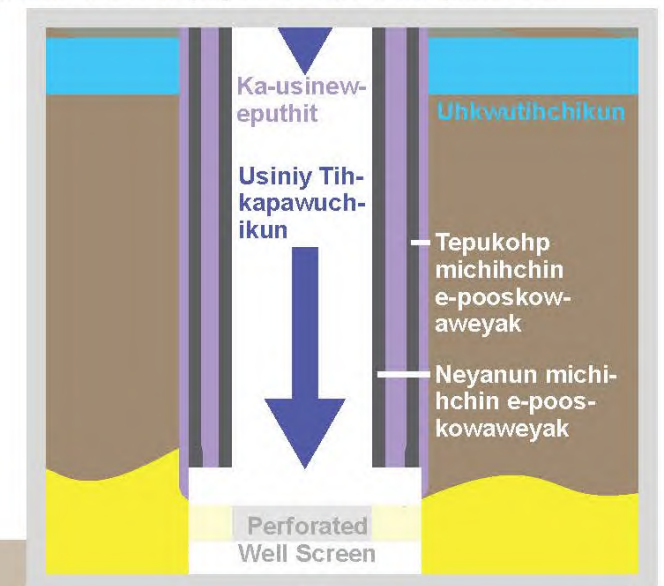
O-kohtuskwuyepiy e-uh-kohtuwisihtaniwik eka kitu pastiputhik pimowepuhikateki tihkapawuchikun



Isi-wepuhikewikumik

Itu kananupachihit ikwu ka-uti kesihit kakisapis-kisot usiniy

Kisiwak ohchi e-isinakwuhk itu ka-usiwutek tihkapawuchikun ikwu usiskewapoy ka-kesi wuthuwe'puhikatek



Tapusinuhikewin kawi-isinakwuhk itamuskumik ikwu wuskitus-kumik ohchi

Ka-ispichi-kuhkuhkeyak

E-yuko oomu kawuthuwe'puhikatek eyuko oomu uranium itamuskumik ohchi otukiseyapeyu ekotawapekumoki itamuskumik isi ikwu ikotu ohchi kakospoowepuhikatek eyuko oomu uranium

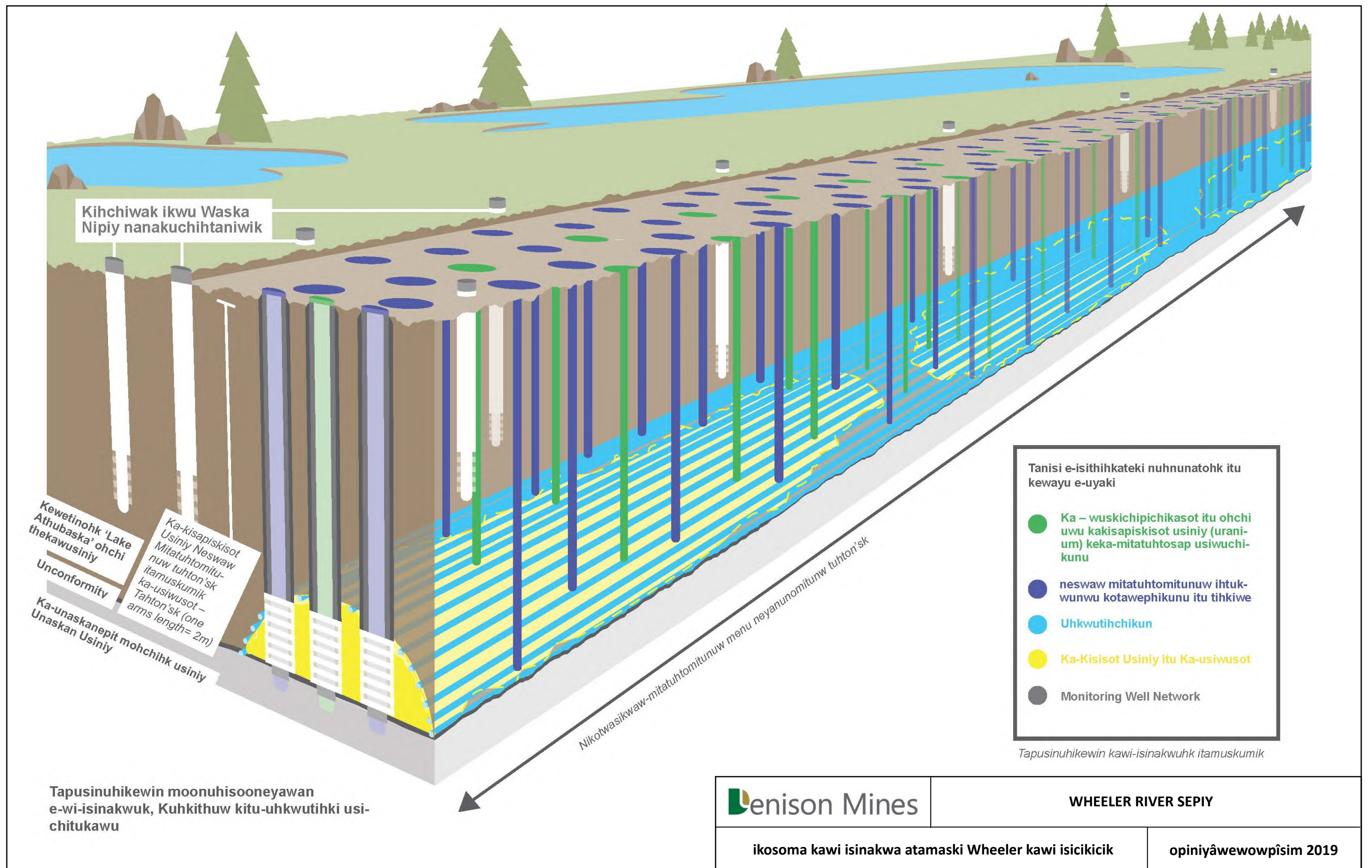
Enison Mines

WHEELER RIVER SEPIY

Yakoma tapasiniykan tansi kawi isi atoskimaka

opiniyâwewowpîsim
2019

Mihcit kiyapic moya tapwi , wiya oma nipi ikwa intwita natow is ti sayak. Maka wiya mina yako ki kitapatamok. Atimi oma ita oma koci itinakwow ikw isiwpahakwa, ikota oma ta waska akwacitawak ika wikac notow isi ti si sipwi ciwa. yakoma atami , osamoko ita kawi atoski mamowi mitatomitanow ospitconis tisiy ayukiskow, nistomintanow tisi spow ikwa peyawkaw kitci mintatomitanow mina nistowmintanow tisi kinaw, ikwa neyow mihtatowmitanow atami uski.



Mamowi Aski Kitakwa

Mikwac oma ita kawi opina atoskiwin kiciwak Wheeler Sepiy ispaski itawin ciki mina Athabasca itowin kiyapic nitonom kotak asiniya aspihin oci neyo mintanow aski. Ata wiya kiyapic maciwak , mitawiwak moya awiyak kisiwak ayow topiykit. Mitatomintow mina niyomitanow tihpahaskan mowic kisiwak awiyak , yako ma Slush Lake iskonikan, English River ka akisocik ota, apo mina pakisomo tiki moya awiya ayow.

Ikosi Denison iki itotom ikwa masinanam, kisiwak ikitapata uski, nipi, pisiyskowa ikwa mina nanatok ta kitapimiko kakiyow kiwi, kinosiw ita amiyit, piysis ita ka pimacihot ita mina nipi oci ikwa astik.

Ikosi kwa Wheeler nistowinom, neyow piskic itoninowak ikota iyakiso Treaty 10 ochi. Wiya iyapicta iyaco isiwak uskikan. Iyako English River Itinowak, Kinepik-Pinehoue, Sepesiy-Beauval ikwa Sahkitawa-Ile La Crosse Apitowkosanak. Ikosiy kwayask apatan oma aski ka nipi ikwa kapihpo.

Ikosi Denison tapwi itam kwayask kayow aski oci ikwa itowin iktapata ikwa masinahum mina tisi nakatoki uski.

Tansi taki isiki

ISR atosikwin ka masina oma oci Uranium atoskiwin ikwa Uranium Kisitawin, ika kikwi iskonikiwin, ta wanata uski, ika ta siwanata nipi, tapikina, asini ka poskwaha, ta pikina, ikosiy kwayask Wheeler ta nakotokih oma isicikiwin.

Ikosi mina kapi ta nakato nipi, kistikana kakiya kikwi papamik ka pimata. Ikosi Denison itiyi tum , ika nanatow tisi siwanata uski, anowc ikwa mwestus.

Wheeler itwew mamowi nesto- mitatomitanow topina oma atoskiwin , nistom nesso askiwin mina takoc mitatomitanow mins mitatomitanow niyanmitanow itnowuk tatoski. Kapi ta kitapimi iyawis ka tosksi ikota.

Ikosi Denison ta nokotow kakiyow kikwi soki tati ispiyik, Iya mina soki tatoski ta masinaha tisi kacitina oma masiniykan tisi opinana ikwa tatoskimaka.

Mamowi Isicikiwin

Aspin oci 2016 Denison nistowinawiw i yawis ka kiso oma opinikiwin. I yakoni ohoh kanitowinawat:

- iyawis itawina
- Oyasowi nowak okimakani
- Iyawis kiciwak ka kiso

Denison kiyapic natkato kakiyow ka ti nakiska ikwa wica atoskiw kakiyow itiniwa mina kakitom apowak ta yamicik ka tispiyik. Sasiy mina masiniykan masinamo isi napo nistota. Ika miwstas iwyak ta pwakatam kitusowi.

Denison nahnaskomo ikwa mamtiso iyawis ka miyo wicito ikwa katiski. Kiyapic mina oti nikan.

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Abbreviations

| | |
|-----------|--|
| ALARA | As Low As Reasonably Achievable |
| CEAA 2012 | <i>Canadian Environmental Assessment Act 2012</i> |
| CNSC | Canadian Nuclear Safety Commission |
| CWQG | Canadian Water Quality Guidelines |
| COSEWIC | Committee on the Status of Endangered Wildlife in Canada |
| Denison | Denison Mines Corp. |
| EIA | Environmental Impact Assessment |
| EIS | Environmental Impact Statement |
| ERFN | English River First Nation |
| ha | hectare |
| HCB | Heritage Conservation Branch |
| HHERA | Human Health and Ecological Risk Assessment |
| IK | Indigenous Knowledge |
| ISR | In Situ Recovery |
| JCU | JCU (Canada) Exploration Company Ltd. |
| km | kilometre |
| masl | metres above sea level |
| mg/L | milligram per liter |
| M lbs/yr | million pounds per year |
| NAD | Northern Administration District |
| PFS | prefeasibility study |
| Project | Wheeler River Project |
| SARA | <i>Species at Risk Act</i> |
| SKCDC | Saskatchewan Conservation Data Centre |
| SEQG | Saskatchewan Environmental Quality Guideline |
| SK MOE | Saskatchewan Ministry of the Environment |
| SSWQO | Saskatchewan Surface Water Quality Objectives |
| VC | Valued Component |
| WTP | Water Treatment Plant |
| Wheeler | Wheeler River Project |

1 Introduction

The Wheeler River Project (Wheeler or the Project) is a proposed uranium mine and processing plant in northern Saskatchewan, Canada (Figure 1.1).

Wheeler is a joint venture project owned by Denison Mines Corp. (Denison) and JCU (Canada) Exploration Company Ltd. (JCU). Denison owns 90% of Wheeler and is the operator, while JCU owns 10%. The Wheeler property contains a number of areas of mineralization, including but not limited to the Phoenix and Gryphon deposits.



Athabasca Basin, Canada
Date: Dec. 2018

Figure 1.1: Wheeler River Location in Canada

Wheeler is located in Saskatchewan's Athabasca Basin about 4 km west of Highway 914. It is located mid-way between Cameco Corporation's Key Lake Mill and McArthur River Mine (Figure 1.2) and is 600 km north of Saskatoon.

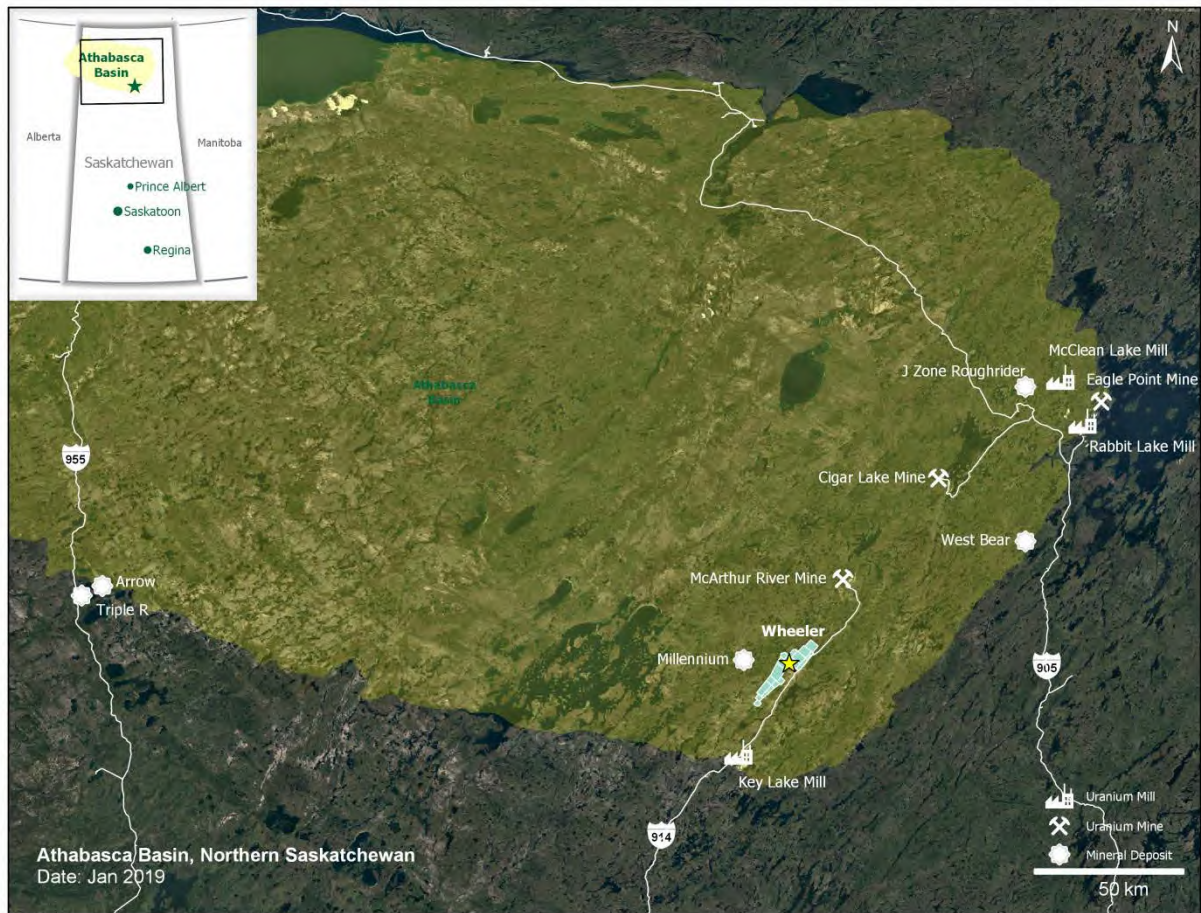


Figure 1.2: Wheeler River Location in the Athabasca Basin

1.1 Project Proponent

Denison is a publicly traded uranium exploration and development company with interests focused in the Athabasca Basin region of northern Saskatchewan, Canada. The company trades on the Toronto Stock Exchange and New York Stock Exchange, and headquartered in Toronto, Ontario with offices in Saskatoon, Saskatchewan and Vancouver, British Columbia.

Historically, Denison (and its predecessor companies) has had over 50 years of uranium mining experience in Elliot Lake, Ontario, Saskatchewan, and in the United States. Today, the company is part owner (22.5%) of the McClean Lake Joint Venture which includes the operating McClean Lake uranium mill in northern Saskatchewan. In addition, Denison provides expert mine decommissioning and environmental services through its Denison Environmental Services division and serves as the manager of Uranium Participation Corporation, a publicly traded company that invests in uranium oxide and uranium hexafluoride.

The company's history of uranium mining, unique expertise in the specialized sectors of uranium mine decommissioning and exploration, as well as its active involvement in the uranium sales and marketing business through its management of Uranium Participation Corporation, have uniquely prepared Denison to be a qualified proponent to develop and operate Wheeler.

As exemplified under our current licences with the Canadian Nuclear Safety Commission (CNSC) at our Elliot Lake and McClean Lake uranium facilities, Denison is committed to the operation of its facilities in a manner that prioritizes safety, environmental protection, and sustainable development.

The proponent is Denison Mines Corp.

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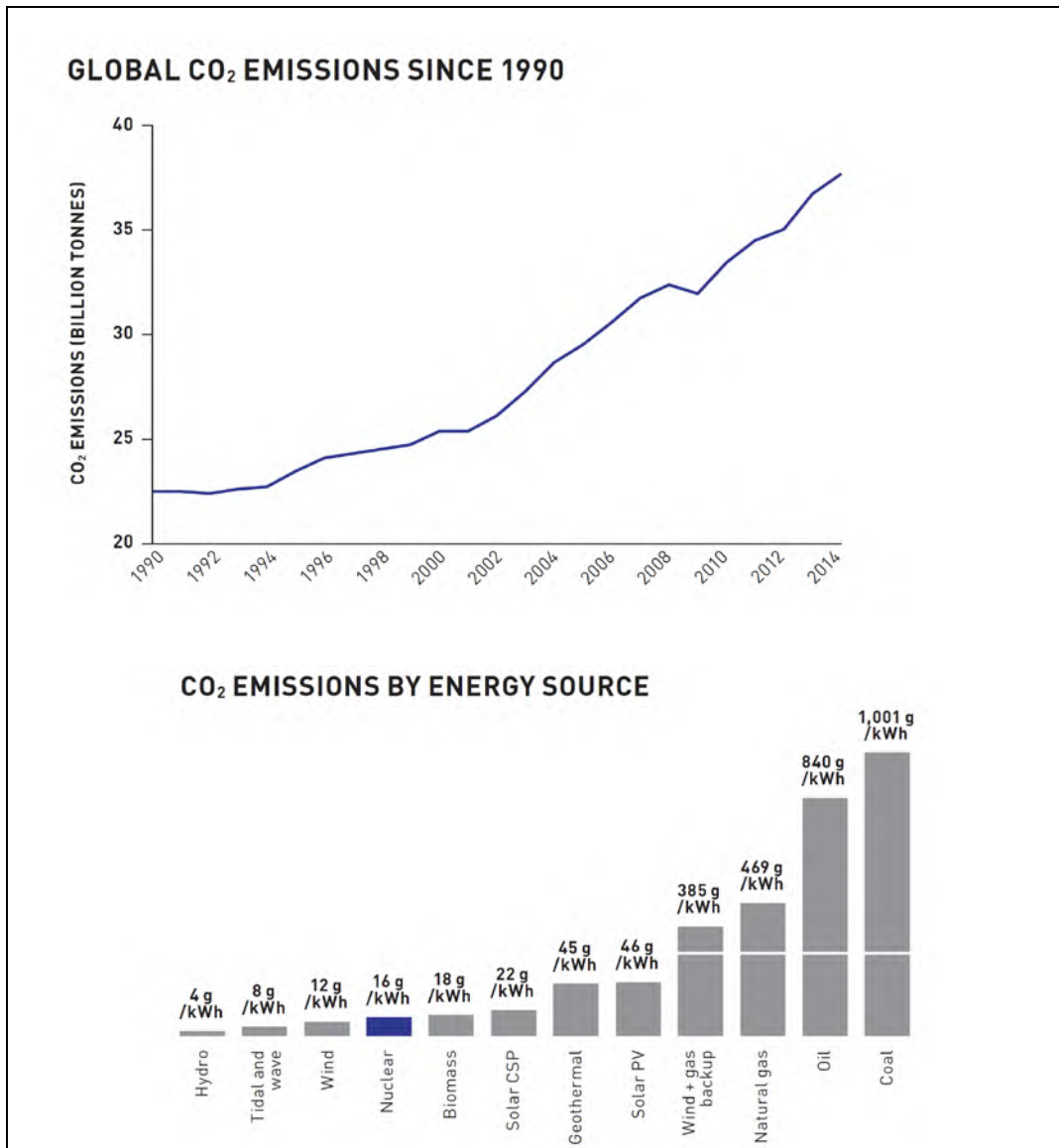
1.2 Project Needs and Benefit

Mining of uranium is the first step in the nuclear fuel cycle, which ultimately concludes with the furnishing of nuclear fuel assemblies to nuclear power plants around the world for the generation of low carbon and low-cost electricity. Accordingly, uranium mining is an essential component in the global battle against climate change and the shift towards the generation of low carbon electricity.

The United Nations estimates that the world's population will grow from approximately 7.5 billion in 2017 to over 9.7 billion in 2050 (United Nations 2017) which is expected to substantially increase global electricity demand. Economic development in non-OECD countries is rapidly shifting global electricity demand and generating more interest in new nuclear plant investments (Massachusetts Institute of Technology 2018). According to the International Atomic Energy Agency (IAEA 2018), high-case projections for nuclear generating capacity suggest that current global capacity could increase from 392 GWe in 2017 to 748 GWe in 2050. At present, there are approximately 450 operable reactors worldwide with an additional 50 to 60 under construction (Canadian Nuclear Association 2017). In addition, momentum is building in regards to the future potential associated

with the development of small modular nuclear reactors, which could bring reliable and low-cost energy to remote communities around the world, and ultimately create significant additional demand for nuclear fuel.

Hand-in-hand with the rising demand for reliable and low-cost energy is the discussion surrounding greenhouse gas emissions and climate change. Despite numerous environmental initiatives and on-going research, global climate change continues at an alarming rate. In 2017, global atmospheric concentration of carbon dioxide (CO₂) rose by 1.4% which is the largest annual rise ever recorded (World Nuclear Association 2018). One of the most influential energy sources available to combat the rise of CO₂ emissions is nuclear power (Figure 1.3). If all the world's coal and natural gas plants were replaced with low carbon nuclear, CO₂ emissions would be reduced by over 22% (Canadian Nuclear Association 2017).



Source: The Canadian Nuclear Association 2017

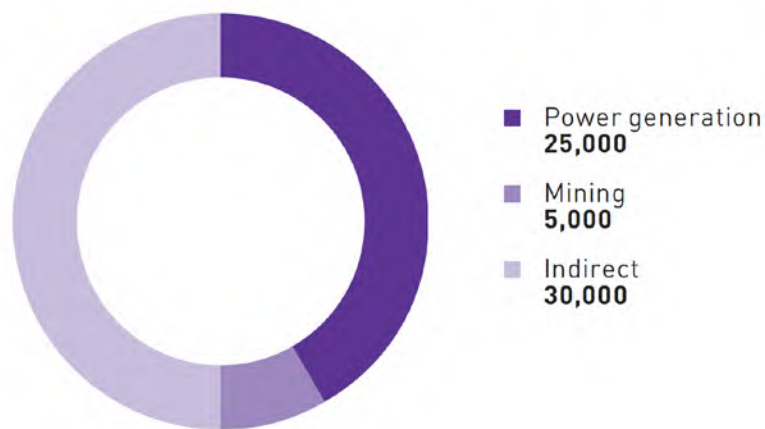
Figure 1.3: Global CO₂ Emissions since 1990 and CO₂ Emissions by Energy Source

A recent report by the United Nations Intergovernmental Panel on Climate Change that examined 89 climate change mitigation scenarios concluded that achieving the 1.5°C target from the Paris Agreement will require global greenhouse gas emissions to start being reduced immediately, and an increase in nuclear power generation of approximately 2.5 times by 2050 (World Nuclear Association 2018). Without a significant contribution from nuclear energy, as the global power mix shifts to respond to climate change initiatives, the cost to achieve meaningful decarbonisation targets will steadily rise or targets will simply go unmet. Nuclear is critical to global climate change objectives because of its unique combination of low carbon emissions, large scale, and reliability.

In terms of scale, the uranium expected to be produced from Wheeler would be sufficient to power 1 million homes for approximately 160 years (assuming 200 tonnes U_3O_8 fuels a 1,000 MWe plant for one year). Alternatively, the uranium produced from Wheeler could provide fuel to meet all of the projected Canadian nuclear utilities' base requirements from 2019 to 2035 including New Brunswick Power, Ontario Power Generation and Bruce Power.

Canada is uniquely positioned to support global climate change initiatives. Canada is the second largest producer and exporter of uranium in the world, with approximately 88% of the uranium produced in Canada destined for export to support global nuclear power use (Natural Resources Canada 2018). At present, Canada's current uranium production comes from uranium mines operated in northern Saskatchewan. Canada has a rich history of involvement with nuclear power and the technological advances that have been made within the industry since the early 1940s. According to Natural Resources Canada, 15% of the country's electricity was provided by nuclear power in 2016 (Natural Resources Canada 2018). Given the integral role it plays in our economy, the nuclear power industry has been and will continue to be a growth vehicle for economic and employment opportunity, an aid to the rapidly increasing electricity demand, and a key contributor in the battle against the environmental impacts associated with greenhouse gas emissions. The mining and processing of uranium as part of the Project will support the projected future growth in nuclear power both domestically and internationally.

Nuclear in Canada is a \$6 billion industry that directly and indirectly supports a total of 60,000 jobs throughout the country (Canadian Nuclear Association 2017) (Figure 1.4).



Source: The Canadian Nuclear Association Factbook 2017

Figure 1.4: Jobs Supported by the Nuclear Industry in Canada

With refurbishment plans in place for 10 of the 19 nuclear reactors in Canada (primarily located at the Ontario Power Generation and Bruce Power nuclear facilities in Ontario) there is a distinct opportunity to add further employment opportunities within the industry and throughout the nuclear fuel cycle. Government research and studies suggest that the economic benefits of refurbishing only 4 of the 10 reactors (located at the Ontario Power Generation facility in Darlington, Ontario) would be almost \$90 billion (Canadian Nuclear Association 2017). At its peak, the refurbishment of Bruce Power’s nuclear facility will create 22,000 direct and indirect jobs annually and will secure the organization’s future for decades creating demand for reliable and safe uranium production for many years to come (Bruce Power and Ontario Power Generation 2018).

While Canada’s nuclear facilities are mainly concentrated in Ontario, the majority of uranium production in Canada comes from northern Saskatchewan, which is home to the world’s largest and highest-grade uranium deposits – some with concentrations more than 100 times the global average (Natural Resources Canada 2018). Wheeler is located in the Athabasca Basin in northern Saskatchewan where established uranium mining and milling operations are a major employer of the province’s northern and Indigenous peoples. The advancement of Wheeler will not only contribute economically to Canada’s nuclear energy industry, but is also expected to provide additional employment and business opportunities to Indigenous and northern communities in Saskatchewan.

The world and Canada need uranium and Wheeler can provide this critical component in the nuclear fuel cycle while making a meaningful contribution to the Canadian economy and Saskatchewan’s northern and Indigenous communities.

1.3 Regulatory Context

This document was written to meet the requirements and guidance for both a federal Project Description under the *Canadian Environmental Assessment Act 2012* (CEAA 2012; *Prescribed Information for the Description of a Designated Project Regulations* and Canadian Environmental Assessment Agency 2015a) and a provincial Technical Proposal (Government of Saskatchewan 2014a) under Saskatchewan's *Environmental Assessment Act*.

Denison anticipates that the provincial and federal environmental assessment processes for Wheeler will be conducted in parallel; the Saskatchewan Environmental Assessment & Stewardship Branch and the CNSC will cooperate in conducting a coordinated provincial-federal EA that will follow the spirit of the Canada-Saskatchewan Agreement on Environmental Assessment Cooperation (2005) to the extent possible. The agreement allows for cooperation in the assessment of projects that require regulation by both levels of government. The cooperation agreement allows for the production of a single environmental impact assessment (EIA) that meets the requirements of both levels of government, so that each level of government can make an independent decision.

Please see Appendix A for the table of concordance with the *Prescribed Information for the Description of a Designated Project Regulations*.

1.3.1 Environmental Assessment Requirements

1.3.1.1 Federal

The proposed Project will include the construction, operation and decommissioning of a uranium mine, processing plant and supporting facilities on a site that is not within the boundaries of an existing licensed uranium mine or mill. As such, Wheeler is a designated project as set out in section 31 of the *Regulations Designating Physical Activities* and is therefore subject to a federal environmental assessment.

The CNSC will be the federal responsible authority for Wheeler's environmental assessment.

Applicable federal Acts and regulations applicable to Wheeler include but are not limited to:

- *Fisheries Act*
 - *Metal and Diamond Mining Effluent Regulations*
- *Canadian Environmental Assessment Act*
 - *Regulations Designating Physical Activities*
 - *Prescribed Information for the Description of a Designated Project Regulations*
- *Species at Risk Act*
- *Nuclear Safety and Control Act*
 - *General Nuclear Safety and Control Regulations*

- *Uranium Mines and Mills Regulations*
- *Packaging and Transport of Nuclear Substances Regulations*
- *Radiation Protection Regulations*
- *Migratory Birds Convention Act*
- *Transportation of Dangerous Goods Act*
 - *Transportation of Dangerous Goods Regulations*
- *Canadian Environmental Protection Act*
 - *Environmental Emergency Regulations*
- *Canadian Wildlife Act*
- *Navigation Protection Act*

Denison acknowledges Bill C-69 that proposes a number of changes to the current environmental assessment process. Section 182 of the bill outlines that EIAs for CNSC designated projects started under *CEAA (2012)* will continue under *CEAA (2012)*.

Accordingly, this project description has been prepared to comply with the requirements of *CEAA (2012)*.

1.3.1.2 Provincial

Environmental Assessment in Saskatchewan is regulated by the *Environmental Assessment Act* and its application hinges on whether a project is a development, or not, based upon the criteria in Section 2(d):

2(d) “development” means any project, operation or activity or any alteration or expansion of any project, operation or activity which is likely to:

- (i) have an effect on any unique, rare or endangered feature of the environment;
- (ii) substantially utilize any provincial resource and in so doing pre-empt the use, or potential use, of that resource for any other purpose;
- (iii) cause the emission of any pollutants or create by-products, residual or waste products which require handling and disposal in a manner that is not regulated by any other Act or regulation;
- (iv) cause widespread public concern because of potential environmental changes;
- (v) involve a new technology that is concerned with resource utilization and that may induce significant environmental change; or
- (vi) have a significant impact on the environment or necessitate a further development which is likely to have a significant impact on the environment.

The likely applicable Section 2(d) triggers are Sections 2(d) (iv) and (v); a potential for public concern, and a new technology application in Saskatchewan (in situ recovery for uranium), respectively.

Accordingly, Denison is self-declaring that Wheeler is a development under the *Environmental Assessment Act*; Denison is not seeking a ministerial determination on whether the Project is a development.

Denison will be submitting the Project's draft Terms of Reference to the province under a separate cover.

Denison will conduct, prepare and submit an environmental impact statement (EIS) to Saskatchewan Ministry of Environment's Environmental Assessment and Stewardship branch that meets the requirements outlined in the Saskatchewan Environmental Assessment Act. Ultimately the Project will require issuance of a ministerial approval under section 15 of the Saskatchewan *Environmental Assessment Act* before proceeding to licensing and permitting.

Relevant provincial Acts and associated regulations applicable to Wheeler include but are not limited to:

- *Environmental Assessment Act*
- *Environmental Management and Protection Act*
 - *Mineral Industry Environmental Protection Regulations*
 - *Hazardous Substances and Waste Dangerous Goods Regulations*
 - *The Waterworks and Sewage Works Regulations*
 - *Environmental Management and Protection (Saskatchewan Environmental Code Adoption) Regulations*
- *Wildlife Act*
 - *Wildlife Regulations*
- *Wildlife Habitat Protection Act*
 - *Wildlife Habitat Lands Disposition and Alteration Regulations*
- *Fisheries Act (Saskatchewan)*
 - *Fisheries Regulations*
- *Forest Resource Management Act*
 - *Forest Resources Management (Saskatchewan Environmental Code Adoption) Regulations*
 - *Forest Resources Management Regulations*
- *Natural Resources Act*
- *Prairie and Forest Fire Act*
- *Heritage Property Act*

- *Provincial Lands Act*
 - *Provincial Lands Regulations*
- *Saskatchewan Employment Act*
 - *Mines Regulations*
 - *Occupational Health and Safety Regulations*
- *Radiation Health and Safety Act*
 - *Radiation Health and Safety Regulations*
- *Reclaimed Industrial Site Act*
 - *Reclaimed Industrial Sites Regulations*
- *Water Security Agency Act*
- *Dangerous Goods Transportation Act*
 - *Dangerous Goods Transportation Regulations*
- *Mineral Resources Act*
- *Crown Minerals Act*
- *Public Health Act*
 - *Plumbing Regulations*
- *Boiler and Pressure Vessel Act*
 - *Regulations Respecting the Design, Construction, Installation and Use of Boilers and Pressure Vessels*
- *Electrical Inspection Act*
 - *Electrical Inspection Regulations*
- *Gas Inspection Act*
 - *Gas Inspection Regulations*
 - *Gas Licensing Regulations*

1.3.2 Guidelines, Policies, Standards

In addition to regulatory requirements from federal and provincial Acts and regulations, Denison will apply a number of other guidelines, policies and standards to the Project. The following list provides examples of guides, policies and standards Denison will use in completing the Wheeler EIA and is not exhaustive:

- Canadian Environmental Assessment Agency:
 - Technical Guidance for Assessing Physical and Cultural Heritage or any Structure, Site, or Thing that is of Historical, Archaeological, Paleontological, or Architectural Significance under CEAA (2012)

- Addressing “Purpose of” and “Alternative Means” under the CEAA (2012)
- Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under the CEAA (2012)
- Considering Aboriginal traditional knowledge in environmental assessments conducted under CEAA (2012) (CEAA 2015b)
- Federal Policy on Wetland Conservation
- Various CNSC regulatory documents (REGDOCS), for example:
 - 2.9.1 Environmental Principles, Assessments and Protection Measures (CNSC 2017)
 - 3.1.2 Reporting Requirements, Volume I: Non-power reactor class I facilities and uranium mines and mills
 - 3.2.2 Aboriginal Engagement (CNSC 2016a)
- CNSC’s generic guidelines for the preparation of an environmental impact statement (CNSC 2016b)
- Various CSA Standards, for example:
 - N288.4-10 Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills
 - N288.7-15 Groundwater protection programs at Class I nuclear facilities and uranium mines and mills
 - N286-12 Management System Requirements for Nuclear Facilities
 - N288.5-11 Effluent Monitoring Programs at Class I nuclear facilities and uranium mines and mills
 - N288.6-12 Environmental risk assessments at class I nuclear facilities and uranium mines and mills
 - N294-09 Decommissioning of facilities containing nuclear substances
- Guidelines for Northern Mine Decommissioning and Reclamation, November 2008, Version 6, Saskatchewan Ministry of Environment
- The Saskatchewan Environmental Code and attendant standards

1.3.3 Licensing and Permitting

The following permits, approvals, and licences are anticipated at different stages of the Project:

- Provincial environmental assessment approval
- Federal environmental assessment approval
- CNSC licences to:
 - Prepare site and construct

- Operate
 - Decommission
 - Abandon (release from licensing)
- Surface lease agreement
- Heritage Conservation Branch approval
- Forest Product Permit
- Aquatic Habitat Protection Permit
- Approval to Construct Highways Approach
- Approval to Construct and Operate Pollutant Control Facilities
- Environmental Protection Plan for Industrial Sources
- Approval to Construct Hazardous Substances and Waste Dangerous Goods Facility and Store Hazardous Substances and Waste Dangerous Goods
- Permit to Operate Waterworks
- Permit to Operate Sewage Works
- Approval to Decommission Pollutant Control Facilities
- Release from Decommissioning and Reclamation
- Provincial Acceptance of Decommissioned and Reclaimed Site into Institutional Control Program

1.4 Regional Studies

EIAs have been completed or are underway for nearby projects related to uranium mining and milling as well as a provincial highway extension. This includes Cameco Corporation's original EIAs and any subsequent expansion EIAs for mining and milling of uranium at Key Lake Operation and mining of uranium at McArthur River Operation. An EIA was initiated and subsequently halted by Cameco for the proposed Millennium Project, a proposed uranium mine located between Key Lake and Wheeler. Saskatchewan Ministry of Highways has initiated the provincial environmental assessment process for extending Highway 914 from McArthur River Operation to Cigar Lake mine and constructing a by-pass at the Key Lake Operation.

Other regional studies include:

- Eastern Athabasca Regional Environmental Monitoring Program;
- Canadian Nuclear Safety Commission's Independent Environmental Monitoring Programs; and
- Saskatchewan Boreal Watershed Initiative (Government of Saskatchewan 2017a) which includes a summary of available air quality, aquatic ecosystems, terrestrial ecosystems and Indigenous Knowledge.

1.5 Engagement

Denison recognizes the importance of engaging with local and Indigenous communities, residents, businesses, organizations, land users and the various regulatory authorities, collectively referred to as ‘Stakeholders.’ Since 2016 Denison had been engaging with Stakeholders in ongoing efforts to build positive relationships with all parties.

Denison has engaged with the following Stakeholders in regards to Wheeler:

- English River First Nation
- Hamlet of Patuanak
- Kineepik Métis Local Inc.
- Pinehouse village
- Sipisishik Métis Local 37
- Beauval village
- A La Baie Métis Local 21 Inc.
- Ile a la Crosse village
- Recreational lease holders
- Northern Saskatchewan Environmental Quality Committee
- Canadian Nuclear Safety Commission staff in the Environmental Assessment division and the Uranium Mines and Mills division
- Saskatchewan Ministry of Environment staff with the Environmental Assessment and Stewardship branch and the Uranium and Northern Operations branch.

Details of Denison’s engagement with Stakeholders, including engagement results to date, influence of engagement on the Project design, and the plan for ongoing engagement activities are provided in sections 7 and 8 below.

Engagement initiated by Denison in 2016 is part of an ongoing commitment by Denison to actively engage all Stakeholders throughout the Project development phases.

Denison’s early engagement initiatives with local Indigenous communities have allowed for the integration of Indigenous Knowledge with the Project development process, environmental baseline studies completed, and socio-economic initiatives directly related to the Project. Some of the key activities demonstrating this integration are presented in the Project timeline shown in Figure 1.5.

Denison’s ongoing Stakeholder engagement program reflects the results of feedback received to date from previous engagement sessions and is intended to be flexible and adaptive.

Denison will visit local Stakeholders, as appropriate, and will provide Project updates as Wheeler is advanced. It is currently envisioned that community meetings will be held at least once per year in a number of local communities, and more frequently if desired by any of these communities.

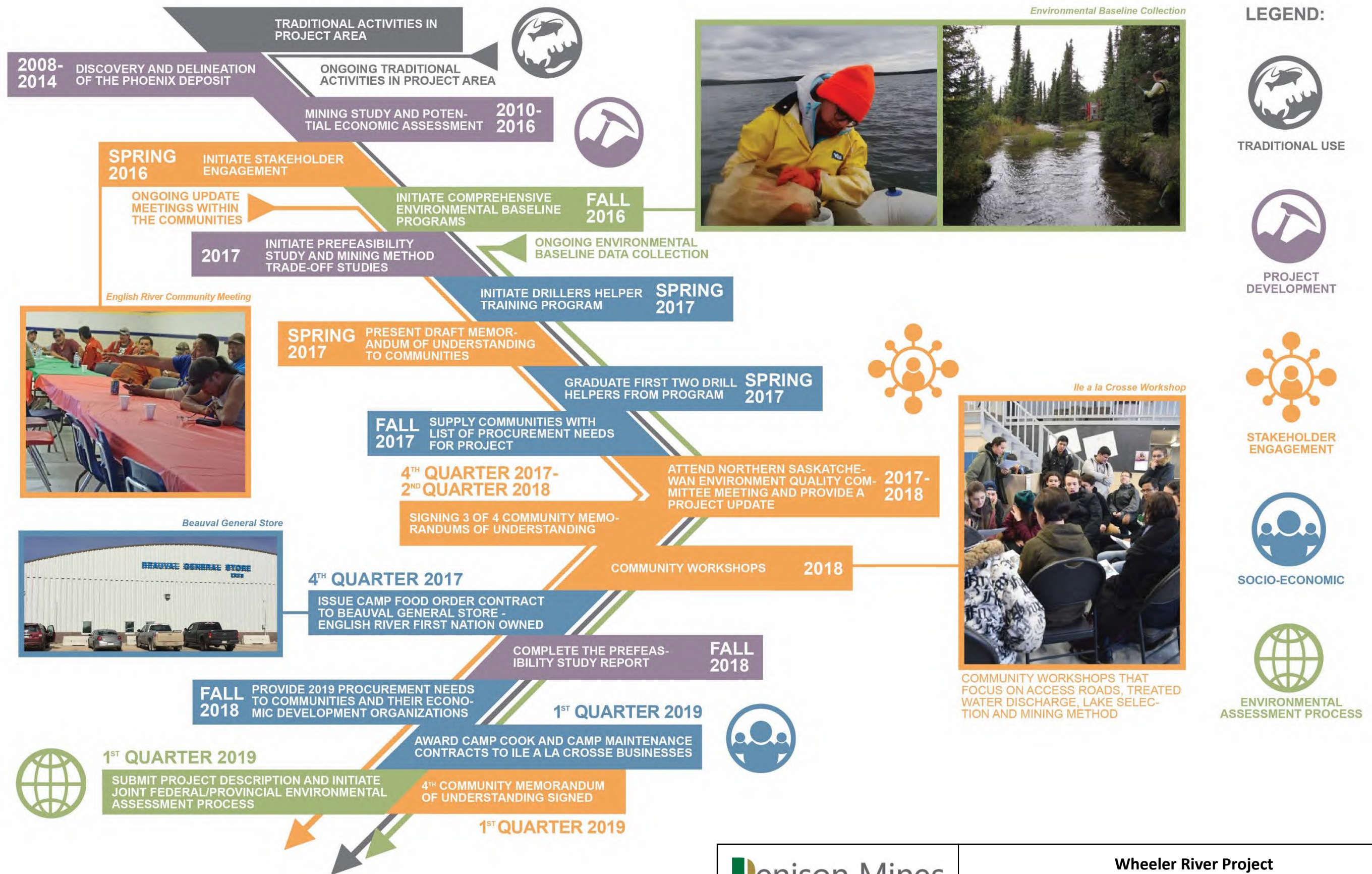
Denison is also committed to meeting with the leadership of these communities, in addition to other stakeholder organizations, as and when requested as part of the Company's standing commitment to respond to any enquires regarding the Project.

As the Project advances Denison is committed to continue to utilize local community radio stations, social media, and print media that may reach northern audiences.

In order to formalize Denison's commitment to its local Indigenous communities (and their associated non-Indigenous communities), Memorandums of Understanding (MOU) have been signed between Denison and:

- English River First Nation;
- Kineepik Métis Local and the community of Pinehouse;
- A La Baie Métis Local 21 and the community of Ile a la Crosse; and
- Sipisishik Métis Local 37 and the community of Beauval.

These non-binding MOUs formalize the signing parties' intent to work together in a spirit of mutual respect and cooperation to collectively identify practical means by which to avoid, mitigate, or otherwise address potential impacts of the Project upon the exercise of the indigenous rights, treaty rights, and interests. In addition, the MOUs outline the signing parties' intent to work together to ensure benefits will flow from the Project, provide a process for continued Project engagement and information-sharing about the project, and establish a relationship to identify business, employment and training opportunities for the parties with respect to the Project.



lenison Mines

Wheeler River Project
Provincial Technical Proposal and Federal Project Description

Figure 1.5: Project Timeline

May 2019

2 Project Information

2.1 Project Overview

2.1.1 Deposit & Geology

Several areas of uranium mineralization amenable to in situ recovery (ISR) have been defined at Wheeler with the most prominent area being the Phoenix deposit. Phoenix is the highest-grade undeveloped uranium deposit in the world. It is geologically situated at or immediately above the unconformity between the Athabasca Basin sandstone and older basement rocks, approximately 400 metres below surface. To date, these zones have been estimated to contain a total of 70.2 million pounds U_3O_8 of indicated mineral resources based on 166,400 tonnes of ore at an average grade of 19.14% U_3O_8 . There are additional zones of mineralization at Wheeler that have not been fully defined from exploration activities.

2.1.2 Selection of In Situ Recovery Mining Method

After completion of the 2016 Wheeler Preliminary Economic Assessment (Denison 2016) Denison initiated a detailed review of the development plan for the Phoenix deposit, which had originally been designed as an underground mine using a jet boring system as the extraction technology.

The 2016 Preliminary Economic Assessment identified disadvantages associated with the jet boring system mining method – including technical risks, comparatively high operating and capital costs, and long pre-production construction timelines. Accordingly, Denison initiated an extensive review process, seeking suitable alternative mining methods for the Phoenix deposit. A total of 32 different mining methods were initially identified and screened. The final two preferred technologies were advanced into a more rigorous evaluation process at the prefeasibility (PFS) level of assessment. Ultimately, In Situ Recovery (ISR) mining was selected as the preferred mining method due to its significant economic, environmental, and technical advantages.

ISR mining is also known as solution mining or in situ leaching – as the mining method uses an engineered fluid or solution to dissolve uranium from the host rock without physically removing the host rock for processing on surface. There are no underground or open pit workings required in an ISR operation; no heavy equipment is needed and people do not work underground. The process utilizes a series of injection wells to inject mining solution into the uranium deposit and another series of wells (recovery wells) to return the uranium rich solution back to surface for processing. There is minimal surface disturbance, minimal waste rock generated and no tailings are produced.

2.1.3 Experience and Lessons Learned from International In Situ Recovery Operations

Globally, ISR mining is considered to be the lowest-cost and industry leading method for uranium extraction. The method was first used in the 1960's and now accounts for over 50% of the world's annual uranium production, with use in Kazakhstan (the world's largest and lowest cost producer of

uranium), the United States, China, Russia, and Australia, among others. ISR mining is amenable to uranium deposits in certain sedimentary formations and is well known in the industry for having comparatively minimal surface impact, high production flexibility, and low operating and capital costs relative to open pit or conventional underground mining methods. There has been continuous development and improvement of ISR mining techniques in recent years, particularly in the two decades since the International Atomic Energy Agency published the *Manual of Acid In-Situ Leach Uranium Mining Technology* (IAEA 2001).

The general benefits of ISR include:

- *No tailings* – as the dissolution of the uranium contained in the host rock occurs “in-situ”, there is no processing of the host rock on surface and thus there is no waste / tailings generated by the ISR mining method;
- *Minimal surface disturbance* – In addition to having relatively modest needs for buildings and structures on site, ISR mining does not involve the sinking of shafts or the development of a large open pit. The surface impact associated with an ISR wellfield is limited to a series of cased injection, recovery and monitoring wells with a diameter of approximately 4-8 inches;
- *Established safety practices and procedures* – with over 50% of global uranium production coming from ISR mining in multiple countries, the mining method has become well known within the uranium mining industry and has allowed for the establishment of a wealth of safety practices and procedures to ensure health and safety of workers;
- *Minimal environmental impacts* - Amongst other additional comparative benefits, ISR mining operations are known for low noise levels, minimal dust and air emissions, low water consumption levels, minimal treated effluent discharge volumes, and minimal waste rock generation; and
- *Economic advantages* – ISR mining operations often have comparatively low capital and operating costs, as well as shorter timelines to first production and greater flexibility to allow production to be scaled to meet market demands.

In evaluating the application of ISR technology to the Athabasca Basin, Denison initiated a detailed review of the experience from international ISR operations over the last 50 years. Information is publicly available from ISR activities in the following countries:

- Australia (5 sites)
- USA (49 sites)
- Kazakhstan (17 sites)
- Bulgaria (19 sites)
- China (3 sites)
- Czech Republic (2 sites)
- Hungary (1 sites)

- Mongolia (3 site)
- Niger (1 site)
- Pakistan (1 site)
- Russia (2 sites)
- Ukraine (3 sites)
- Uzbekistan (3 sites)

Other countries such as Germany also have experience with ISR operations but have less extensive publicly available records to date.

While each operation is unique based on site-specific characteristics, the two general challenges to international ISR operations are: 1) potential groundwater impacts during operations and 2) remediation of the mining zones after mining is complete.

2.1.3.1 Potential Impacts to Groundwater

Traditional ISR operations rely on natural barriers (aquitards) or artificial pumping to create a drawdown of the regional groundwater to help contain the mining solution and minimize loss of the mining solutions to the regional groundwater. Containment of the mining solution in this way may create downstream problems including:

1. Loss of the mining solutions to the environment (known as excursions) may occur. Depending on the site-specific characteristics, these excursions will have varying levels of impact on the groundwater. In some instances, the excursions are allowed to continue while in other cases operations are required to implement mitigation strategies such as drilling additional pumping wells, reversal of wellfield flows and increase in draw down rates of the regional groundwater to capture the excursion.
2. Artificial drawdown of the aquifer brings excess water into the ISR process plant known as a bleed. Depending on site specific characteristics the bleed is either treated and discharged or directly discharged. In either case, it results with handling additional volumes of groundwater, an increased demand on energy and stress on the regional groundwater system.

In order to eliminate potential excursion to the regional groundwater Denison will engineer and create an artificial freeze wall to encapsulate the uranium deposit and create an isolated mining chamber (details in Section 2.3.1.3). The freeze wall will prevent the mining solution from travelling into the regional groundwater system and at the same time prevent the regional groundwater from entering the mining chamber area and diluting the mining solution.

2.1.3.2 Remediation After Operations

The second major challenge to international ISR operations is the remediation of the site after mining is complete. Remediation efforts in international operations vary significantly depending on

site specific characteristics as well as the time period in which the operation occurred. In general, more recent operations have increased efforts towards remediation. Similar to many legacy mining sites, some historical ISR operations were operated with limited environmental considerations and as a result have led to contamination of the regional groundwater system.

In some operations, conditions surrounding the wellfield support a natural attenuation approach to remediation. In this context as groundwater travels outside the mining area it naturally improves. No active treatment outside the wellfield area is completed. Natural attenuation is typically completed in areas where the pre-mining environment showed poor background groundwater quality, limited or no use of groundwater for agriculture or human consumption, and/or areas with geochemical characteristics capable of naturally neutralizing the groundwater.

In some operations active treatment of the wellfield is completed. This can be completed by injecting reagents into the mined-out wellfield to neutralize the impacted groundwater, flushing the wellfield with clean water (in the same manner as mining was completed) with treatment and discharge of the collected groundwater or a variety of other options.

Denison's inclusion of a freeze wall (details Section 2.3.1.3) will mitigate many of the remediation challenges encountered at international operations. The freeze wall will allow for a controlled remediation process to occur unaffected by the regional groundwater. The depth to the deposit (400 metres below surface), the existing poor quality pre-mining groundwater chemistry, and limited volume of groundwater disturbance due to the isolation of the mining chamber will eliminate any impacts on regional groundwater use. Remediation of the contained mining chamber will be completed using active treatment and containment will continue until conditions inside the chamber demonstrate acceptable geochemical conditions.

Denison has extensively researched best practices and challenges experienced in international operations. The design of the Wheeler ISR project has specifically targeted the elimination of the major challenges seen at international operations which is expected to result with the Wheeler being one of the most environmentally friendly mining projects in the world.

2.1.4 Objective and Overview of Wheeler In Situ Recovery

The objective of the Project is to construct, operate, and decommission an ISR uranium mine and processing plant.

The mining solution proposed at Wheeler will be similar to the leaching solution currently used in conventional Saskatchewan uranium mills and will consist of water and reagents such as sulphuric acid mixed to a consistent and relatively dilute concentration. The low pH or acidic mining solution oxidizes and dissolves the uranium as it travels through the uranium deposit. The process involves injecting the mining solution into the uranium deposit through a series of cased (contained) drill holes called injection wells. Following sufficient contact between the mining solution and the uranium deposit, the uranium is dissolved into the mining solution. The uranium rich mining

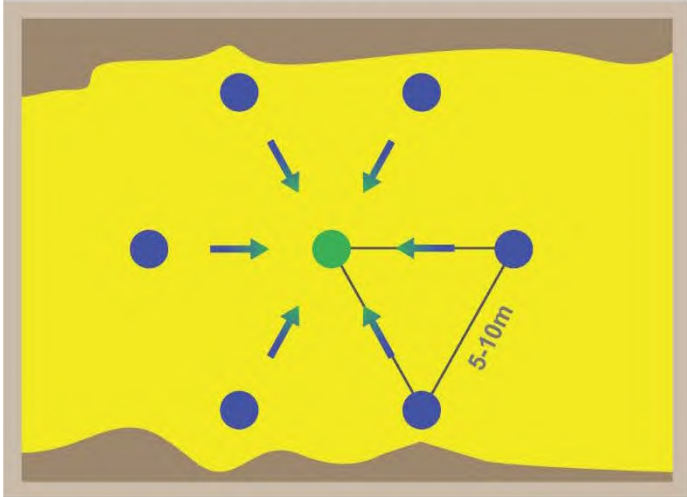
solution is then pumped back to surface via a similar series of cased recovery wells. This process is shown graphically in Figure 2.1 and details are provided in Section 2.3.1. Once on surface, the uranium rich mining solution will be piped to the processing plant for chemical separation of the uranium from the mining solution.

At Wheeler the uranium deposit is confined to a relatively small area (approximately 900 m x 90 m) and has proved readily leachable in laboratory testing. As a result, infrastructure disturbance (e.g., number of wells, extent of surface piping systems) are expected to be significantly reduced when compared to conventional low-grade ISR operations or conventional open pit operations.

In conventional ISR operations, containment of the mining solution is typically achieved by naturally impermeable bounding layers in the geological strata (i.e., aquitards) and/or by creating an artificial drawdown (via pumping) of the water table towards the uranium deposit. At Wheeler, there is a natural impermeable layer below the deposit, in the form of competent basement rock, but the deposit is otherwise hydraulically connected to the regional groundwater system in the overlying sandstone formation that is consistent throughout the Athabasca Basin. Given the depth and small spatial extents of the uranium deposit, extraction could be done without an upper bounding layer of containment; however, doing so will require significant engineering controls between the injection and recovery wells to facilitate the necessary containment of the mining solution.

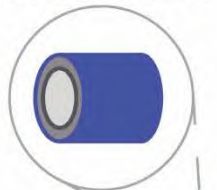
In order to simplify these controls and associated costs as well as to maintain proper concentrations of the mining solution and constant contact of the mining solution with the uranium deposit, an artificial freeze wall will be created to serve as an impermeable layer above and around the uranium deposit (details are provided in Section 2.3.1.3). When combined with the low permeability basement rock underneath the uranium deposit, the dome-shaped freeze wall will isolate the uranium deposit, creating the mining chamber (Figure 2.2). Within the mining chamber, the mining solution can then circulate from the injection wells through the deposit to the recovery wells without interacting with the surrounding groundwater. The freeze wall will also facilitate controlled restoration of the mining chamber during the decommissioning phase.

TOP VIEW OF A SINGLE WELL FIELD



- INJECTION WELL WITH MINING SOLUTION
- RECOVERY WELL WITH URANIUM RICH SOLUTION

PIPE WITH SECONDARY CONTAINMENT

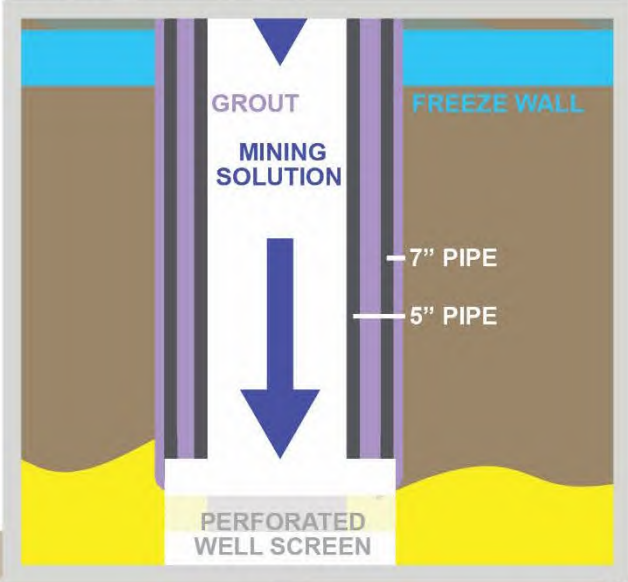


PUMPHOUSE

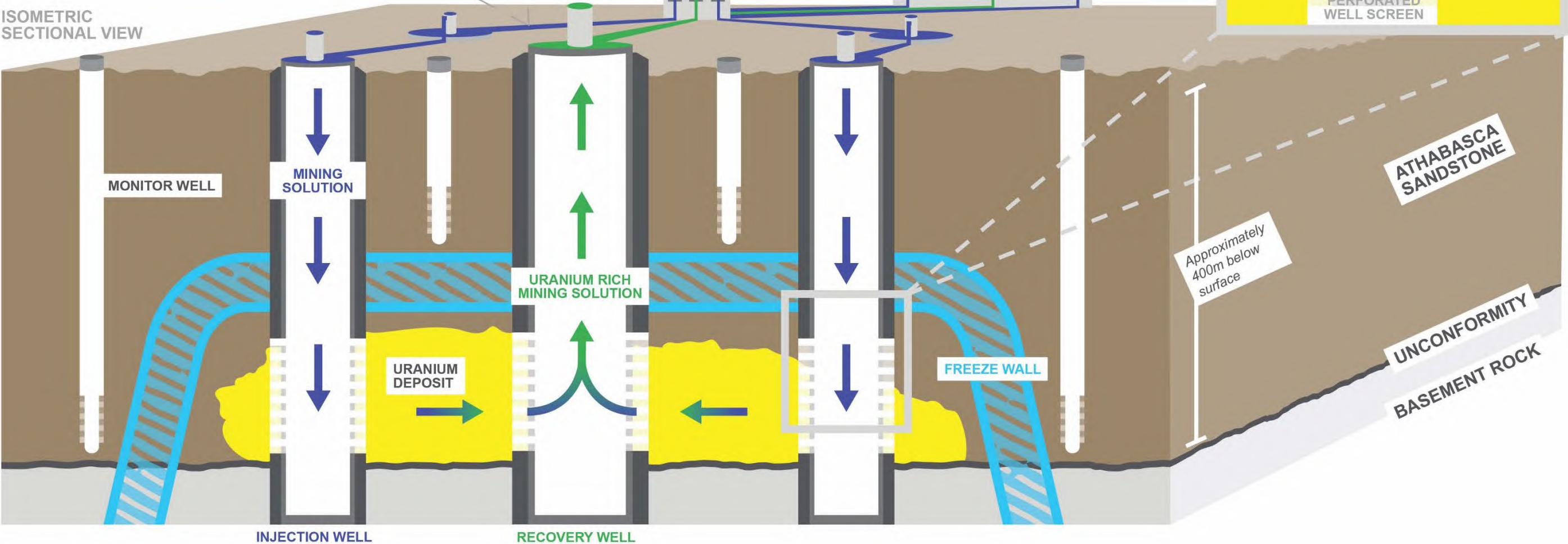
URANIUM PROCESSING PLANT

WELL CLOSE-UP

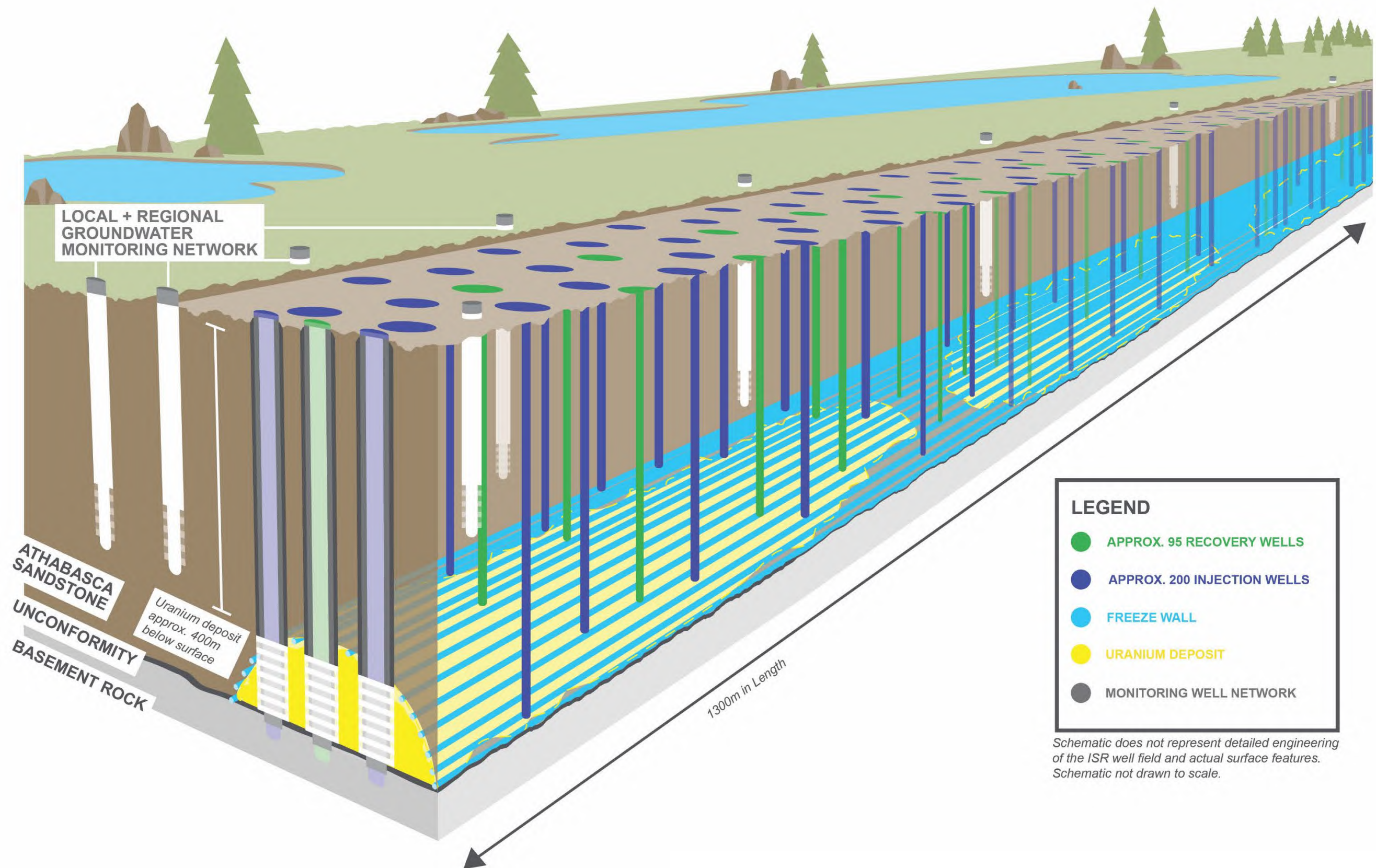
See well installation process



ISOMETRIC SECTIONAL VIEW



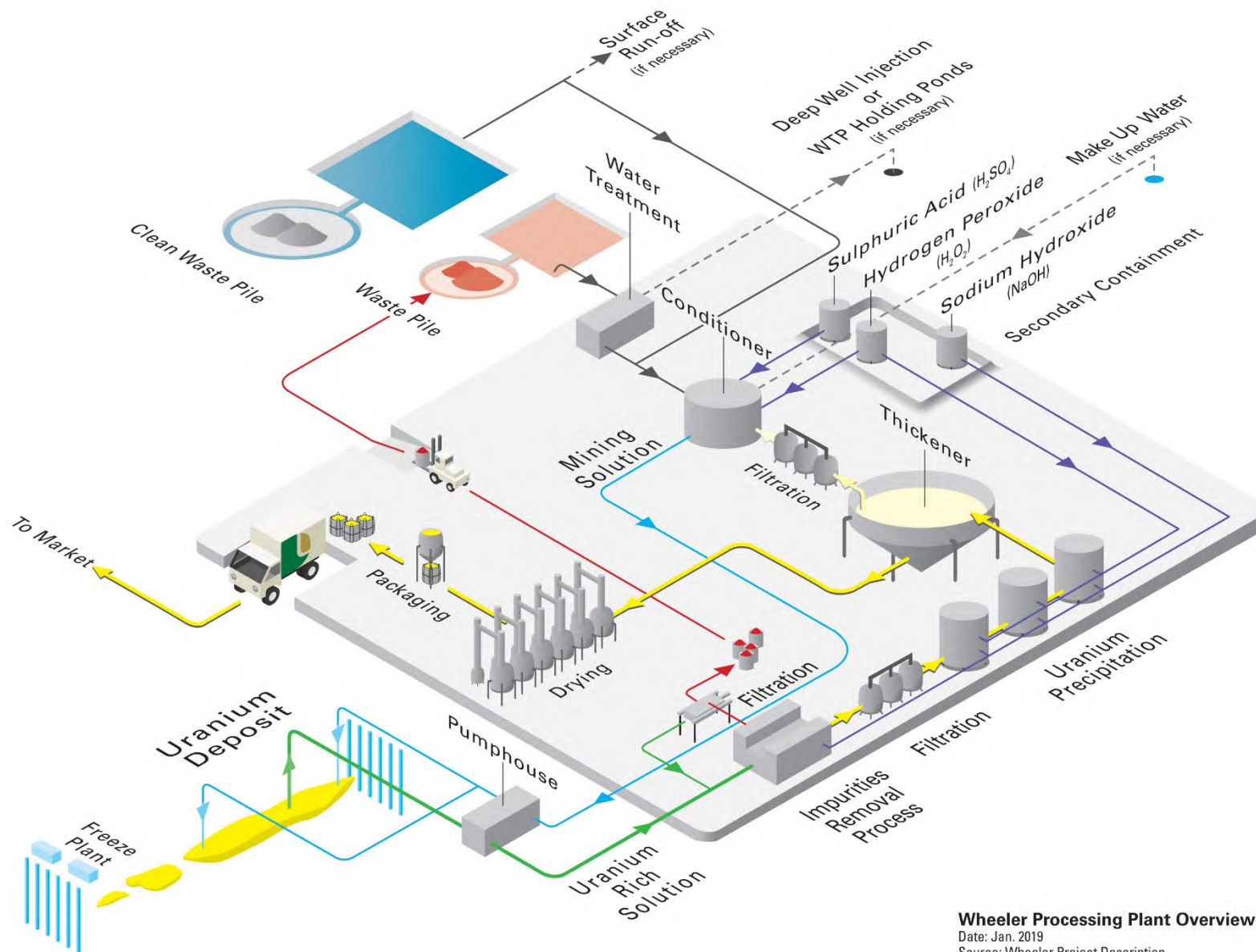
Schematic does not represent detailed engineering of the ISR well field and its components. Schematic not drawn to scale.



As part of the Project evaluation process, Denison completed numerous metallurgical test programs to simulate the ISR mining process, in accordance with industry standards – including leach tests, agitation leach tests, column tests, and post-mining restoration tests. The test results have been used to inform the design of the processing plant.

The processing plant design will be relatively simple for a variety of reasons. The first is that the ISR mining method eliminates the need for treatment of ore through conventional milling circuits like crushing, grinding and leaching. Secondly, as a result of the high uranium concentration and low levels of impurities in the uranium deposit and the uranium rich mining solution, Denison has demonstrated through test work that direct precipitation of the uranium is viable and may eliminate the need for ion exchange or solvent extraction circuits. However, to be conservative and allow for operational flexibility, future design work may evaluate use of additional processing circuits to improve performance. Finally, since the ISR process produces no tailings there is no need for tailings preparation circuits and a tailings management facility.

The processing of the uranium rich mining solution will consist of an impurities (mainly iron) precipitation circuit followed by the uranium precipitation, drying and packaging circuits (Figure 2.3). Details are provided in Section 2.3.2. The processing plant will be designed as a closed loop system, meaning that once the uranium is precipitated, the mining solution is reformed with reagents and returned to the wellfield for re-injection and further mining.



Wheeler Processing Plant Overview
 Date: Jan. 2019
 Source: Wheeler Project Description

2.2 Site History

2.2.1 Property Description

The Wheeler River exploration property is host to the Phoenix uranium deposit discovered in 2008 and Gryphon deposit discovered in 2014 (Figure 2.4) plus additional zones of mineralization and other prospective exploration targets.

Access to the property and deposits is by road, helicopter, or fixed wing aircraft from Saskatoon. Vehicle access to the property is by Highway 914. Access to Highway 914 north of Key Lake Operation is controlled by a gatehouse operated by Cameco. An older access road, the Fox Lake Road, between Key Lake Operation and McArthur River Operation provides access to most of the northwestern side of the property. The Fox Lake Road was decommissioned in 1999 and has been unmaintained since with the removal of all bridges and culverts in 2017. Gravel and sand roads and drill trails provide access by either four-wheel-drive or all-terrain vehicles to the rest of the property.



2.2.2 Land Tenure

The property consists of 19 mineral claims totalling 11,720 ha with an aggregate annual requirement of \$293,000 in either work or cash to maintain title to the mineral claims. In Saskatchewan, a mineral claim does not grant the holder the right to mine minerals. A mineral claim (Crown disposition) grants the right or privilege to explore or prospect for any Crown mineral or any other right to or interest in any Crown mineral or any Crown mineral lands. Based on previous work submitted and approved by the province of Saskatchewan, Denison has secured the title of the Wheeler River property until 2035. Denison continues to explore on the Wheeler River property and the right to explore on the property are reviewed on a project basis annually by the Saskatchewan Ministry of Environment.

A Saskatchewan mineral claim (Crown disposition) in good standing can be converted to a lease (Crown Lease) upon application. Leases have a term of 10 years and are renewable. A lease gives the holder the exclusive right to explore for, mine, work, recover, procure, remove, carry away, and dispose of any Crown minerals within the lease lands which are nonetheless owned by the province. Denison current has not converted any mineral claims to mineral leases. A surface lease agreement will be developed with the province following the successful completion of the environmental impact assessment process. It is anticipated that a small portion of the 11,720 ha mineral lease area will be converted to a surface lease.

Any uranium produced from the Wheeler River property is subject to uranium mining royalties in Saskatchewan, in accordance with Part III of the *Crown Mineral Royalty Regulations*. There is a 10% Net Profits Interest associated with the property held by the Wheeler River Joint Venture in approximate proportion to the ownership interests of each participant. There are no other back-in rights or third-party royalties applicable to this property.

There are no known environmental liabilities associated with the property, and there are no other known significant factors and risks that may affect access, title, or the right or ability to perform work on the property. All necessary permits for surface exploration on the property are in place and current. There are no known authorizations relating to a water lot in the Project area.

2.2.3 Exploration History

The Wheeler River property was staked on July 6, 1977. Excluding the years 1990 to 1994, exploration activities (such as airborne and ground geophysical surveys, geochemical surveys, prospecting, and diamond drilling) have been carried out on the property from 1978 to present. In November 2004, Denison became operator of the property and in 2005 carried out property-wide airborne geophysical surveys. The Phoenix deposit was discovered by diamond drilling in 2008, with subsequent delineation completed over the next six years from 2008 to 2014.

2.2.3.1 Current Site Conditions

Exploration field operations are currently conducted from Denison's on-site camp facilities, which are located approximately 3 km southwest of the Phoenix deposit (Figure 2.4). The camp provides accommodations for up to 40 field staff using ATCO trailer units and tent facilities (Figure 2.5). Fuel and miscellaneous supplies are stored in existing warehouse and tank facilities at the camp. Drill core from exploration activities is also stored on site. The exploration site currently generates its own power by diesel generator.

Denison maintains portions of the site roads necessary to gain access to the camp facilities (Figure 1.1) and complete field activities. This maintenance includes installation of temporary water crossings (bridges) and general road maintenance to ensure safe travel by either four-wheel drive vehicle or ATV. In addition, several gravel and sand roads as well as drill trails provide access by either four-wheel-drive or all-terrain vehicles to the rest of the property. These roads are maintained only as necessary.



Figure 2.5: Denison's Wheeler River Project Exploration Camp

Outside of the Phoenix drilling area (Figure 2.6) and Wheeler exploration camp facility, various surface disturbances have occurred since commencement of exploration activity in 1978. Several ground geophysical survey grid lines transect the property uniformly with an approximate additional 750 exploration pads that were cleared to accommodate diamond drill hole exploration programs. As a result of exploration drilling activities, several portions of the property have been previously disturbed with the removal of vegetation to allow for access trails and drilling areas.



Figure 2.6: Phoenix Deposit Aerial View

2.3 Project Components

The following section describes the anticipated Project components.

An overview of all proposed Project components is provided in Figure 2.7 and the proposed site layout is available in Figure 2.8.

2.3.1 In Situ Recovery of Uranium

2.3.1.1 Mining Solution

Test work completed to date indicates that the uranium at Wheeler is amenable to the same type of leach solution that is used to leach other Athabasca Basin uranium ores in mills: an acidic or low pH solution.

The Wheeler ISR mining solution will initially be created by adding certain reagents (e.g., sulphuric acid (H_2SO_4) and sodium chlorate (NaClO_3)) to fresh water. The fresh water will be sourced from either a shallow groundwater well or a nearby lake. The liquids will be mixed to achieve the optimal pH of the mining solution which is a pH between 1.0 to 2.0.

The mining solution will be pumped underground to the uranium deposit via an injection well and recovered as uranium rich mining solution through a series of recovery wells (Figure 2.1). Once uranium rich mining solution is recovered, it will be pumped from the pumphouses into the processing plant where uranium will be removed from the uranium rich solution. The mining solution will be reformed (Section 2.3.2) with reagents as required and pumped back into the mining chamber via an injection well (Figure 2.3). In this way, it is expected that the mining solution will be reused over and over again throughout the mining process. A small volume of make-up water will be added to the mining solution during operations to replace moisture removed during the yellowcake precipitation and drying processes. This make-up water will be preferentially sourced from site runoff where possible; although the EIA will include options for obtaining make-up water from either a shallow groundwater well or a nearby lake.



lenison Mines

Wheeler River Project
Provincial Technical Proposal and Federal Project Description

Figure 2.7: Overview of Proposed Project Components

May 2019



2.3.1.2 Wellfield

The ISR wellfield is a group of wells, installed and completed in an area of uranium mineralized. The Wheeler wellfield will consist of a combination of injection and recovery wells, potentially in the general arrangement of one recovery well in the centre surrounded by 6-8 injection wells. At surface, the spacing between the recovery well and each injection well is anticipated to be roughly 10 metres apart (Figure 2.1), with certain areas requiring closer spacing (approximately 5 meters) or further spacing (approximately 15 metres).

With these configuration options, the final wellfield for Phoenix is expected to include approximately 310 wells over a 90 m x 900 m area.

A variety of alternative arrangements or patterns of injection and recovery wells may be used; however, and may include other vertical or horizontal arrangements. The final details of the wellfield design (e.g., pattern on surface, distance between wells, orientation of wells, number of pumphouses, etc.) will be developed as Project engineering advances. A schematic of the conceptual wellfield and surface features is provided in Figure 2.2.

Well Design and Installation

There is no material difference in the design of an injection and a recovery well – both can be used to move mining solution in either direction depending on how pumps direct flow in or out of the ground. Pumping pressures between injection and recovery wells are expected to vary considerably depending on distance and stage of mining.

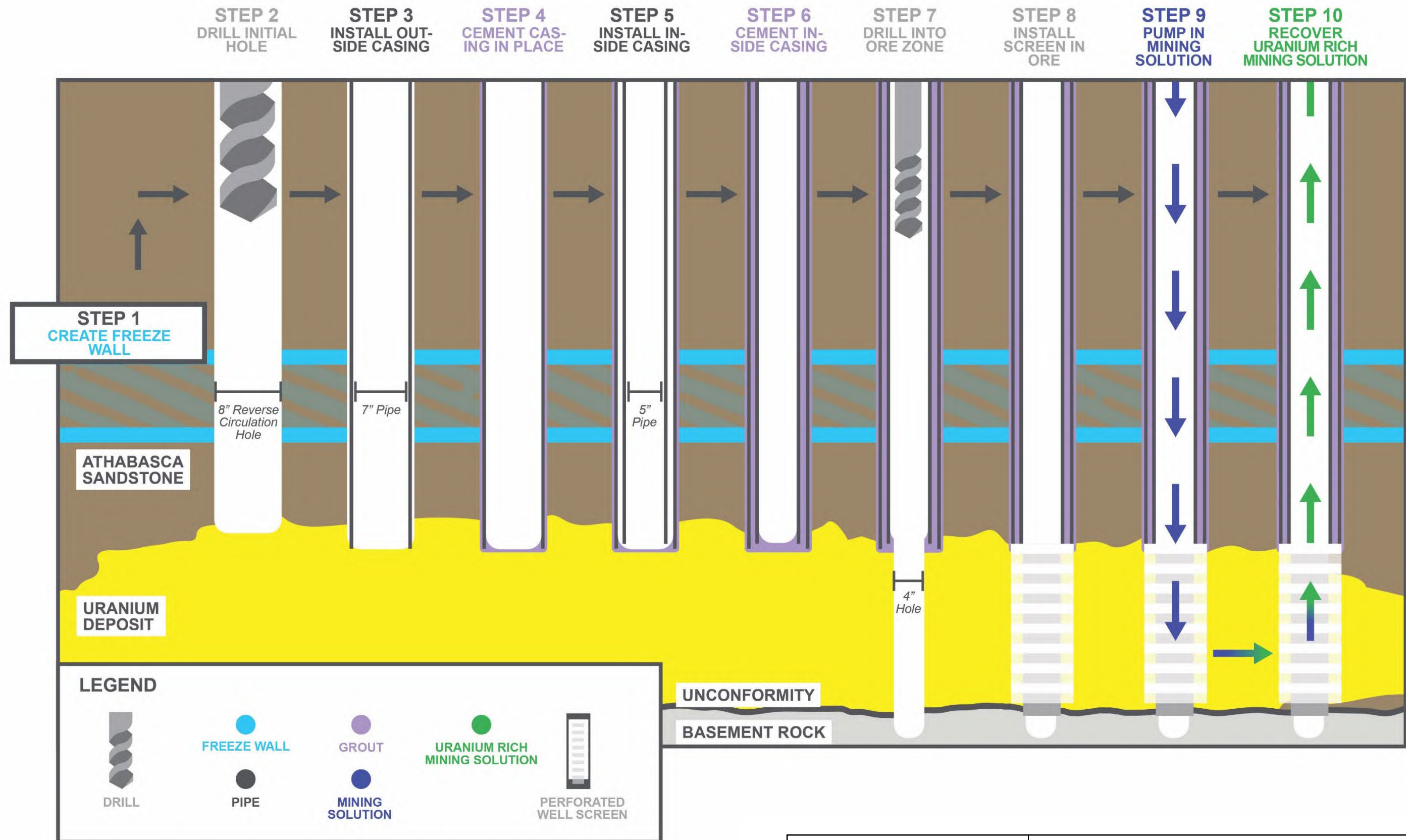
Injection and recovery wells at Wheeler may be about 4 to 8 inches in diameter at surface, however, other diameters may be used in some instances. Figure 2.9 shows photographs of a typical ISR well at surface and a standard type of well cover.

Figure 2.10 provides an overview of Denison's current conceptual well installation sequence based on prefeasibility level engineering. Specific details may change as the Project advances into feasibility and detailed engineering design stages.



Figure 2.9: Typical In Situ Recovery Well at Surface

Source: Confidential uranium in situ recovery operation in the USA



Schematic represents injection and recovery well installation concept at the prefeasibility stage. Details of well design, installation, and dimensions may be refined. Schematic not drawn to scale.

Pumphouses

Based on the current designs for the Project, approximately three pumphouses will be needed. A pumphouse is a small building or container on surface where pipes from injection and recovery wells are operated and flows of mining solution are monitored. See photos in Figure 2.11 for examples of components inside an operating ISR pumphouse in the USA.



Figure 2.11: Inside a Typical In Situ Recovery Pumphouse

Source: Confidential uranium in situ recovery operation in the USA

Pumphouses will distribute the mining solution to the injection wells, as well as collect the uranium rich mining solution from the recovery wells. Each pumphouse will be connected to two production trunk lines. One of the trunk lines will be used for receiving mining solution from the processing plant, and the other will be used for returning uranium rich mining solution back to the processing plant (Figure 2.1 and Figure 2.8). Each pumphouse will include a manifold, valves, flow meters, pressure meters, and instrumentation, as required, to fully operate, monitor and control

the process. Pumphouse control monitoring systems enable operators to individually adjust each recovery or injection well as well as allow for sampling. Operators can also use the master control system in the processing plant to remotely control pumphouse production lines.

Ventilation in the pumphouses will be designed with the ALARA principle (as low as reasonably achievable) in mind to provide sufficient worker protection from potential radon and radon progeny exposure. Monitoring systems will be in place to ensure these mitigation measures are meeting design specifications.

Wellfield Piping System

Pipelines will transport the mining solution to and from the processing plant. The flow rates and pressures of the individual well lines will be monitored in the pumphouses. This data will be transmitted to the processing plant for remote monitoring through a master control system. Through the master control system, operators will be capable of controlling pumphouse production lines remotely.

Double-walled high-density polyethylene (HDPE), or equivalent, piping will be used in the wellfields and will be designed and selected to meet design operating and environmental conditions.

The lines from the processing plant, pumphouses, and individual well lines will be freeze protected and secured to minimize pipe movement.

Monitoring Wells

Groundwater monitoring wells will be installed at various depths and locations in and around the wellfield. The monitoring wells will allow for both groundwater sample collection and measurement of groundwater level.

Mechanical Integrity Testing

After an injection, recovery, or monitoring well has been completed, and before it is made operational, a mechanical integrity testing of the well casing will be completed to ensure the installation has been successful and the well is functioning as designed. Well casings that fail integrity tests will be repaired before the well is placed into service.

2.3.1.3 Freeze Wall

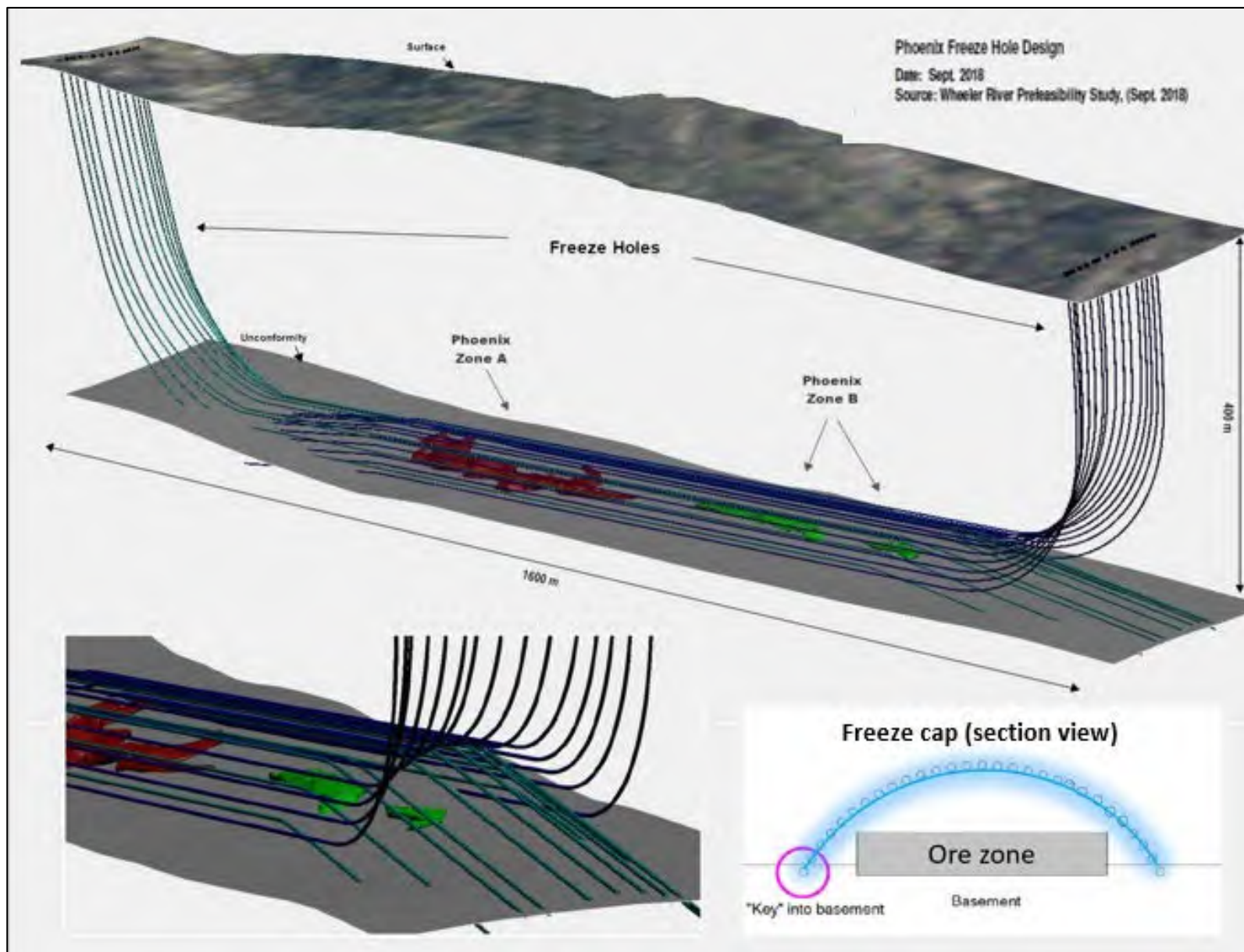
In typical ISR operations, containment is normally achieved through naturally impermeable geological layers (aquitards) or by artificially creating a drawdown of the water table by pumping.

At Wheeler, the very low permeability basement rock below the uranium deposit serves as a natural aquitard; however, the sandstone hosting the uranium deposit is permeable and groundwater can flow across the deposit. To achieve containment at Wheeler, the entire uranium deposit will be isolated from the surrounding sandstone by creating a freeze wall above and on all sides of the uranium deposit – encapsulating the uranium deposit (Figure 2.2).

Ground freezing technology is well established throughout the world. Its use in a mining environment was pioneered in Saskatchewan's potash mining industry and later adapted for use in Saskatchewan's uranium industry. Ground freezing to control and eliminate groundwater from entering the mining areas is a fundamental component of two existing Athabasca Basin underground uranium mines.

The freeze wall will be established by drilling parallel cased holes from surface, starting at both ends of the deposit and travelling horizontally along the long axis of the uranium deposit anchoring into the impermeable basement rock on the opposite end of the deposit. This process is illustrated in Figure 2.12 and is expected to be achievable using existing directional drilling techniques. Once the drill holes have installed, a low temperature brine solution will be circulated through the cased holes to remove heat from the ground, ultimately freezing the natural groundwater and establishing an impermeable, frozen wall to encapsulate the uranium deposit. While the freeze wall is expected to be several metres thick, it will be developed around the uranium deposit, to ensure the uranium deposit itself does not freeze.

The area under the freeze wall is referred to as the mining chamber. The approximate dimensions of the mining chamber are: 100 m wide x 30 m high x 1,300 m long. The volume of the mining chamber is approximately 1.8 million m³. The mining chamber is similar in shape to London, England's Paddington train station. The volume contained within the mining chamber is approximately the same volume contained in Roger's Centre in Toronto, Ontario as shown in Figure 2.13.



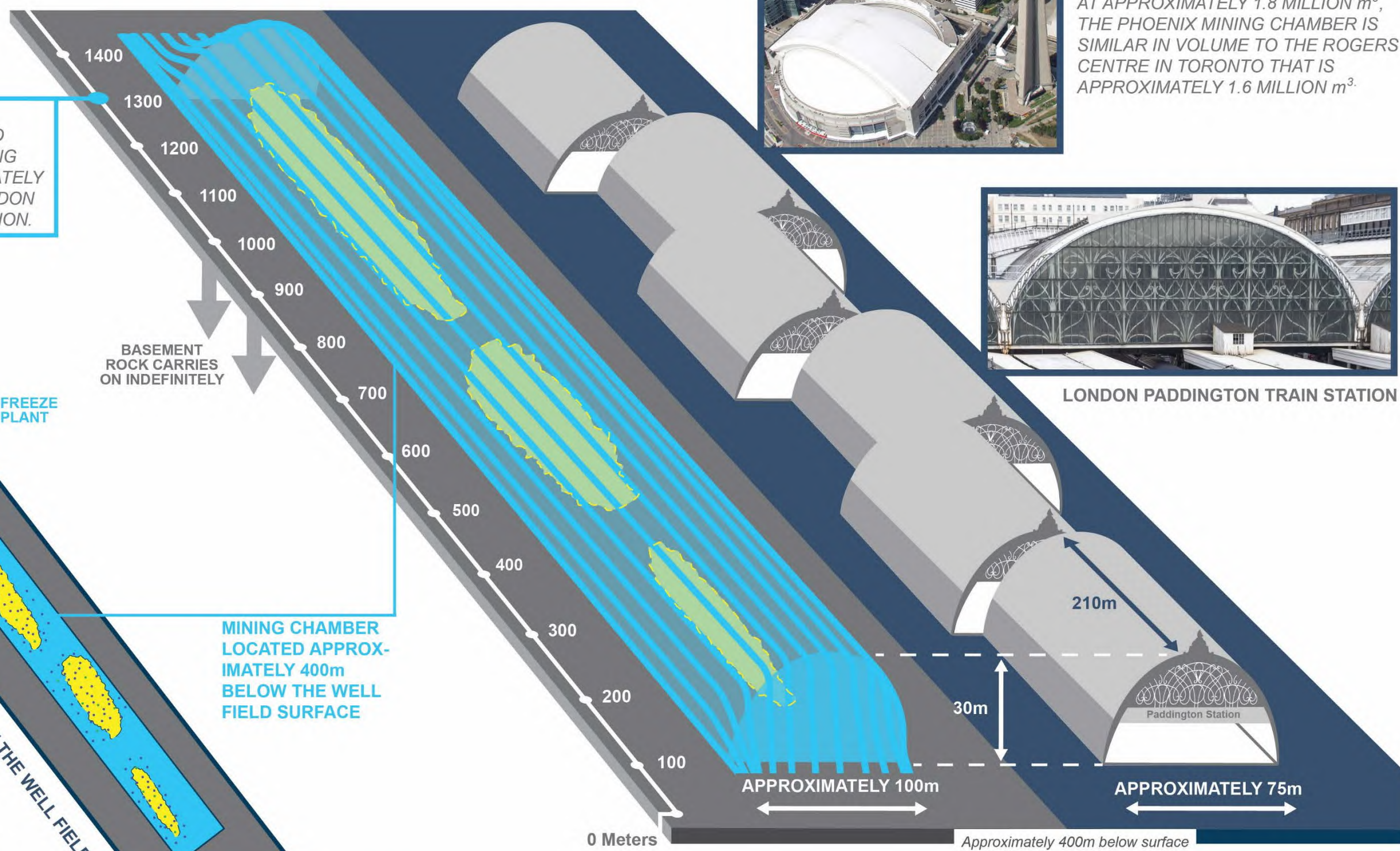
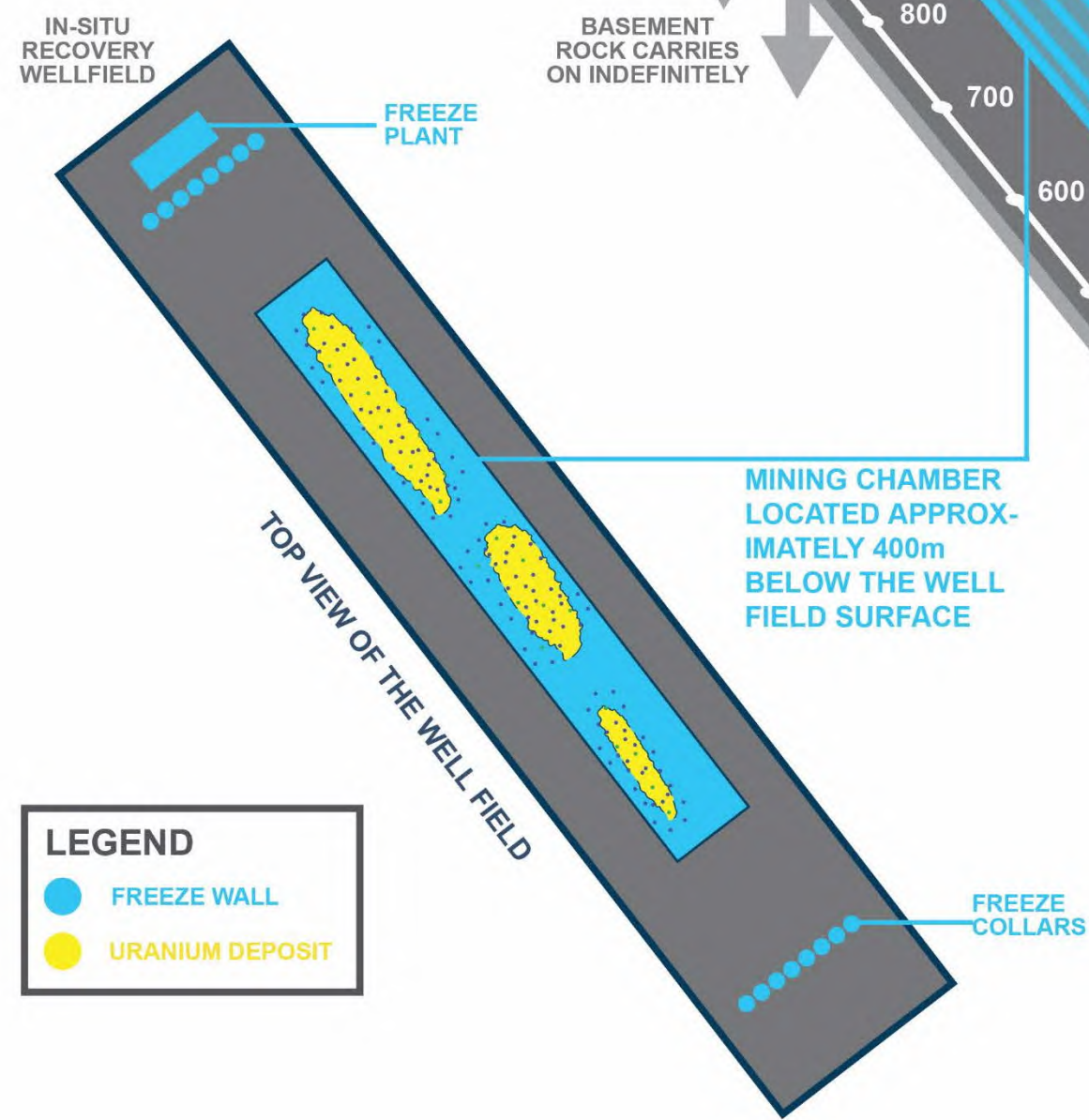
MINING CHAMBER
 AT 1300m IN LENGTH AND
 30m IN WIDTH, THE MINING
 CHAMBER IS APPROXIMATELY
 6X AS LONG AS THE LONDON
 PADDINGTON TRAIN STATION.



ROGERS CENTRE
 AT APPROXIMATELY 1.8 MILLION m³,
 THE PHOENIX MINING CHAMBER IS
 SIMILAR IN VOLUME TO THE ROGERS
 CENTRE IN TORONTO THAT IS
 APPROXIMATELY 1.6 MILLION m³.



LONDON PADDINGTON TRAIN STATION



LEGEND

- FREEZE WALL
- URANIUM DEPOSIT

Freeze Plant

Two freeze plants will be required on surface; one at each end of the deposit where the freeze holes are collared (Figure 2.8). The two freeze plants will be constructed on surface based on a modular design for easy installation and operation. The design for each freeze plant includes:

- Six modular freeze plant skids;
- One electrical/control skid;
- Six evaporative condenser skids; and
- One insulated brine tank.

Freeze Wall Timeline

Modelling predicts the freeze wall will require 14 months to be established. The freeze wall will be in place throughout the operations phase.

After decommissioning once the freeze wall is no longer needed and refrigeration is turned off, it will take a minimum of 2 to 3 years for the freeze wall to thaw depending on how long the freeze wall was active and actual ground conditions encountered.

2.3.2 Processing Plant

Refer to Figure 2.3 for an overview of the conceptual design of the processing plant.

The processing plant will house the tanks and equipment to fully process uranium rich mining solution recovered from the ISR wellfield into yellowcake and reformat the mining solution for continued use in the ISR wellfield. The processing plant will also contain filtration systems, bulk chemical storage, process solution storage tanks, and a control room.

The processing plant will be designed with expert consideration of potential environmental and health and safety effects to mitigate interactions to the extent possible. For instance, the floor will be graded as required and sumps will be installed to collect any spills. Ventilation in the processing plant will be designed with the ALARA principle in mind to provide sufficient worker protection and monitoring systems will be in place to ensure worker health and safety. Dust control and good housekeeping practices throughout the processing plant will also form a critical component of the Radiation Protection Management Plan developed for the Project. The processing plant exhaust, mainly from drying and packaging areas, will be directed through a stack and released outside of the building. The stack height will be designed based on results of air dispersion modelling to be an appropriate height for optimal dispersion. Bulk storage tanks for the processing chemicals, such as sulfuric and/or hydrochloric acid, sodium hydroxide, and hydrogen peroxide, will be located outside the processing plant. The storage tanks will sit inside appropriately designed and sized concrete secondary containment basins. The secondary containment basin for each applicable chemical system will be physically separated from the containment basins for other chemical systems.

The plant is anticipated to be approximately 50,000 ft² (4,600 m²) in size, which is about half the size of a CFL football field. The building will be constructed adjacent to the wellfield to minimize piping distances (Figure 2.8).

The uranium bearing solution will be pumped from the wellfield pumphouse(s) to the processing plant and pumped through the following circuits:

- *pH adjustment (not shown in Figure 2.3)* – The pH of the incoming uranium rich mining solution will be monitored and adjusted as required to ensure the uranium is fully dissolved.
- *Impurities Removal Process* – Uranium rich mining solution will be pumped to an impurities removal circuit where the pH of the solution will be adjusted to allow the precipitation of iron hydroxides and other metals. Once the impurities have precipitated out of the uranium rich mining solution, the solution is routed to the yellowcake precipitation circuit. Precipitated impurities removed at this step will be placed into totes and stored on the lined waste pad (Figure 2.8) until final disposal.
- *Uranium Precipitation* – Uranium is recovered from the uranium rich mining solution following the impurities removal process. Reagents are added to the uranium rich mining solution in a series of agitation tanks to precipitate dissolved uranium. If required, there is additional pH adjustment. The solution moves to a thickener that provides time for growth of the uranium oxide crystals. The precipitated uranium will accumulate at the bottom of the thickener and the mining solution, now depleted of uranium, will rise to the top. The mining solution is cleaned through a series of sand filters prior to reformation and re-injection into the wellfield. The precipitated uranium product accumulated at the bottom of the thickener is withdrawn at the underflow of the thickener and pumped through a filter press (*not shown in Figure 2.3*), where excess liquid is removed and circulated back to the thickener.
- *Yellowcake Dewatering/Drying and Packaging* – Entrained solids particles exiting the filter press will be collected for drying and packaged. Fresh water is sprayed on the surface of the cake to reduce the entrainment of contaminants in the dryer. Any remaining moisture is evaporated in the dryer. Any water collected from the drying process will be condensed and reused in the plant for reagents preparation. Once the moisture is removed from the yellowcake product, the yellowcake is packaged into 400 L steel drums via gravity. Denison will evaluate the use of either low temperature dryers or calciners for drying in the processing plant.
- *Mining solution reformation* – The ISR process circulates the mining solution through the uranium deposit over and over, and it is expected that contaminants may accumulate in the continuously recycled solution. Accordingly, it may be required to remove (or ‘bleed’) a portion of the mining solution to prevent accumulation of contaminants. The bleed solution will be routed to the water treatment plant where the contaminants will be removed from the system and any produced cleaned water will be re-used as process make-up water when possible. This bleed volume in addition to moisture losses in the drying process must be replaced. Reagents will be added to any makeup water (sourced from either surface runoff or fresh water from

groundwater or a lake) and will then be mixed with the recycled mining solution and re-injected into the mining chamber.

The ISR wellfield and processing plant will be designed to efficiently recover uranium and to reduce operating costs by recycling and re-using most of the solutions inside each circuit. Any excess treated water from the WTP will be released to a surface water body or injected into groundwater via deep well injection once acceptable water quality is achieved.

2.3.2.1 Production Capacity

The anticipated production capacity of Wheeler is up to 12 Mlbs/year with a mine life of up to 20 years. This is above the current known reserves at Wheeler and is intended to provide a conservative basis for assessing Project effects in the EIA and operational flexibility.

2.3.3 Roads

Mainland access to the site will be from Highway 914. A seven-kilometer (7 km) section of road will be constructed from the highway to the Wheeler site and a five kilometer (5 km) long road will also be constructed from the Wheeler site to the airstrip (Figure 2.7); the total road length is twelve kilometers (12 km). Additional site roads will include a service loop to the camp and a short service road to the runoff pond and the potential treated effluent discharge point.

Many of the proposed roads will be developed along previously disturbed areas, including roads currently used for exploration activities, thereby minimizing terrestrial habitat disturbance.

Denison anticipates the need for installation of two water crossings along the road from the Wheeler site to the airstrip. The crossings will be designed, constructed and maintained to avoid causing harm to fish and fish habitat.

During the PFS process (Denison 2018), an assessment was completed to evaluate access road alignment options from the highway into the Wheeler site. Several routes were analyzed for key factors including: length, cut and fill quantities, distance from cabins, distance from waterbodies and distance from any water crossings. As outlined in Section 8.2.1.2, a workshop was completed with communities to obtain input from local Indigenous and non-Indigenous communities into the access road routing options. After the engagement process and using community input, the preferred route was selected and incorporated into the current Project design.

2.3.4 Supporting Infrastructure

2.3.4.1 Air Strip and Terminal

As a proposed fly in-fly out operation, Wheeler will require an airstrip to bring personnel to and from the site.

A 1,600 m long airstrip is proposed to be positioned in a natural and relatively flat valley to the NE of the Wheeler site (Figure 2.7). The magnetic headings are 03/21, which is similar to both the

Collins Bay airport and Key Lake airstrip. The runway has been designed to accommodate the aircraft presently used by existing mining operations in northern Saskatchewan to transport personnel into and out of site. An airstrip terminal building and two double-walled Jet A fuel tanks, to provide site service to aircraft as required, will be constructed near the airstrip. The approach line to the airstrip from the SW clears the Wheeler surface facilities by 500 m.

2.3.4.2 Accommodations Facility

Located to the southeast of the wellfield, the proposed accommodations facility is anticipated to be a turnkey building manufactured offsite and assembled and commissioned on-site. The building's design will be sized to accommodate a peak load of about 100-150 individuals during operations; however, due to its modularized design, additional modules can be easily installed should additional beds be required in the future.

The facility will include a central services complex with:

- Kitchen with food preparation area and serving area;
- Dining room;
- Camp office;
- Commissary;
- Recreation area; and
- Exercise facilities.

2.3.4.3 Operations Centre

The operations complex is planned to be a standalone, multi-functional building that will serve the administrative, technical, and maintenance needs of the site.

At the PFS stage, the building is proposed to be a two-story pre-engineered structure with total usable space of 38,000 ft²: 27,000 ft² on the first floor and 11,000 ft² on the second floor.

The first floor will house the two-story shops, dry space, and warehouses. The shops will include three full-sized maintenance bays, with one being equipped as a welding bay. Areas of the operations centre will be designed to have containment and sumps as required. Men's and women's change areas (dries) will be provided, with contamination control and suitable wash spaces for each, including laundry facilities. The warehouse has two receiving doors adjacent to the shops. Office spaces will also be provided in these areas for warehouse and procurement staff as well as maintenance supervisors.

The second floor will have administrative space with offices, a boardroom, meeting rooms, lunchroom, and washrooms.

Additional facilities include:

- Medical or nursing station with waiting area;

- Parking space for emergency response vehicles;
- Space for storage of mine rescue/emergency response gear and supplies;
- Laboratory facilities;
- Training room; and
- Mechanical and electrical services rooms.

2.3.4.4 Security Houses and Truck Scales

Access to the property will be controlled by both a north and south security gate (Figure 2.8).

The main, south gate security house will be staffed as required and be equipped with an 80-tonne weigh scale that is hard-wired into the shack. The security and truck scale buildings are planned to be modular, pre-fabricated units that will be manufactured off-site and shipped to site for installation and commissioning. The south gate facilities will have appropriate power and communications capability.

The north gate will be a simple locked gate.

2.3.4.5 Wash Bay and Scanning Facility

A wash bay will be available to clean items, equipment and vehicles that may have been in contact with potential contaminants. Contaminated water from wash bay will be collected in a sump tank and routed to the water treatment plant for treatment and discharge.

Radiological clearance scanning required for any items, equipment and vehicles leaving the site will be conducted in the same building.

2.3.5 Power Needs and Power Supply

Operation of an ISR uranium mine does not require substantial inputs of energy compared to traditional mining methods.

In an effort to further improve Wheeler's energy efficiency, Denison will assess using state of art technology for battery-powered light vehicles and mobile equipment. Similarly, Denison will evaluate the viability of using an AC powered dual rotary drill for ISR wellfield development rather than a traditional diesel-powered unit. Site infrastructure anticipated to draw power from the provincial power grid, includes the camp buildings, operations buildings, the ISR precipitation plant, and the freeze plants.

Primary Power Supply

Electrical service to Wheeler will be provided via an approximate 5 km extension tap from the existing 138 kV overhead transmission line that runs along Highway 914. Optimization of the precise line route will be completed as the Project advances and will likely follow the access road alignment.

Power transmission to the site (e.g., assessment, obtaining necessary permits, and construction) will be led by SaskPower and is not considered as part of this Project (refer to Section 2.6).

Back-up Power Supply

Based on historical data provided by SaskPower, the outage rate of the existing line is approximately six outages per year. To provide electrical service during times of utility outages, emergency diesel generator will be installed in strategic locations to service the site and maintain essential functions.

The generators will be used to maintain power to the processing plant and the accommodations facility, as well as to maintain other essential services as required.

2.3.6 Water Management and Treatment

As part of Denison's approach to sustainable mining at Wheeler, Denison intends to recycle process water to the greatest extent possible, thereby reducing the demand for a fresh water supply. The proposed recycling process design incorporates a closed-loop system within which only limited make-up water is estimated to be required to supplement ISR mining and on-site processing. As a result of the focus on water recycle, the volume of treated effluent requiring discharge is expected to be low.

2.3.6.1 Site Runoff

Water will be collected from the waste pond (which collected runoff from the waste pad) and the processing plant terrace and then directed to the water treatment plant. Runoff for the small clean waste rock pile may be collected into a settling pond to remove total suspended solids if necessary. Other site runoff collection needs will be examined and identified as part of the EIA.

2.3.6.2 Fresh Water Supply and Distribution

A fresh water distribution system will be designed to provide fresh water to the fire water system (fresh water tank, two electric fire water pumps, and a back-up diesel fire water pump for on-site fire suppression needs), the potable WTP, the processing plant, wash bay and temporary batch plant (required during construction phase). Fresh water will be sourced from either a shallow groundwater well or an intake from a nearby surface water body. Estimated fresh water consumption rates are provided in Table 2.1 below.

Table 2.1: Estimated Fresh Water Consumption Rates

| Consumer | Flow Rate (L/day) |
|--|-------------------|
| Processing Plant | 2,000 |
| Wash Bay | 6,000 |
| Potable WTP | 30,000 |
| Temporary Batch Plant (during construction only) | 5,000 |

2.3.6.3 Potable Water Treatment Plant and Distribution

Raw water for the potable WTP will be sourced from either groundwater or a nearby surface water body.

Potable water will be generated on site by a pre-fabricated modularized (40 ft shipping container) potable WTP comprised of a treatment plant, a 2,000 L storage tank, and a bottle filling station. Potable water will be piped to the camp, the operations centre, and the processing plant to provide water for safety showers and eyewash stations. Other locations, such as the airstrip terminal, gate houses and satellite lunch trailers (during construction) will receive bottled water as required.

Ultrafiltration or reverse osmosis with UV filtration are proposed for filtration. Chlorination will be needed prior to distribution. The modular plant will be capable of all necessary processes and will contain required HVAC and lighting. The potable WTP will be placed on a concrete pad and will generate 1.4 m³/hr (33 m³) of potable water per day based on 300 L per person per day. Raw water will be pumped to the potable WTP via pipeline from the fire water storage tank and fresh water distribution system.

2.3.6.4 Sewage Treatment Plant

Domestic waste water and sewage will be generated at the camp, processing plant, and the operations centre. Domestic waste was assumed to be generated at the rate of 300 L per person per day. Sewage will either be collected in septic tanks and transported by a vacuum truck or piped directly to the on-site sewage treatment plant. The sewage treatment plant will be a modular facility comprised of two heated and insulated units (likely containers), a holding tank, ancillary filtration, ancillary treatment process equipment, and sludge handling system. Denison may investigate options to dispose of treated sewage underground or through a septic field. Alternatively, the sewage treatment plant will generate effluent suitable for discharge to local surface water. Treated effluent will first be discharged to surface testing ponds where the water quality will be checked to ensure it meets regulatory limits. Reject solids from the treatment process will be collected, dewatered, and stored on the waste pad on site prior to permanent disposal.

2.3.6.5 Water Treatment Plant

The Wheeler WTP will be designed to treat any contaminated water removed from the ISR process (e.g., backwash of sand filters, bleed solution), runoff collected from the waste pad, and any other contact water such as water from the wash bay and process sumps. The WTP will be located inside of the processing plant.

Contaminants will be removed from the system. It is Denison's intent to incorporate treated water back into the mining water balance as make-up water in the processing plant, to the extent possible. Any excess treated water from the WTP will be pumped to appropriately-sized holding

ponds. The holding ponds will be sized to hold effluent for a period of 24 hours for testing before discharge to the environment.

Treated water in the ponds will be monitored prior to release to a surface water body or injected into groundwater via deep well injection. All treated effluent released to surface water will meet federal and provincial regulatory discharge limits. The treated effluent discharge line will be heated and have secondary containment in place.

Details on the proposed treated effluent discharge location, the pipeline, the type of release point, and modelled results of any changes in the aquatic environment will be presented in the EIA.

2.3.7 Waste Management

2.3.7.1 Incinerator

Denison plans to operate an incinerator to incinerate any food waste. This is a best practice to avoid attracting wildlife into the site. It is expected that selection of an appropriate incinerator will have design components to mitigate emissions to air. Correct operation and regular maintenance of the incinerator will be important to achieve the design parameters for minimizing emissions to air and procedures will be in place to achieve this.

2.3.7.2 Landfill

Denison plans to construct, operate, monitor and decommission a domestic landfill on site. A waste management plan will be developed for the Project which will detail how each type of waste generated on site will be managed. In general, only inert non-hazardous wastes such as wood and plastics will be suitable for disposal in the on-site landfill.

2.3.7.3 Waste Pad and Pond

During operations, the waste pad is expected to contain:

- Mineralized drill cuttings from wellfield development;
- solid impurities (mainly iron and/or radium) removed from the uranium rich mining solution during the impurities removal step in the processing plant; and
- dewatered reject solids from the sewage and water treatment processes.

The waste pad will be double lined, with leak detection capabilities and an associated monitoring program to ensure containment. An adjacent pond will be used to collect runoff from the pad and water in the waste pond will be piped to the water treatment plant for treatment. As part of the EIA, Denison will identify options for either on-site disposal of these wastes or off-site disposal at an approved facility.

2.3.7.4 Clean Waste Rock Pad and Pond

Clean waste rock will be generated from the sandstone cuttings from drilling activities. This includes the drilling of the injection and recovery wells to create the ISR wellfield and the drilling of

freeze holes to create the freeze wall. It is estimated that a total of 7,100 m³ of clean waste rock will be generated.

Clean waste rock will be stored on an unlined pad and can be used for road or concrete construction. A pond may be constructed beside the pad to collect runoff if required.

2.3.7.5 Hazardous Substance Storage and Use

Fuel Storage and Dispensing Facility

Since the site's primary power supply will be from the provincial electrical grid, Wheeler fuel consumption at Wheeler may be limited to back-up power supply, auxiliary vehicles (i.e. ATVs and snowmobiles), miscellaneous equipment (i.e. portable pumps), and freight and personnel transportation to site. This will reduce Project fuel consumption and minimize greenhouse gas emissions.

Tanker trucks will deliver diesel and gasoline to the site on an as-needed basis. Fuels will be stored in approved, above-ground, 25,000 L double-walled storage tank(s) equipped with secondary containment in accordance with provincial regulations and standards. Fuel storage and distribution infrastructure will be constructed in accordance with applicable legislation requirements (e.g., *Hazardous Substances and Waste Dangerous Goods Regulations*). Stationary and mobile equipment will be fueled with a fuel-dispensing truck.

Propane Facility

Propane may be used as a primary or backup means to support the camp kitchen, the incinerator, and to heat the buildings. The propane facility will be sized to meet the needs of the site activities and will feature a storage tank (assumed to be 30,000 uswg), vaporizers, a propane bottle fill station, and a propane bottle weigh station. Propane will be delivered to site on an as needed basis.

Other Hazardous Substances

Sulfuric acid, hydrogen peroxide, sodium hydroxide, barium chloride and flocculants are the main chemicals anticipated to be used in the processing plant and in mining. Bulk storage tanks for the processing chemicals, such as sulfuric and/or hydrochloric acid, sodium hydroxide, and hydrogen peroxide, will be located outside the processing plant. The storage tanks will sit inside appropriately designed and sized concrete secondary containment basins. The secondary containment basin for each applicable chemical system will be physically separated from the containment basins for other chemical systems.

The various lubricants and coolants required for regular maintenance of equipment will be stored on site.

Each one of these materials will be stored, handled, recycled or disposed of in an appropriate manner and meet the requirements of the *Hazardous Substances and Waste Dangerous Goods Regulations*.

No fuels, oils or other hazardous substances will be stored within 100 m of any water body and no equipment maintenance or re-fuelling will be conducted within 100 m of a water body. Denison will maintain an up to date record of the various hazardous substances on site and will maintain Material Safety Data Sheets and appropriate procedures for spill management, handling and clean up in an accessible location.

2.4 Project Activities and Schedule

The following sections describe the main activities to be performed in each Project phase and the proposed schedule for Project development.

2.4.1 Pre-Development and Construction

2.4.1.1 Pilot Demonstration Well Pattern

In order to obtain essential data for detailed engineering, licensing and the environmental assessment, Denison may elect to operate a pilot demonstration well pattern. A separate proposal will be submitted to the appropriate regulatory agencies for review and approval. The pilot demonstration may include well development, circulation of mining solution over a small spatial area and subsequent recovery of the mining solution. Permeability enhancement of the uranium deposit may be included as part of the scope. Monitoring wells will be in place and monitoring will be conducted to ensure the well pattern functions as proposed. It is not anticipated that the pilot demonstration will incorporate the use of a freeze wall.

2.4.1.2 Pre-Development Phase

Following receipt of environmental approvals, the preparatory phase will include initiation of licensing activities, organization of the Project execution team, preparation of key Project documents, and procurement of equipment, materials, and labour. These activities will be initiated during the last stages of the feasibility study should results continue to support advancement of the Project.

2.4.1.3 Construction Phase

Following receipt of licensing approvals, construction activities on site will commence. Construction of Wheeler infrastructure can be divided into several key areas as outlined below.

Site Preparation: Clearing and leveling of the surface facilities will be contracted out to a suitable contractor. The initial earthworks construction will focus on preparing roads into the site, specifically to the ISR plant and the two ends of the wellfield where the freeze wall drilling will occur. These two sites will remain the focus of levelling and grading activities. All of this work will be supported by temporary camps and utilities (and/or the existing exploration camp and utilities) while permanent facilities are established. Temporary security checkpoints will be established early in the site preparation phase.

Wellfield and Freeze Hole Drilling: Denison has been drilling on the property since 2004; this experience and knowledge will be applied to the drilling of the freeze and wellfield holes. Suitably qualified and experienced contractors will be overseen by Denison personnel to complete drilling activities.

Ground freezing requires the establishment of a pattern of freeze wells drilled across the uranium deposit and of refrigeration units and corresponding electrical and mechanical services to each. Freeze well drilling will be initiated as early as possible. The ground freezing units will arrive at site and be physically installed and operating when the appropriate tie-ins to the site power distribution system is completed.

Processing Plant Construction: While the processing plant is likely the most complex construction activity for the Project, it is relatively simple when compared to other full-service uranium mills, as there are a limited number of vessels and minimal piping. Furthermore, due to the degree of isolation of the plant from other site facilities, construction of this facility can be prioritized with minimal impact to other facilities. Most of the equipment and materials inside the plant are small in size, enabling the shipment of tanks and other vessels pre-assembled. Processing plant construction will begin immediately following earthworks at the site. After foundations are completed, the building can start constructed. A short commissioning period begins post-construction prior to first uranium production.

Other Surface Infrastructure: Other surface infrastructure includes camp buildings, the operations centre, the airstrip terminal building, and various other smaller infrastructure. With the exception of the operations centre and processing plant, all other buildings are expected to be pre-fabricated buildings to reduce the costs of construction on site.

The operations center is planned to be completed ahead of commissioning. This will allow the operations team to conduct activities in a suitable building and will create a permanent maintenance facility before operations commence. The permanent camp is completed in a similar time frame, along with basic services such as permanent communications and fire systems.

A temporary batch plant will be used during the construction phase. Concrete will be required for construction of foundations and containment walls in select surface infrastructure.

Electrical infrastructure: A powerline will be constructed from the existing provincial power line adjacent to Highway 914 into site to the main substation. Distribution around site will be completed as required to support the various operations.

Other: The balance of the infrastructure items, such as storage areas, incinerator, and security gates, are planned to be completed at about the time of commissioning and will complete the construction at Wheeler.

Commissioning of the facilities is expected to be supported by engineering and/or supplies vendors along with the assistance of the construction teams. This will ensure constructed facilities adhere to the designs and specifications set forth.

Project and construction management during the capital development phase of the Project will be managed by a small dedicated Project management team. During the construction phase, Denison will provide general and administrative services to operate the site and support the contractors in construction (i.e. room and board, flights, general supplies, freight haulage, etc.). It is expected that a mix of employees, contractors, and engineering service providers will support site construction efforts.

Wheeler construction milestones are summarized in Table 2.2.

Table 2.2: Wheeler Conceptual Development Schedule

| Project Activity | Schedule |
|---|-----------|
| Environmental Impact Assessment and Licensing | 2019-2022 |
| Feasibility Engineering | 2019-2021 |
| Detailed Engineering | 2021-2022 |
| Construction | 2022-2024 |
| Operation | 2024-2044 |
| Decommissioning (does not include progressive decommissioning during operations) | 2044-2049 |
| Post-decommissioning | 2049-2054 |
| Release from licence and transfer back to Crown land or into Provincial Institutional Control Program | 2055 |

2.4.2 Operation

Operation of Wheeler is planned to last up to 20 years. Denison anticipates operating the site with employees and a limited number of external contractors.

The operation phase is generally focused on operating the Project components presented in Section 2.3. As such, the operational activities for Wheeler include but are not limited to:

- Operation of the ISR wellfield;
- Operation of the ISR processing plant and production of uranium concentrate at a production rate of up to 12 Mlbs U₃O₈/year;
- Maintenance activities at the wellfield, processing plant, roads, airstrip and other site facilities;
- Water withdrawal from groundwater or surface water body for potable use, fire suppression system and make-up water in the processing plant;
- Water treatment of potable water, sewage, and waste water;

- Waste management;
- Environmental monitoring as outlined in the Environmental Management System;
- Package and transport of nuclear substances;
- Reporting to regulators;
- Engagement with local Indigenous and non-Indigenous communities; and
- Systems for maintaining site security.

2.4.3 Decommissioning

The five main decommissioning activities include:

- Mining chamber remediation;
- Decontamination;
- Asset removal;
- Demolition and disposal; and
- Reclamation.

Progressive decommissioning will be completed throughout the life of the Project whenever feasible and reported to the regulatory agencies as part of the annual reporting requirements throughout operations. Progressive decommissioning activities will focus on the decontamination, demolition, and disposal of unused buildings and infrastructure, as well as the removal of unused equipment and machinery. Reclamation of inactive areas will take place when these areas become available.

Closure of the entire Project will be completed in accordance with all provincial and federal regulations and guidance documents with the fundamental considerations being to ensure physical and chemical stability of the site in order to protect human health and the environment.

2.4.3.1 Mining Chamber Remediation

Mining chamber remediation will be initiated once mining is completed. The objective will be to restore the water within the confines of the freeze wall (i.e. within the mining chamber) to reach an acceptable decommissioning objective. Details on groundwater quality decommissioning objectives for the mining chamber will be developed as part of the EIA.

To complete mining chamber remediation, water will be injected into the mining chamber via injection wells and then recovered through the recovery wells. Produced water would be processed through the processing plant until non-economic uranium concentrations are observed. Non-economic produced waters will be treated and mixed with fresh water for continued circulation in the mining chamber. This will continue until recovered water reaches acceptable groundwater quality decommissioning objectives.

During groundwater restoration, reagents may be added to the injected water to accelerate groundwater quality recovery.

After remediation has been completed, the freeze wall will be turned off and allowed to thaw. This will allow the eventual re-establishment of the pre-operational groundwater flow regime in the former mining chamber area.

2.4.3.2 Decontamination

Surface facilities and injection, recovery, and monitoring wells will be systematically surveyed and decontaminated as necessary. Surplus chemicals and other hazardous materials will be removed and stored in designated temporary storage facilities. Sumps will be cleaned. All hazardous materials will be disposed of at approved off-site facilities. All radiologically contaminated material will be disposed of on-site in accordance with licence conditions.

Empty tanks will be removed from the sites and sold as scrap or reused. Otherwise, they will be transported to an approved waste management facility. Fuel tanks will be managed by a contractor licenced to handle these types of tanks. Any remaining fuel and tanks will be removed by the contractor from the site. As much waste as possible will be hauled off-site and disposed of at appropriate licenced facilities.

2.4.3.3 Asset Removal

Salvageable machinery, equipment, and other materials will be dismantled, decontaminated, and taken off-site for resale or recycling. Remaining items will either be managed at a facility licenced to manage radioactive wastes or disposed of in an approved facility on-site.

2.4.3.4 Demolition and Disposal

All permanent structures that cannot be removed from the property as an asset will require demolition. Most process equipment and non-supporting structures will be removed from buildings prior to demolition and the buildings will be demolished.

During demolition, dust control will be required. An initial wash may be necessary, in addition to the wetting of demolition debris as structures are disturbed during demolition. The requirement and duration of misting will be determined on a case-by-case basis.

A review prior to the start of demolition will identify areas requiring additional procedures. Where possible, dust generating materials will be removed prior to demolition. Appropriate personal protective equipment and personnel decontamination procedures will be employed.

Valuable recyclable materials will be separated and processed for transport and sale concurrent with demolition. Excavators equipped with grapples will sort the recyclable products from the non-recyclables. Shears will be used to size recyclables for shipping and sale. Cleaning procedures of recyclables will be integrated into demolition, as necessary.

Concrete foundations will be left in place. Any portions of concrete foundations remaining above grade will be levelled and rebar will be cut-off at grade. Large slabs will be perforated on a 2 m grid to permit drainage. Concrete slabs will be covered with 0.5 m of development rock or locally stockpiled till.

The demolition process will produce:

- Saleable recyclable materials (steel, stainless steel, copper, steel sections, and sheet metal);
- Hazardous materials, including contaminated material that cannot be decontaminated;
- Roofing materials and insulation;
- Wood;
- Concrete; and
- Contaminated soils.

Saleable recyclable materials will also be transported off-site as scrap or recycled.

Hazardous materials will be handled and disposed of in accordance with the appropriate regulations and good practice. Where possible, chemicals will be mixed to produce a neutral solution and disposed of in an approved manner at site. Hazardous materials, such as spent chemicals (that cannot be managed on-site), waste oil, and sludges, will be disposed of off-site at licenced facilities.

Non-hazardous waste materials, such as roofing materials, insulation, wood, co-mingled concrete, and light steel (i.e. hand railings), may be disposed of on-site or off-site in a licensed landfill. Soil testing will be conducted in any areas of known contamination and/or potential spills, including areas around chemical, fuel, and explosive storage areas. Testing will be conducted according to industry standard procedures and compared to provincial and federal soil standards.

2.4.3.5 Reclamation

An overview of the reclamation activities that will be completed for the main Project components is provided below. The main Project components that will require reclamation at closure include:

- ISR wellfield and infrastructure;
- Transportation corridors and laydown areas;
- Ancillary infrastructure;
- Waste pad; and
- Water storage ponds.

Closure of the ISR wellfield and associated infrastructure will require the following activities:

- Decommissioning of all injection and recovery wells, following acceptable wellfield restoration;
- Removal, decontamination, and disposal of all surface piping;
- Decontamination and removal of the pumphouses;

- Decontamination, removal, and/or disposal of the processing plant;
- Allowing the freeze wall to thaw and decommissioning of all freeze pipes and freeze plant; and
- Placement of all waste in an approved long-term licenced facility.

Prior to reclamation, the existing wellfield will be used to circulate neutralizing solution and clean water through the mining chamber. The tanks in the processing plant may be repurposed and used for the closure water treatment process.

Transportation corridors will be graded and scarified to promote natural revegetation. Access roads required for post-closure monitoring will be left as is and maintained to permit access. Access to the site will be restricted by gates and/or berms. Laydown areas will be scarified, covered with 0.5 to 1.0 m of stockpiled overburden, and vegetated with native self-sustaining species.

Reclamation of remaining infrastructure components involves the decommissioning and removal of components such as power transmission lines and electrical infrastructure, water pipelines, and water treatment plants. Ponds and lined settling ponds will be decommissioned once they are no longer required for water management. Any contaminated liners will be removed and hauled to an approved landfill. The footprints of ancillary infrastructure will be scarified and vegetated with native self-sustaining species as required.

2.4.4 Post-Decommissioning

The post-decommissioning period will extend from the end of physical decommissioning until transfer of the site into the provincial Institutional Control Program (Government of Saskatchewan 2009) or direct release of the land back to the Crown, is expected to last five years.

Following decommissioning, physical, chemical, and biological monitoring of the site will be conducted to ensure that the site is chemically and physically stable. The monitoring programs will be designed and conducted in accordance with the provincial and federal regulations and licence conditions.

The following is a summary of the anticipated monitoring programs:

- Groundwater quality;
- Physical stability;
- Biological; and
- Surface water quality.

The monitoring programs will be conducted until the site-specific decommissioning and reclamation objectives for the Project are met. Monitoring reports will be developed and submitted to both the provincial and federal regulators, in accordance with licence conditions.

2.5 Project Alternatives

Denison first initiated evaluation of the production potential from Wheeler in 2010. Since that time the Project has undergone significant design and review stages and has naturally evolved into the current state. During this time, several key alternatives and options were evaluated including:

1. Mining methods: Historical work evaluated a total of 32 mining methods to extract uranium from the deposit. Methods were evaluated through an increasingly rigorous process and considered factors such as: safety, environment, production rates, capital costs, operating costs, schedule, operational flexibility, risk, etc. In addition, specific workshops were held in local Indigenous and non-Indigenous communities to capture community input into the selection of a preferred mining method. After several years of study, the ISR mining approach was selected as the best option across the majority of factors.
2. Mineral Processing: In conjunction with the above assessments, historical work evaluated the construction of an on-site conventional mill to process run of mine ore from an underground mine. Factors such as: safety, environment, production rates, capital costs, operating costs, schedule were considered. Ultimately the decision to avoid construction of a conventional mill and tailings facility was made.

Following the selection of ISR as the mining method, further processing alternatives were evaluated including the use of a toll mill to process the uranium rich mining solution, ion exchange technology (common to international ISR operations) and direct precipitation. Direct precipitation on site scored the highest in all evaluation categories.

3. Site Access Road Routing: The Wheeler site is approximately 4 km from the existing highway 914. An assessment of several routes was completed and considered factors such as: safety, environment (total disturbance), capital costs and risk. In addition, specific workshops were held in the Indigenous and non-Indigenous communities to capture community input into the final route selection.
4. Treated Effluent Discharge Location: After completion of baseline data collection a preliminary evaluation of potential surface water bodies was completed to assess the suitability of the surrounding areas to receive treated effluent from the site. Preliminary modelling identified five surface waterbodies that would likely be able to receive treated effluent without significant adverse environmental impacts. More detailed assessments of these waterbodies were completed and factors such as safety, environment, capital cost, operating costs and risk were considered. In addition, specific workshops were held in Indigenous and non-Indigenous communities to capture community input into the final location selection.
5. Site Infrastructure Layouts: Throughout the design process, several iterations of the site infrastructure and placements were considered. This process is on-going with factors such as safety, environmental disturbance, schedule, capital costs and risk being considered.

2.6 Ancillary Projects

SaskPower will secure permits for and construct the ~5 km powerline extension from along Highway 914 into Wheeler. It is anticipated that the powerline extension will be adjacent to the access road.

Saskatchewan Ministry of Highways has initiated the provincial environmental assessment process for Highway 914 extension and the Key Lake by-pass. As outlined in the project's Terms of Reference (Saskatchewan Ministry of Highways 2016) the Key Lake bypass component includes construction and operation of an approximate 5 km all-weather road by-pass to route traffic around Cameco's Key Lake uranium mill site. The Key Lake by-pass component of the Ministry of Highway's proposed project is considered an ancillary project for Wheeler.

2.7 Socio-Economics

Approximately 300 workers are expected to be required during the two-year construction period. Each component of construction will require workers with different types of skills and training depending on the task (e.g. road construction, wellfield drilling, erection of buildings, connection to services, etc.). During operations, about 150 people will be employed to operate the ISR wellfield and processing plant, as well as provide various supporting activities such as security, camp operations, operation of the water treatment, sewage and potable water plants, environmental monitoring, and maintenance of roads, equipment, and buildings.

The need for goods and services during construction, operations and decommissioning will generate business opportunities throughout the life of Wheeler. Examples of anticipated goods and services may include: catering, housekeeping, food, freight, and bulk materials such as fuel, propane, and reagents.

Employment and procurement opportunities pursued by those from nearby communities will be preferred as outlined in the MOUs executed with nearby communities and Indigenous groups (Section 8). In accordance with the intent of the MOUs, Denison has established an internal procurement approach, which requires the procurement of all goods and services for the Project to first consider businesses based in the communities prior to looking elsewhere in northern Saskatchewan, southern Saskatchewan and/or outside of Saskatchewan.

As a result of Denison's early engagement initiatives, a number of programs and actions focused on producing socio-economic benefits for local Indigenous and non-Indigenous communities have been initiated. Examples of some of the successes to date are described in Section 8.2.1. It is Denison's intent to leverage its early work and existing relationships with local Indigenous and non-Indigenous communities in order to expand upon its existing socio-economic commitments. This will allow Denison to meet or exceed the socio-economic commitments that will be outlined in the Project's Saskatchewan Surface Lease Agreement and the Human Resource Development Agreement to be negotiated between Denison and the province following the successful completion of the environmental impact assessment process.

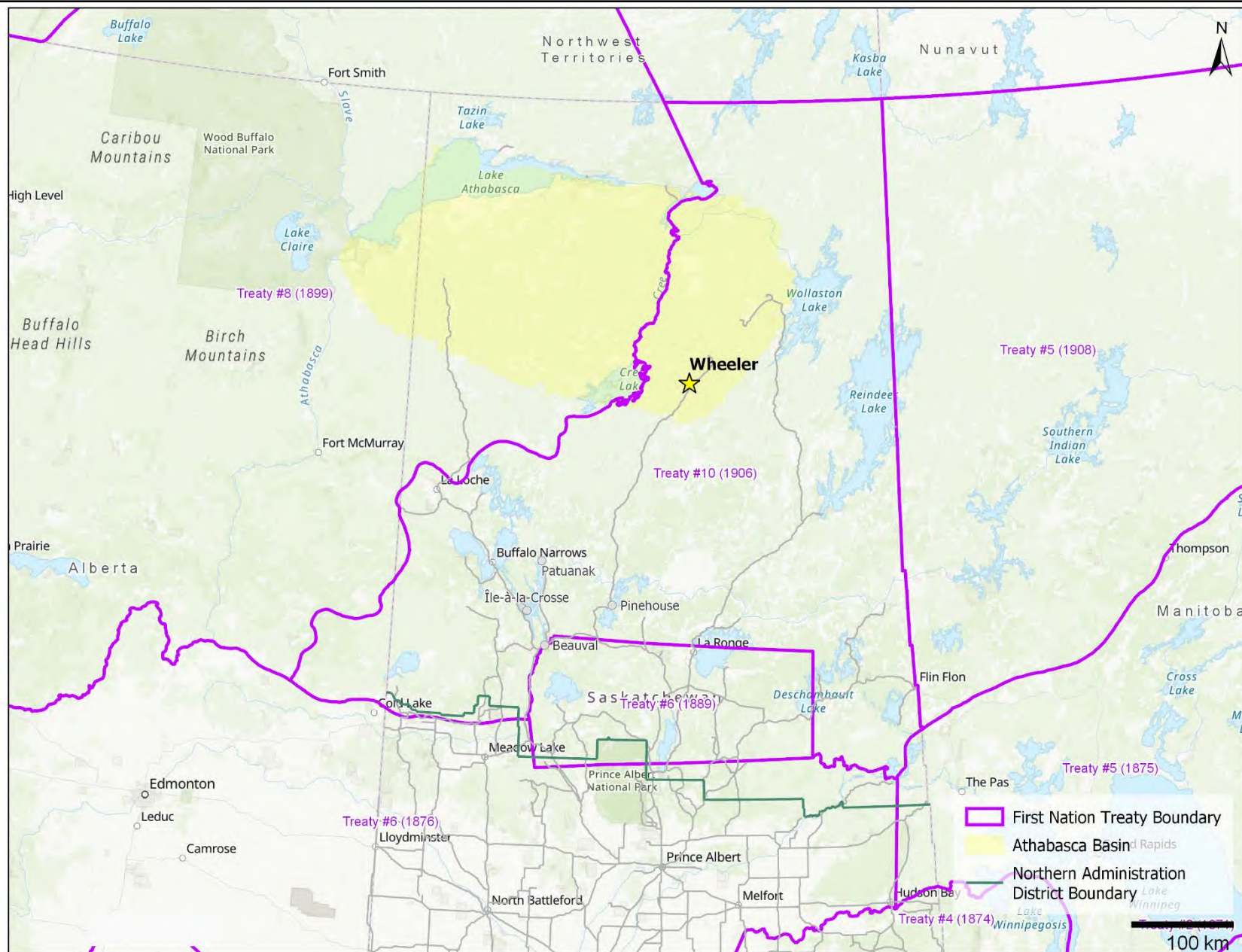
3 Project Location

The property straddles the boundaries of NTS map sheets 74H-5, 6, 11, and 12. The approximate UTM coordinates of the property are 477,000E and 6,374,000N (NAD83, Zone 13). Wheeler is located within Treaty 10 territory (Figure 3.1).

Wheeler is located in Saskatchewan's Northern Administration District (NAD) as defined in the province's Northern Municipalities Act, but its creation dates back to The Northern Administration Act, 1948, which provided for the administration and development of the northern part of Saskatchewan. The NAD includes approximately half of Saskatchewan's land area, but less than four per cent of the province's population. The NAD's population of roughly 37,000 lives in approximately 45 communities, which include municipalities, First Nations reserves, settlements, and sometimes a combination of each.

There are a number of leases near Wheeler including recreational, traditional land use, and industrial surface leases. Figure 3.2 shows the location of recreational and traditional land use leases issued by the Province of Saskatchewan; it is assumed there are seasonally used cabins on these properties and this will be confirmed as part of the EIA. There are potentially eleven (11) cabins within 22 km of Wheeler (Figure 3.2).

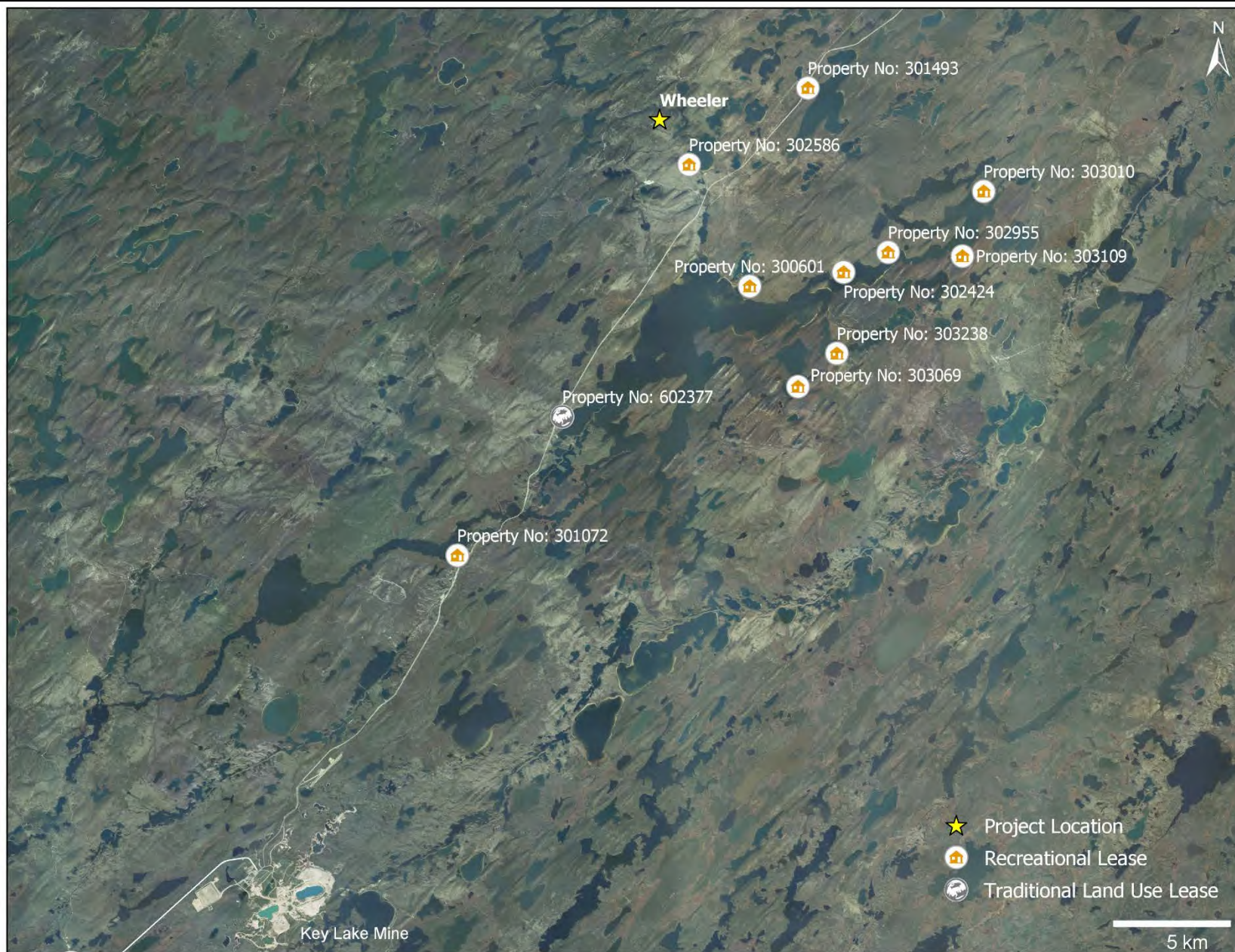
Other nearby surface leases are for industrial sites such as power transmission and mineral exploration (Figure 3.3 and Table 3.1). Industrial surface leases are in place for the Key Lake Operation (a uranium mill) and the McArthur River Operation (an underground uranium mine); milling and mining activities at these sites are currently suspended.



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Figure 3.1: Wheeler Location within the Treaty 10 Boundary

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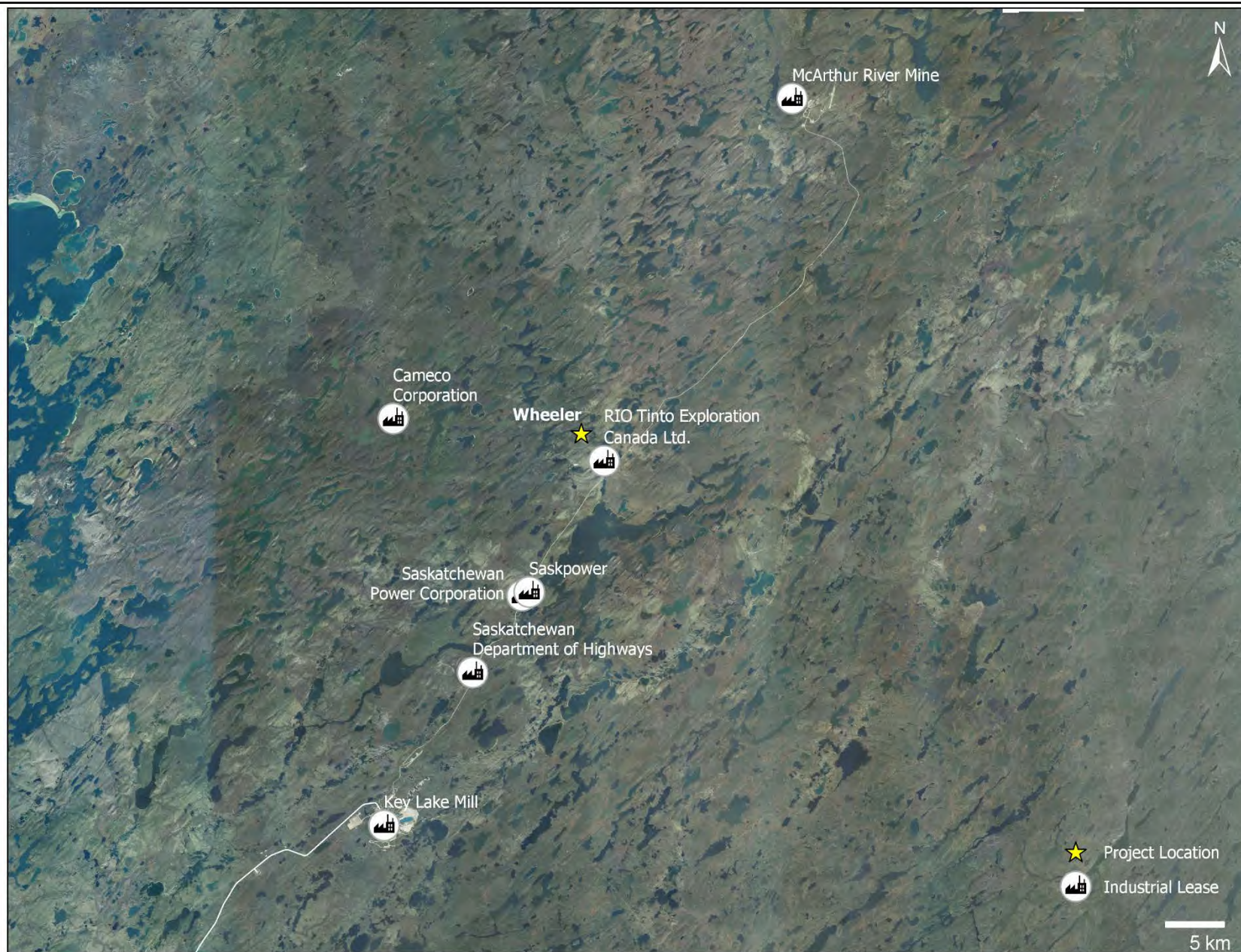


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Figure 3.2: Recreational and Traditional Land Use Leases in Proximity to Wheeler

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**Figure 3.3: Industrial Land Use Leases
in Proximity to Wheeler**

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Table 3.1: Leased Properties near Wheeler

| Type of Lease | Description | Property Number ¹ | Distance from Wheeler (km) |
|-----------------------|---|------------------------------|----------------------------|
| Recreational Lease | Assumed cabin on lease. Leased to individual(s) – names withheld for privacy. | 302586 | 2.7 |
| Industrial Land Lease | Rio Tinto Exploration Canada Ltd. | 303242 | 3.4 |
| Recreational Lease | Assumed cabin on lease. Leased to individual(s) – names withheld for privacy. | 301493 | 6.3 |
| Recreational Lease | Assumed cabin on lease. Leased to individual(s) – names withheld for privacy. | 300601 | 8.6 |
| Recreational Lease | Assumed cabin on lease. Leased to individual(s) – names withheld for privacy. | 302424 | 10.5 |
| Recreational Lease | Assumed cabin on lease. Leased to individual(s) – names withheld for privacy. | 302955 | 11.5 |
| Recreational Lease | Assumed cabin on lease. Leased to individual(s) – names withheld for privacy. | 303238 | 13.0 |
| Recreational Lease | Assumed cabin on lease. Leased to individual(s) – names withheld for privacy. | 303069 | 13.3 |
| Traditional Land Use | Operated by a member of the English River First Nation | 602377 | 14.0 |
| Recreational Lease | Assumed cabin on lease. Leased to individual(s) – names withheld for privacy. | 303010 | 14.3 |
| Recreational Lease | Assumed cabin on lease. Leased to individual(s) – names withheld for privacy. | 303109 | 14.4 |
| Industrial Land Lease | SaskPower (transmission line from Key Lake to Island Falls) | 303261 | 14.9 |
| Industrial Land Lease | Saskatchewan Power Corporation | 303329 | 15.4 |
| Industrial Land Lease | Cameco Corporation | 603071 | 16.3 |
| Recreational Lease | Assumed cabin on lease. Leased to individual(s) – names withheld for privacy. | 301072 | 21.2 |
| Industrial Land Lease | SK Highways gravel pit for road maintenance | 500490 | 23.1 |

Notes:

¹ Land dispositions from Crown Resource Lands provided by Government of Saskatchewan, Ministry of Environment, Fish, Wildlife and Lands Branch

As a remote site, there are no communities in relatively close proximity to Wheeler (Figure 3.4). Calculated using a straight line, the closest communities are approximately 150 km away in the northern settlement of Wollaston Lake and the neighbouring reserve of Lac La Hache (Table 3.2 and Figure 3.4). Travelling by existing roads the closest community to the Project is Pinehouse which is approximately 260 km away (Table 3.2).

The communities and associated Indigenous groups of Patuanak, Pinehouse, Ile a la Crosse, and Beauval were identified as key through the community selection process; additional details are provided in Section 7 and Section 8.

Table 3.2: Communities and Associated Indigenous Groups in Proximity to Wheeler

| Community | Status | Population in 2016 Census ¹ | Indigenous Groups Affiliated with the Community | Approximate Absolute Distance from Wheeler ² | Approximate Distance from Wheeler (along roads) ³ |
|-------------------|---------------------|--|---|---|--|
| Points North | Camp settlement | Not applicable | Not applicable | 115 | 936 |
| Wollaston Lake | Northern settlement | 99 | Métis | 150 | 940 |
| | Reserve | 1,377 | Hatchet Lake First Nation Treaty 10 | | |
| Black Lake | Reserve | 1,379 | Black Lake Denesuline First Nations, Treaty 8 | 181 | 1,121 |
| Brabant Lake | Indian Settlement | 62 | Métis | 184 | 645 |
| Southend | Reserve | 1,045 | Peter Ballantyne Cree First Nation, Treaty 10 | 185 | 694 |
| Stony Rapids | Northern Hamlet | 262 | Métis | 196 | 1,137 |
| Missinipe | Northern Hamlet | 5 | Métis | 215 | 552 |
| Grandmother's Bay | Reserve | 342 | Lac La Ronge Indian Band, Treaty 6 | 216 | 556 |
| Fond du Lac | Reserve | 903 | Fond du lac Denesuline First Nation, Treaty 8 | 217 | 1,217 |
| Patuanak | Northern Hamlet | 73 | Métis | 229 | 454 |
| | Reserve | 565 | English River First Nation, Treaty 10 | 228 | 457 |
| Turnor Lake | Northern Hamlet | 149 | Métis | 232 | 548 |
| | Reserve | 476 | Birch Narrows Dene Nation, Treaty 10 | | |
| Pinehouse | Northern Village | 1,052 | Métis | 233 | 264 |
| Stanley Mission | Northern Settlement | 95 | Métis Band | 238 | 554 |
| | Reserve | 1,840 | Lac La Ronge Indian Band, Treaty 6 | | |
| Buffalo Narrows | Northern Village | 1,110 | Métis | 264 | 479 |
| La Ronge | Town | 2,688 | Métis | 266 | 475 |
| | Reserve | 2,622 | Lac La Ronge Indian Band, Treaty 6 | | |
| La Loche | Northern Village | 2,372 | Métis | 269 | 580 |
| | Reserve | 822 | Clearwater River Dene First Nation, Treaty 8 | | |
| Air Ronge | Northern Village | 1,106 | Métis | 270 | 471 |

| Community | Status | Population in 2016 Census ¹ | Indigenous Groups Affiliated with the Community | Approximate Absolute Distance from Wheeler ² | Approximate Distance from Wheeler (along roads) ³ |
|-------------------|---------------------|--|---|---|--|
| Ile a la Crosse | Northern Village | 1,296 | Métis | 274 | 453 |
| Black Point | Northern Settlement | 43 | Métis | 278 | 580 |
| Dillon | Reserve | 1,273 | Buffalo River First Nation, Treaty 10 | 279 | 526 |
| Michel Village | Northern Hamlet | 57 | Métis | 282 | 543 |
| St. George's Hill | Northern Hamlet | 131 | Métis | 285 | |
| Sandy Bay | Northern Village | 697 | Métis | 290 | 746 |
| | Reserve | 481 | Peter Ballantyne Cree Nation, Treaty 10 | | |
| Uranium City | Northern Settlement | 73 | Métis | 297 | 1,320 |
| Beauval | Northern Village | 640 | Métis | 297 | 367 |
| Pelican Narrows | Northern Village | 630 | Métis | 301 | 705 |
| | Reserve | 1,869 | Peter Ballantyne Cree Nation, Treaty 10 | | |
| Jans Bay | Northern Hamlet | 152 | Métis | 312 | 405 |
| | Reserve | 912 | Canoe Lake Cree First Nation, Treaty 10 | | |
| Camsell Portage | Northern Settlement | 10 | Métis | 323 | 1,357 |
| Cole Bay | Northern Hamlet | 170 | Métis | 325 | 400 |
| Weyakwin | Northern Hamlet | 49 | Métis | 344 | 462 |
| Creighton | Town | 1,402 | Métis | 375 | 726 |
| Denare Beach | Northern Village | 779 | Métis | 375 | 743 |
| Green Lake | Northern Village | 429 | Métis | 389 | 470 |
| Cumberland House | Northern Village | 671 | Métis | 441 | 874 |
| | Reserve | 795 | Cumberland House Cree Nation, Treaty 5 | | |

Notes:

¹ Statistics Canada (2017)

² Approximate absolute distance is in a straight line or 'as the crow flies'

³ Winter roads are included in some distance calculations

The federal lands close to Wheeler are First Nation Reserves, most of which do not have permanent residences. Figure 3.5 shows the location of reserve land within 150 km of Wheeler and Table 3.3 provides the details about the reserve lands. The closest national park to Wheeler is Prince Albert National Park which is 357 km south.



Note: Communities shown in bold font have been the focus of Denison's local Indigenous and non-Indigenous engagement program

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Figure 3.4: Nearby Communities

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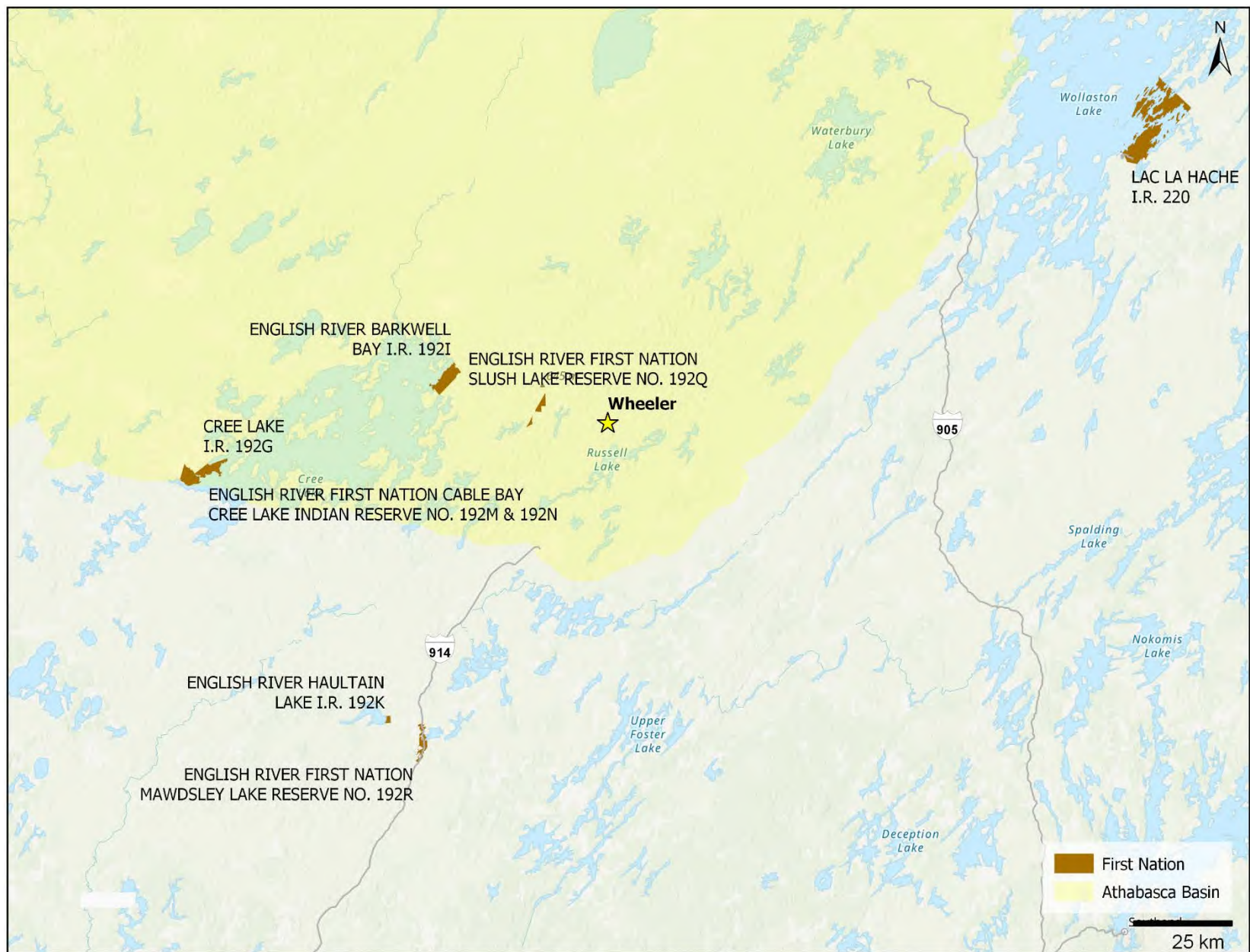
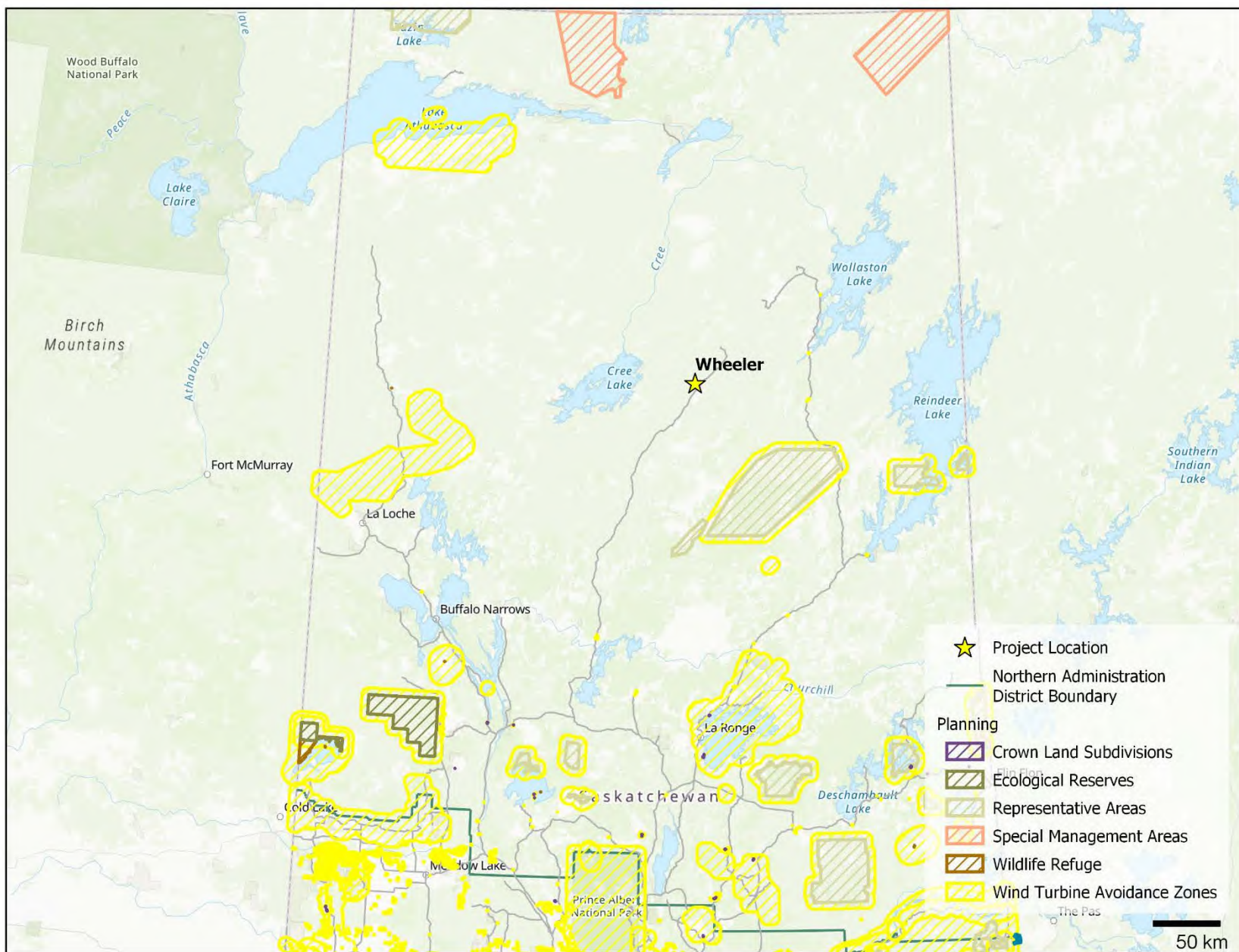


Table 3.3: Federal Lands within 150 km of Wheeler

| Federal Land Type | Name | Distance from Wheeler (km) |
|-------------------|--|----------------------------|
| First Nation | English River First Nation Slush Lake Reserve No. 192Q | 16 |
| First Nation | English River Barkwell Bay Indian Reserve 192I | 39 |
| First Nation | English River First Nation Mawdsley Lake Reserve No. 192R | 91 |
| First Nation | English River Haultain Lake Indian Reserve 192K | 94 |
| First Nation | Cree Lake Indian Reserve 192G | 98 |
| First Nation | English River First Nation Cable Bay Cree Lake Indian Reserve No. 192N | 105 |
| First Nation | English River First Nation Cable Bay Cree Lake Indian Reserve No. 192M | 105 |
| First Nation | Lac La Hache Indian Reserve 220 | 147 |

Denison screened the area around Wheeler to check for environmentally sensitive areas. As shown in Figure 3.6, crown land subdivision, ecological reserves, representative areas, special management areas, wildlife refuges and wind turbine avoidance zones are not located near the Project area. In addition to the information provided on Figure 3.6, there are no game preserve, national wildlife areas, migratory bird sanctuaries, conservation easements, Fish and Wildlife development fund lands, Ramsar wetlands, or wildlife habitat protection areas in the area shown.

In terms of management areas, Wheeler is near the centre of the woodland caribou SK1 administrative unit, fur block 18, and the provincial wildlife management zone 75 (Figure 3.7).

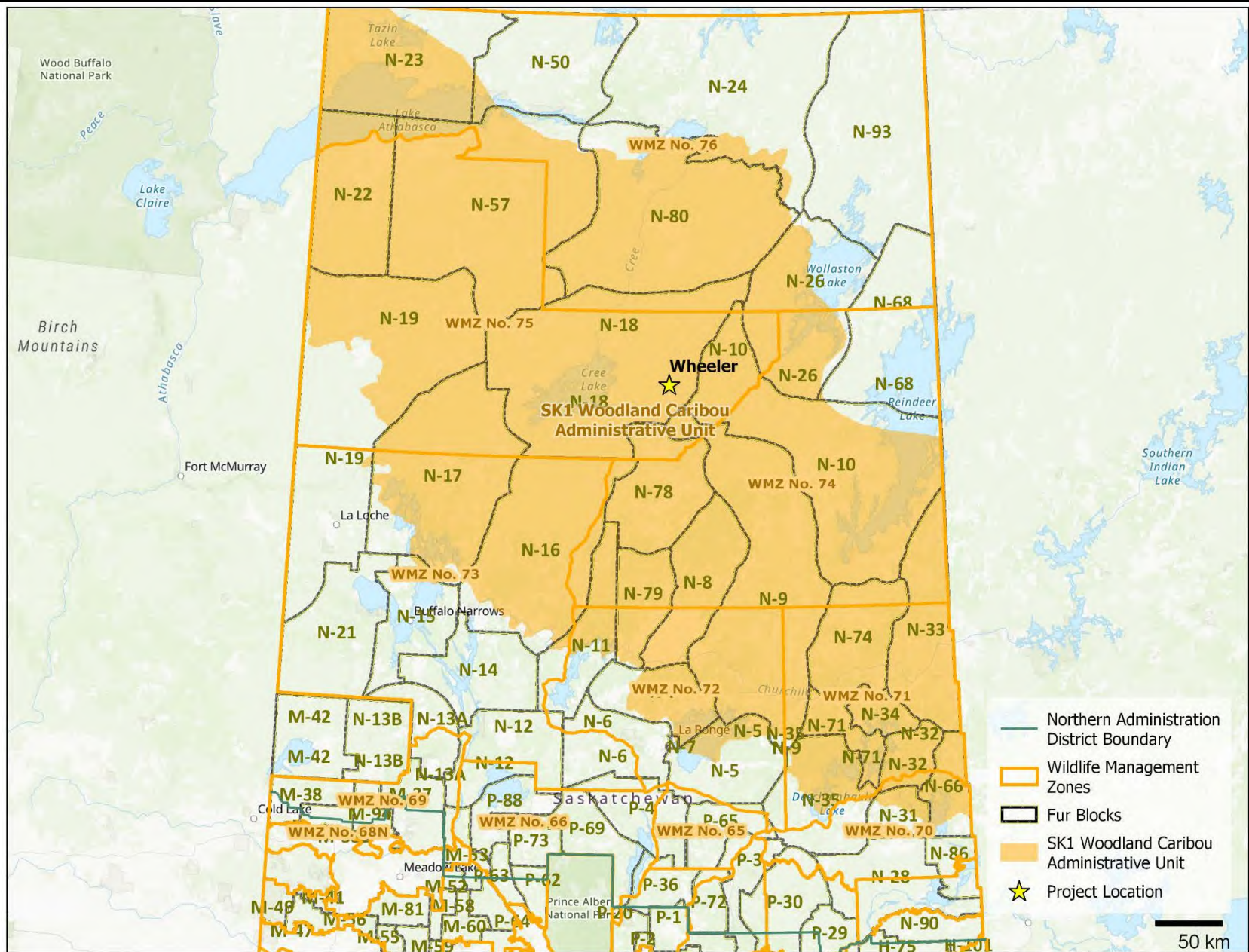


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Figure 3.6: Sensitive Areas and Conservation Areas

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4 Federal Involvement

No federal funding or support has been provided to the Project.

Federal lands will not be used for the purpose of carrying out the Project.

5 Existing Environment

5.1 Physiography and Terrain

The property is characterized by a relatively flat till plain with elevations ranging from 477 to 490 metres above sea level (masl). Throughout the area, there is a distinctive north-easterly trend to landforms resulting from the passage of Pleistocene glacial ice from the northeast to the southwest. The topography and vegetation at the property are typical of the taiga forested land common to the Athabasca Basin area of northern Saskatchewan.

The regional area is covered with overburden from 0 to 130 m in thickness; the overburden in the immediate area of the Wheeler uranium deposit is 22 to 30 m in thickness. The terrain is gently rolling and characterized by forested sand and dunes. Vegetation is dominated by black spruce and jack pine, with occasional small stands of white birch occurring in more productive and well-drained areas. Lowlands are generally well drained but can contain some muskeg and poorly drained bog areas with vegetation varying from wet, open, non-treed vistas to variable density stands of primarily black spruce as well as tamarack depending on moisture and soil conditions. Lichen growth is common in this boreal landscape mostly associated with mature coniferous stands and bogs.

5.1.1 Geology

The Property is partially covered by lakes and muskeg which overlies a complex succession of glacial overburden deposits. These include eskers and outwash sand plains, well-developed drumlins, till plains and glaciofluvial plain deposits (Campbell 2007). Glacial overburden is comprised of medium to coarse grained sand and gravel till outwash. The quaternary deposits vary in thickness from zero to approximately 120 metres with the orientation of the drumlins reflecting a southwesterly ice flow. Local outcrops of consolidated paleoproterozoic sandstone of the Athabasca formation also occur in select areas on the Property.

The glacial overburden is underlain by relatively undeformed paleoproterozoic Athabasca Group sandstone that unconformably overlie the crystalline basement rocks and have a considerable range of thickness from 170 metres over the quartzite ridge to at least 560 metres on the western side of the property. The unconformity varies dramatically across the property. From elevations of 160 to 230 metres above sea level along the Property's southeastern edge, the unconformity rises gently to a pronounced north-easterly trending ridge up to 350 metres above sea level, coincident with the subcrop of a quartzite unit in the crystalline basement. The unconformity surface drops steeply westward to as low as 30 metres below sea level. A schematic cross-section of the general property geology is shown in Figure 5.1.

Basement rocks on the Wheeler property are located within the Wollaston Domain of the Trans Hudson-Orogeny and comprise metasedimentary and granitoid gneisses. The metasedimentary rocks belong to the Paleoproterozoic Wollaston Supergroup and include graphitic and non-graphitic

pelitic and semipelitic gneisses, felsic and quartz feldspathic gneisses, meta-quartzite and rare calc-silicate gneisses. These metasediments are interpreted to belong to the Daly Lake Group, (Yeo and Delaney, 2007). Pegmatitic segregations and intrusions are common in all units. Garnet, cordierite and sillimanite occur in the pelitic units indicating an upper amphibolite grade of metamorphism. A “Paleoweathered Zone”, generally between three to ten metres thick, is superimposed on the crystalline rocks and occurs immediately below the unconformity.

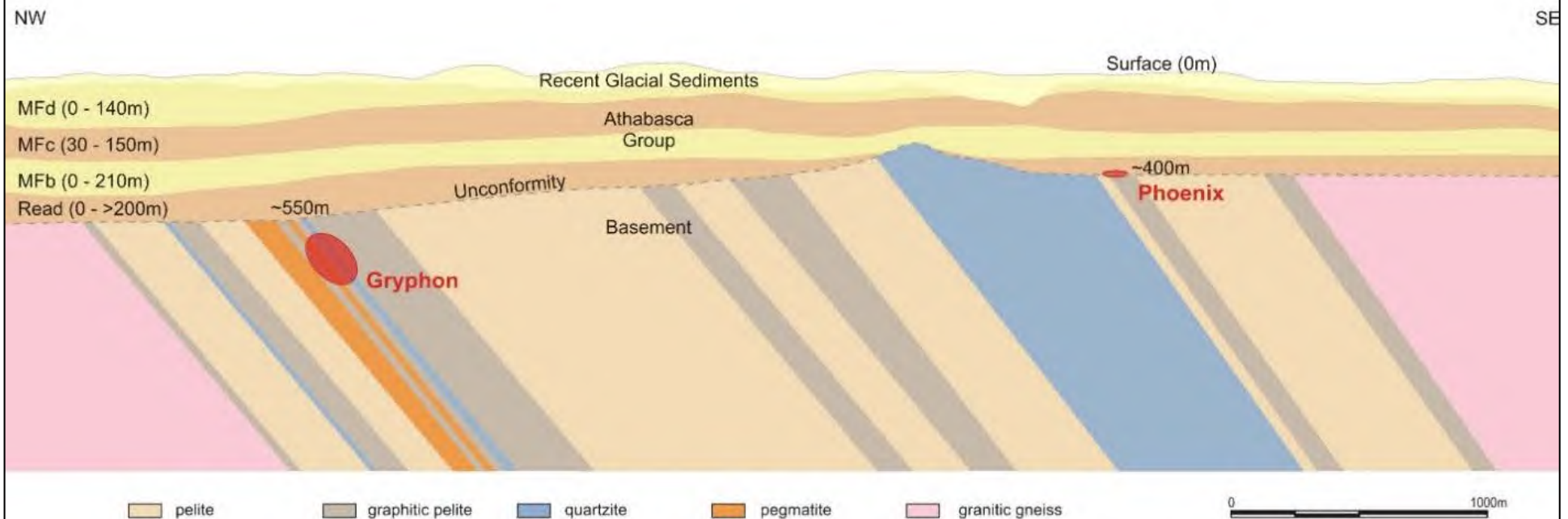
The Wheeler exploration property is host to the Phoenix uranium deposit discovered in 2008 and Gryphon deposit discovered in 2014 (Figure 2.4) plus additional zones of mineralization and other prospective exploration targets. The details below are focused on the Phoenix deposit although other areas of mineralization suitable for ISR mining at Wheeler are anticipated to be geologically similar.

The quartzite ridge, an interpreted impermeable and structural barrier forming the footwall to the mineralization, dominates the basement geology at the Phoenix deposit. The quartzite unit exhibits variable dips from 45° to 75° to the southeast, averaging 50°, and with an undulating, but generally 055° azimuth. Immediately overlying the quartzite is a garnetiferous pelite, which varies from seven metres to 60 metres in thickness. Overlying the garnetiferous pelite is a graphitic pelite. The graphitic pelite is approximately 5 metres wide in the southwest, increases to approximately 70 m in the central portion of the deposit area and is 50 metres wide at the northeast extremity.

Mineralization at Phoenix generally occurs at the Athabasca unconformity in contact with the underlying basement rocks at depths ranging from 390 to 420 metres. It is interpreted to be structurally controlled by the northeast southwest trending (055° azimuth) WS Fault which dips 55° to the southeast on the east side of the quartzite ridge.

A detailed schematic of the geology at the Phoenix deposit is shown in Figure 5.2. The grades and thickness of the deposit vary along the major structure where typically higher grades and thicker portions of the deposit are associated with larger offsets along the structure where the sandstone contact has been displaced allowing for greater structural disruption and permeability of the deposit area. In general, the deposit is comprised of an exceptionally high-grade core, related to the major structure, and is surrounded by a lower grade shell away from the structure. Both the core and the shell are variably structured and are characterised by sandy clays with portions of the deposit containing ‘islands’ of less permeable though high grade ore within the more permeable and structured areas. The Phoenix deposit appears to be amenable to ISR as it is situated within relatively porous and permeable structured sandstones and underlain by less porous and competent basement rocks.

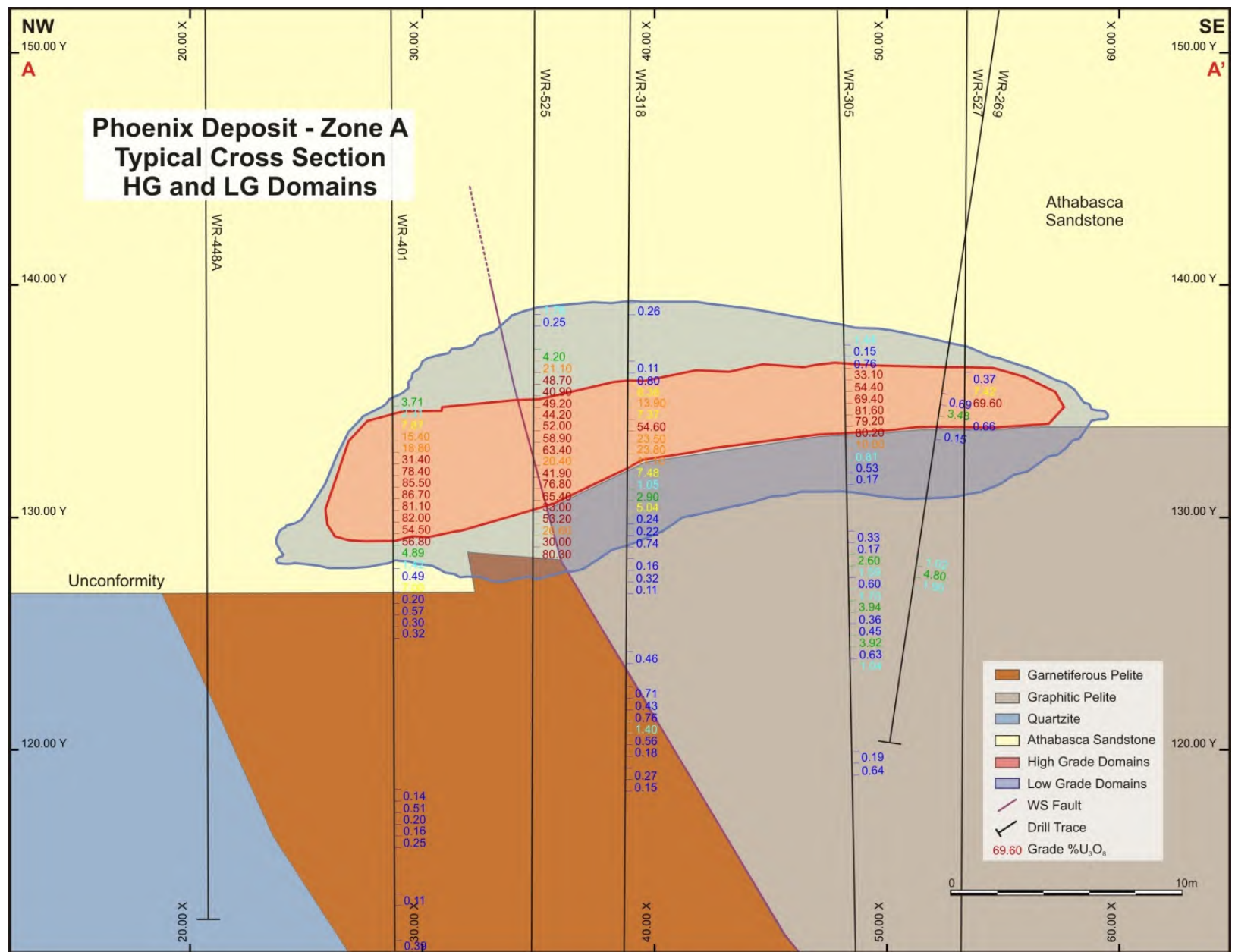
Wheeler River Property Geological Cross Section



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**Figure 5.1: Schematic Cross Section of the
Wheeler River Property**

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5.2 Hydrogeology

Shallow groundwater monitoring wells have been installed in the overburden and upper sandstone in a regional area north of the Phoenix deposit to establish baseline conditions. Monitoring has been ongoing since 2018 and results to date are typical for the Athabasca Basin and the water contains low concentrations of total dissolved solids. The water table in this area is located about 2 to 10 meters below surface.

Baseline groundwater quality samples have been collected from the Athabasca Sandstone in the site study area above the uranium deposit. Results from samples collected from between 280 to 363 m below surface show the groundwater quality has low concentrations of total dissolved solids and nutrients and a relatively neutral pH (between 6.0 and 7.0). Conductivity was 71 $\mu\text{S}/\text{cm}$. When compared to Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME 2017), results exceeded the prescribed criteria for dissolved aluminum, dissolved iron, dissolved copper, dissolved lead, and uranium. Radium-226 was 1.9 Bq/L, exceeding the Saskatchewan Environmental Quality Guideline (SEQG) of 0.11 Bq/L for surface water (Government of Saskatchewan 2017b), while the concentration of lead-210 was 0.80 Bq/L.

Baseline groundwater quality samples have also been collected from sandstone in an area immediately above the uranium deposit (352 to 395 m below surface), providing information on the water quality closer to the uranium deposit. The results from the groundwater sampling indicate a neutral pH (6.9 to 7.5), as anion chemistry was dominated by bicarbonate alkalinity and sulphate, whereas chloride was comparatively low. Cation chemistry was shown to be dominated by sodium, calcium, iron, and aluminum. Conductivity was 216 $\mu\text{S}/\text{cm}$. Dissolved iron concentrations were higher than expected given the pH of the samples, as iron hydroxides have low solubility at neutral pH, and under oxidizing conditions, iron is expected to precipitate. The iron results indicate it is likely that iron is out of equilibrium with surface conditions due to the change in redox conditions (to more oxidizing) produced by removal of the water from depth. When compared to Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME 2017), results exceeded the prescribed criteria for aluminum, dissolved iron, dissolved arsenic, dissolved copper, dissolved lead, and dissolved uranium. Radium-226 was 7.2 Bq/L, exceeding the SEQG of 0.11 Bq/L for surface water (Government of Saskatchewan 2017b), while the concentration of lead-210 was 2.1 Bq/L.

An extensive groundwater quality sampling program will be completed in 2019 to further characterize the baseline hydrogeological conditions in and around the proposed wellfield, as well as at the broader regional area. Collection of groundwater quality and water level data will be ongoing at key locations.

5.3 Atmospheric and Acoustic Environment

5.3.1 Radon

Atmospheric or passive radon monitoring commenced in September 2016 to establish baseline radon levels in the Project area. Passive radon detectors were deployed at 10 select locations in duplicate. On a quarterly basis, each deployed detector is exchanged with a new replacement detector, and each collected detector is sent to an accredited laboratory for analysis.

While there is currently no Canadian regulation that prescribes a radon threshold value in outdoor environments, Health Canada has developed a guideline for radon in indoor air for dwellings of 200 Bq/m³. This guideline provides Canadians with guidance pertaining to when remedial action should be taken to reduce radon levels. Results to date demonstrate that baseline atmospheric radon levels within the Project area are low, with the average radon concentration not exceeding 10 +/- 3 Bq/m³ at any location. Baseline radon monitoring will continue as required.

5.3.2 Dustfall

Dustfall monitoring stations were established at six (6) locations around the site in the fall of 2018. Data from these stations is not yet available.

5.3.3 Noise

Noise baseline studies are scheduled to be completed in 2019. It is reasonable to assume the baseline noise levels will be quite low in the Project area since it is located in a relatively isolated area of the boreal forest.

5.3.4 Climate and Meteorology

Regional climate and meteorological data is available from the nearby weather station at Key Lake; the station is approximately 32 km away from Wheeler. Temperature and precipitation data from 1981 to 2010 is provided in Figure 5.3. An on-site metrological station has not yet been established.

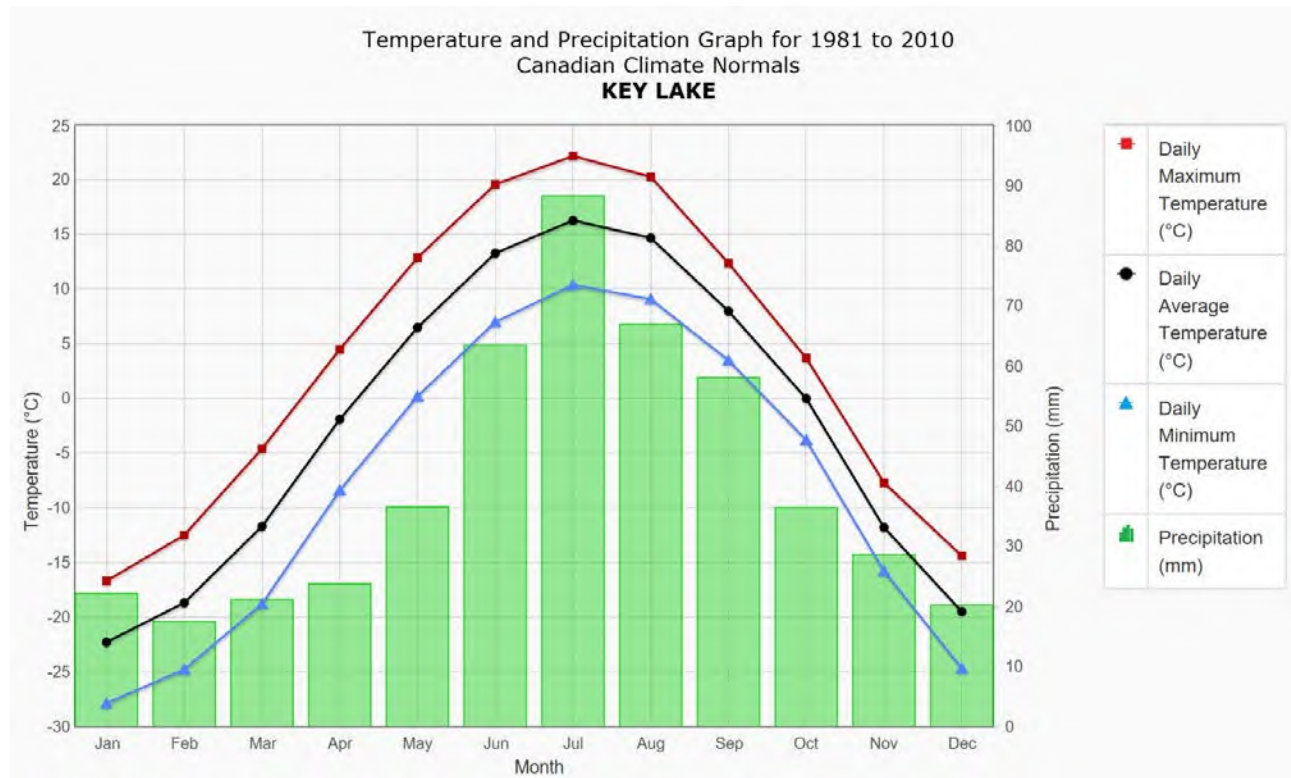


Figure 5.3: Historical Temperature and Precipitation near Wheeler

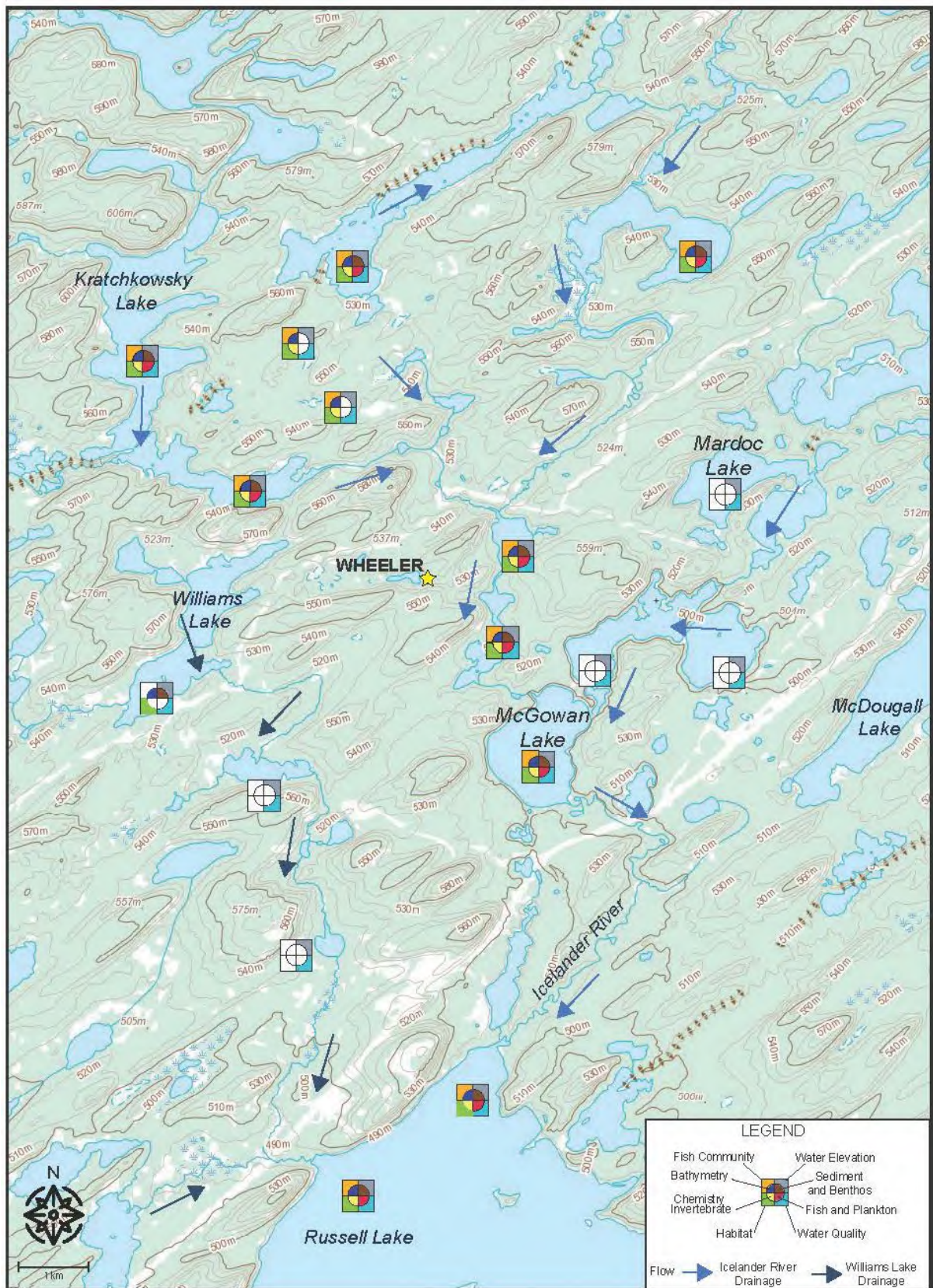
The climate is typical of the continental sub-arctic region of northern Saskatchewan, with temperatures ranging from +32°C in summer to -45°C in winter. Winters are long and cold, with mean monthly temperatures below freezing for seven months of the year. Winter snow pack averages 70 cm to 90 cm. Freezing of surrounding lakes, in most years, begins in November and break-up occurs around the middle of May. The average frost-free period is approximately 90 days.

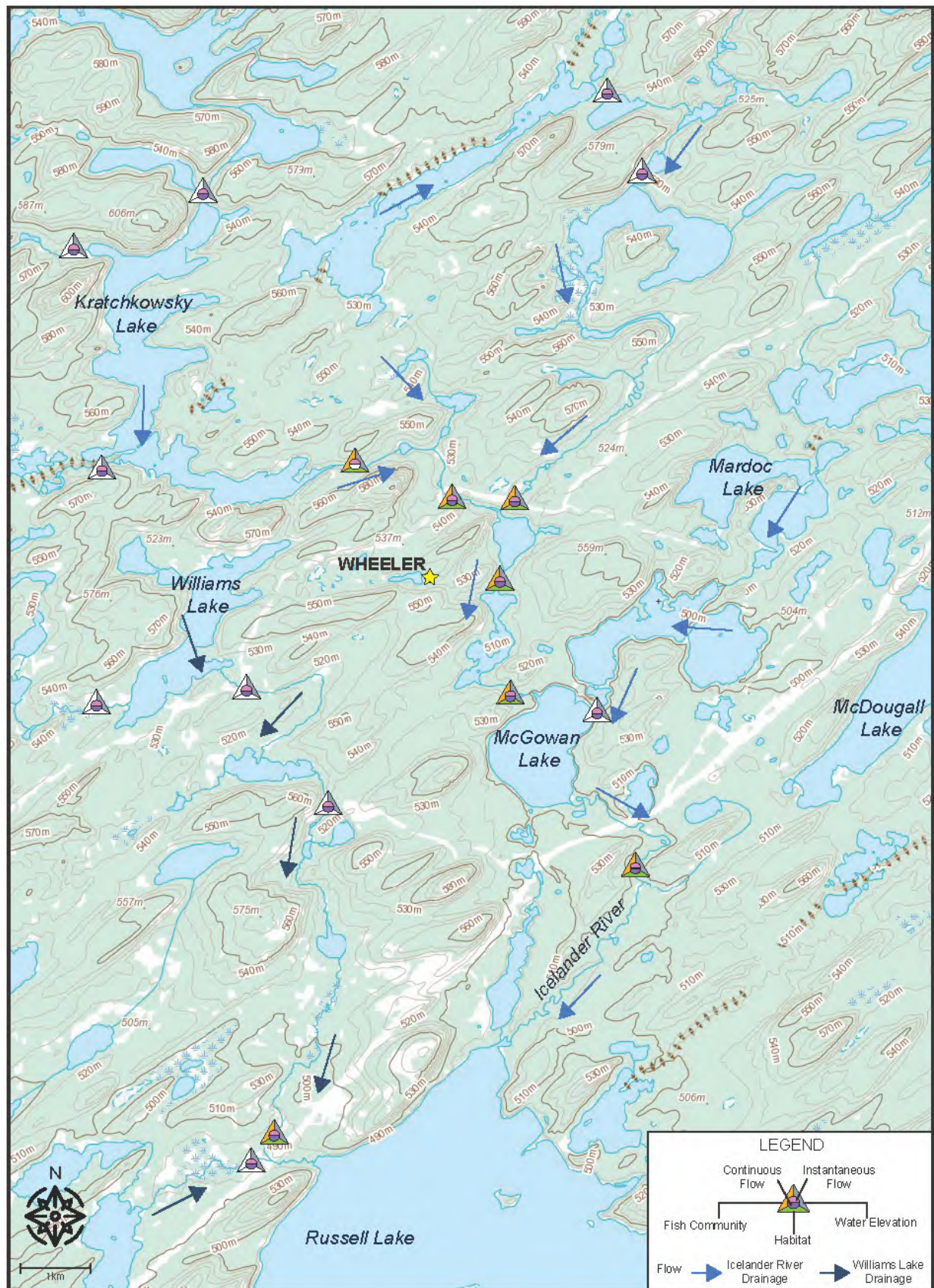
Average annual total precipitation for the region is approximately 480 mm, of which 67% falls as rain, with more than half occurring from June to September. Snow may occur in all months but rarely falls in July or August. The prevailing wind direction is from the north-west/west with a mean speed of 12 km/hr.

5.4 Aquatic Environment

Aquatic environment baseline field surveys completed between 2012 and 2018 focused on hydrology, water quality, limnology, sediment quality, aquatic habitat, bathymetry, plankton community, benthic invertebrate community and tissue chemistry, and fish community, spawning, and tissue chemistry.

A summary of data collected in lakes and ponds is provided in Figure 5.4 and a summary of data collected from streams is provided in Figure 5.5.





5.4.1 Hydrology

The Project area is located within two distinct sub-drainage areas that drain into Russell Lake, the Wheeler River, and ultimately into Wollaston Lake (via the Geikie River). Extending north and east of the Project area, the Iceland River drainage area drains approximately 371 km², while the Williams Lake drainage area is located south of the Project area and drains approximately 78 km² (Figure 5.6).

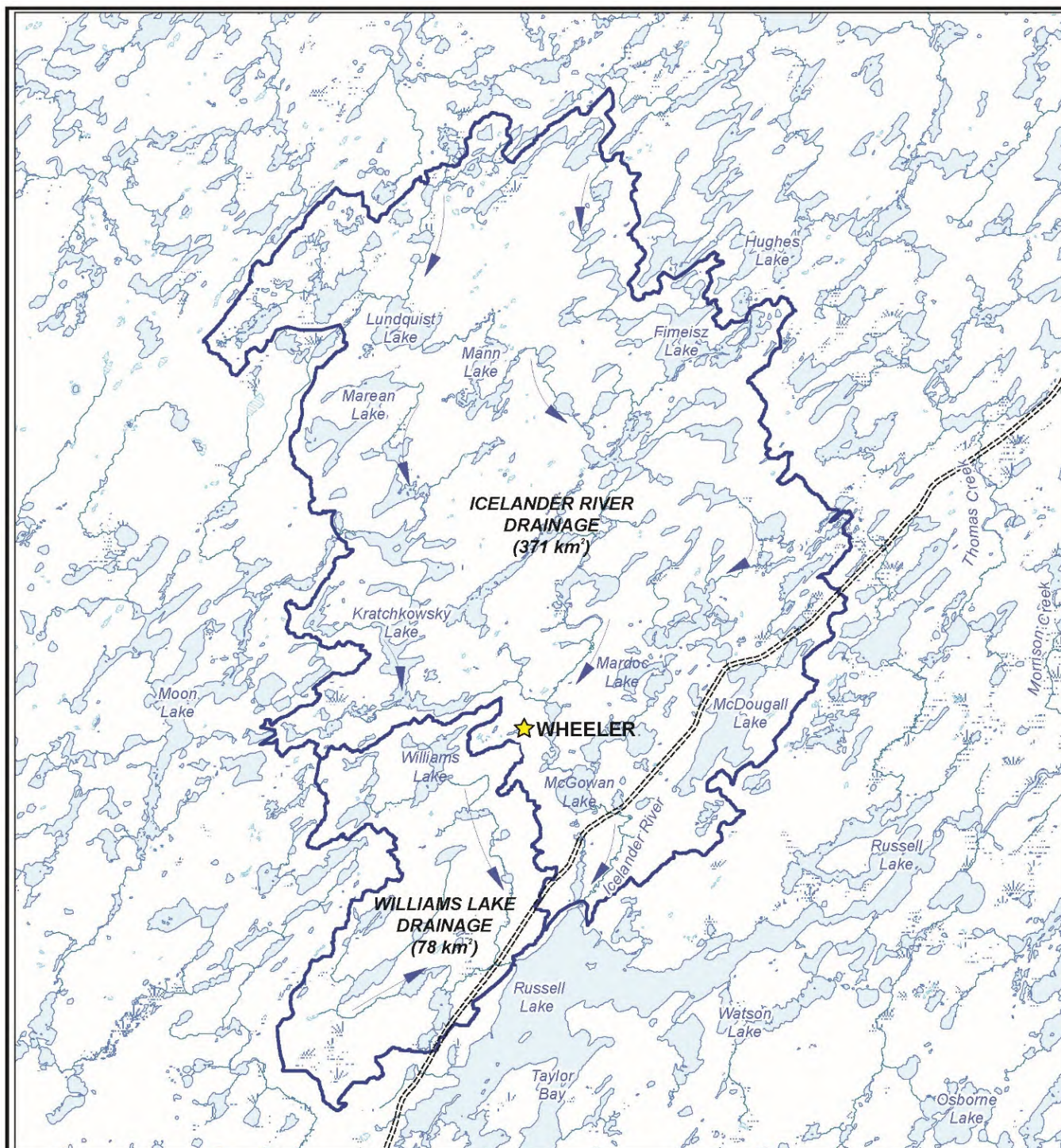
Hydrological baseline studies included manual streamflow measurements, staff gauge and elevation surveys, detailed bathymetric surveys, and continuous water level recording using dataloggers to develop rating curves at select stream locations within the Project area.

The hydrological characteristics of lakes and streams in the Project area were surveyed between 2011 and 2014. Water elevation survey locations were established at nine stream stations and eleven lake stations. Manual flow measurements were performed at each of the nine stream stations, and automated stream elevation instruments (level data loggers) were installed at all stream stations. Rating curves were established for each station based on the manual stream discharge measurements to permit estimation of hydrographic profiles for each location.

Four field programs were completed from fall 2016 to summer 2018 to capture seasonal flow conditions in spring, summer and fall. One winter field program was completed between March 15 and 19, 2018, to assess ice cover in the area and to gain a better understanding of winter baseflow conditions. Continuous monitoring equipment has been installed in seven stream stations and one lake station for continued hydrological data collection.

Project area lake and pond surface water elevations ranged from 520.86 masl at an unnamed headwater lake, to 488.26 masl at Russell Lake. In the Iceland River drainage area, water level elevations at the stream stations ranged from 520.73 masl at the most upstream station, to 492.71 masl at the most downstream station. Stream flow measurements were recorded at 2.34 cm/s at the most downstream location of the Iceland River drainage area.

In the Williams Lake drainage area, water levels at stream stations ranged from 518.33 masl at the most upstream station, to 488.55 masl at the most downstream station. Stream flow measurements recorded during this time were recorded at 0.64 cm/s at the most downstream location of the Williams Lake drainage area.



==== Highway 914

▬ Watershed Boundary

4 0 4
Scale 1:200,000 (kilometres)

Reference - NTS Mapsheets 74H02, 03, 04, 05, 06, 07, 10, 11 and 12; NAD83 UTM Zone 13

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Figure 5.6: Drainage Areas around Wheeler

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5.4.2 Surface Water Quality and Limnology

Baseline surface water quality was assessed at seventeen (17) lentic locations and eleven (11) lotic stations within the Project area. Water quality data were compiled for the years 2012, 2014, 2016, 2017, and 2018 by measuring physical and chemical constituents obtained in situ, as well as by accredited laboratory analyses. Surface waters within the Project area were found to be comparable to other lakes in the region, which are classified as being soft with typically low levels of alkalinity, nutrients (nitrate and phosphorus), total dissolved solids, and total suspended solids. The pH of surface waters within the study area are slightly acidic to neutral.

In general, the concentrations of metals and metalloids were similar throughout the study area. Radionuclide concentrations were low, with the majority of measurements lower than their respective laboratory detection limits. For parameters with Saskatchewan Surface Water Quality Objectives (SSWQO) or Canadian Water Quality Guidelines (CWQG), most were below their respective guideline limits. Aluminum, cadmium, and lead concentrations exceeded guideline values at some locations; however, this appears to be a natural occurrence as demonstrated in surface water throughout the Project area. Elevated concentrations of iron and mercury were measured near the lake bottom in lakes that exhibited thermal stratification at the time they were sampled.

Radionuclide concentrations measured in surface water are low within the study area, and generally below the laboratory detection limits of 0.02 Bq/L for lead-210, 0.005 Bq/L for polonium-210, 0.005 Bq/L for radium-226, and 0.01 Bq/L for thorium-228, thorium-230, and thorium-232.

Limnology profiles were recorded at the deepest location in each lake, measuring conductivity, pH, temperature, and dissolved oxygen. Thermal stratification of the water column was infrequently observed in the Project area lakes.

5.4.3 Sediment Quality

Sediment samples were collected from the depositional areas of selected lakes for analysis of metals, radionuclides, total organic carbon, and particle size during the 2016 field study. Lake sediments within the Project area were found to be generally silty-clay or sandy-silt with total organic carbon present at approximately 16%. For parameters with prescribed sediment quality guidelines, all constituent concentrations were found to be at, or below, their respective threshold values.

5.4.4 Benthic Invertebrate Community and Tissue Chemistry

Benthic invertebrate community samples were collected at select lakes in September 2016. Benthic invertebrates were identified to family and consideration was also given to functional feeding group. Results were analyzed for abundance, relative abundance, and community metrics such as

density, richness, Simpson's Diversity Index, Simpson's Evenness Index, and Bray-Curtis dissimilarity index. Thirty-eight (38) major taxonomic groups (families) present in Project area waterbodies.

Total invertebrate density ranged from 671 to over 10,000 individuals per m². A total of 78 taxa were identified in the study area and mean invertebrate richness ranged from 7 to 24 taxa per sample. Simpson's Diversity Index values suggested that the benthic communities were relatively diverse at all locations; mean Simpson's Diversity Index values ranged from 0.65 to 0.85. Simpson's Evenness Index values ranged from 0.18 to 0.4 and overall few taxa comprised a large proportion of total invertebrate density at any given sampling location.

Thirty-eight major taxonomic groups (Families) were present in the study area. Chironomids were the most prevalent, comprising between 16 to 85% of the total benthic invertebrate density at each location. Furthermore, chironomids were the most numerically dominant taxon at all but two locations where Chydoridae family of water fleas (Cladocera) were the most numerically dominant. Other major taxonomic groups with respect to total benthic invertebrate density were detritus worms (Naididae), pill clams (Pisidiidae), water fleas from the families Holopedidae and Macrothricidae, phantom midges (Chaoboridae), seed shrimps (Ostracoda) and cyclopoid copepods.

Benthic macroinvertebrates from the following functional feeding groups were present at all locations sampled in the study area: scrapers, shredders, collector-gatherers, collector-filterers, and predators.

Benthic invertebrates (dragonfly nymphs and caddisfly larvae) were collected from selected Project area lakes, including Russell Lake and Kratchkowsky Lake, and analyzed for metals and radionuclides. The results of the analyses identified that radionuclide levels were generally below the laboratory method detection limit, with the exception of Po-210 and Ra-226. While metal concentrations observed in benthic invertebrate tissues collected from Project area lakes were generally consistent across all locations, cobalt and nickel concentrations were observed to be more variable. Benthic invertebrate tissues collected from Russell Lake had higher concentrations of some metals, including aluminum, cobalt, and uranium, than other lakes in the Project area.

5.4.5 Plankton Community

Lake phytoplankton and zooplankton samples were collected in September 2016 at six locations.

The biovolume of phytoplankton ranged from 0.69 to 14.0 mm³/m³ water at the locations sampled. In total, 55 phytoplankton taxa were identified from seven classes and at least six classes were identified in each of the waterbodies sampled. Diatoms (Bacillariophyceae) were dominant at all locations, representing approximately 25% to 90% of the total biovolume at each location.

The biovolume for zooplankton ranged from approximately 10 to 2,211 mm³/m³ water at lakes sampled. A total of 32 taxa belonging to 10 classes were identified. Branchiopods (Branchiopoda)

were dominant at all locations representing approximately 33% to 94% of zooplankton biovolume at each location.

At all locations, chlorophyll-a concentrations were below the laboratory method detection limit ($< 0.60 \mu\text{g/L}$). This is a reflection of the typically low primary productivity of oligotrophic lakes in the Project study area.

5.4.6 Fish Community, Spawning, and Fish Tissue Chemistry

Baseline field surveys were conducted to assess aquatic habitats throughout seasonal fluctuations in fish movements and spawning activities. Fish community surveys were undertaken in various habitat types in selected Project area waterbodies to characterize fish species presence and community diversity. A total of 13 species of fish were collected within the Project area during baseline surveys in September 2016 and May 2017. All waterbodies sampled, except one headwater pond, supported fish.

Eleven fish species were collected within study area lakes: lake chub, spottail shiner, longnose sucker, white sucker, lake whitefish, lake trout, northern pike, burbot, ninespine stickleback, yellow perch, and walleye.

Eleven fish species were also collected at stream sampling areas: lake chub, spottail shiner, longnose sucker, white sucker, arctic grayling, northern pike, burbot, ninespine stickleback, slimy sculpin, yellow perch and walleye.

Large-bodied fish spawning surveys were conducted in the fall of 2016 and spring of 2017 at selected lake and stream locations to determine the utilization of these areas for spawning. Fall spawning species present within the study area include lake whitefish and lake trout, and potential spawning habitats for these species were identified in several Project area lakes, including Kratchkowsky Lake. Spring spawning species present within the study area include walleye, northern pike, arctic grayling, white sucker, longnose sucker, and yellow perch. Spawning habitats for walleye and suckers were observed at most stream stations. Northern pike spawning habitats were present in nearly all study area lakes, as well as most stream stations. Burbot spawn during late winter in streams or lake shallows under ice. No specific spawning surveys targeted burbot, however potential spawning habitat occurs within the study area.

Tissue samples (muscle and bone) collected in 2016 and 2017 from northern pike and white sucker were submitted for chemical and radiological analyses. Northern pike represents a predator species whereas white sucker represents a forage species. Mercury concentrations in both northern pike and white sucker tissue were below the Health Canada (2007) standard of $0.5 \mu\text{g/g}$ wet weight for commercially sold fish. Selenium concentrations in both northern pike and white sucker tissue were below the British Columbia Ministry of Environment (2014) guideline of $4 \mu\text{g/g}$ dry weight and the United States Environmental Protection Agency (2016) criterion of $11.3 \mu\text{g/g}$ dry weight for fish muscle.

5.5 Terrestrial Environment

Terrestrial baseline studies were initiated in 2016 to characterize the existing environment in the Wheeler area.

5.5.1 Predictive Ecosite, Anthropogenic, and Fire Mapping

In order to develop baseline disturbance and vegetation cover/fire mapping, as well as provide an accurate characterization of the vegetation cover for future monitoring and/or impact assessment purposes, predictive ecosite mapping was obtained from the Saskatchewan Technical Branch and enhanced to increase accuracy for site, local and regional study areas.

The predictive ecosite mapping identified that there are 22 different ecosite classifications located throughout the Project area, with the most abundant being jack pine/blueberry/lichen (70%), waterbodies (13%), and jack pine/black spruce/feathermoss (5%). The results also identified that the broader regional study area was comprised of the same ecosite classifications, however differing slightly in their proportions (jack pine/blueberry/lichen (52%), waterbodies (21%), and jack pine/black spruce/feathermoss (13%)).

The results of the baseline anthropogenic map of the Project study area identified that the total amount of anthropogenic disturbance in the Project local study area is 2.9% (1.4 km²), and 1.5% (5.8 km²) identified in the broader regional study area.

Historical fire data was obtained from the Saskatchewan Ministry of Environment, Wildfire Management Branch to characterize the proportion of the Project and regional study areas which have been disturbed by past fires. The results of the fire mapping survey identified that 43% percent of the Project area landscape has burned within the last 30-50 years, and the remaining 57% of the landscape has forests aged 70 years and older.

5.5.2 Ecosite Characterization, Plant Structural Diversity, and Species Richness

Detailed vegetation and wildlife habitat characterization field surveys were undertaken in 2017 to describe and quantify the ecological and botanical conditions within recurring mapped ecosite types and regeneration forests. Sample site locations were widely distributed throughout the Project area. One hundred and ninety-four (194) species and/or genus of species were recorded during the vegetation field survey.

5.5.3 Vegetation and Soil Chemistry

The vegetation and soil sampling program was undertaken between August 2 and 7, 2017. Blueberry stems, leaves, fruit (currents year's growth), terrestrial lichen, and soil samples were collected to determine baseline conditions of physical properties, inorganic ions, metals, and radionuclides in vegetation (blueberry and lichen) and soil samples, as well as to support future monitoring, mitigation, and impact assessments.

Lichen and blueberry radionuclide levels were relatively consistent across the Project study area. Metal parameters were variable but relatively consistent, aside from elevated levels of aluminum, chromium, iron, lead, titanium, and vanadium observed at one location.

Radionuclide levels in soil were also variable but relatively consistent, with the exception of one sample site located northeast of Russell Lake where higher levels of lead-210 and polonium-210 were observed compared to other sample sites. Elevated levels of calcium, copper, lead, and manganese were also observed at this location compared to other sample sites.

5.5.4 Winter-Active Wildlife Identification and Abundance

Winter tracking surveys were completed to determine the presence of winter-active animals, determine the relative abundance of winter-active animals, enhance the Project specific area understanding of species-ecosite affiliations, and provide a robust baseline for potential follow-up and monitoring requirements. Winter tracking surveys were completed between January 25 and February 3, 2017, February 1 and 3, 2018 and March 2 and 12, 2018. Methodology was developed with guidance from the provincial snow track survey protocols (Government of Saskatchewan 2014b) and long-term monitoring techniques originating in Finland (Linden *et al.* 1996) and adopted by the Alberta Biodiversity Monitoring Program (Shank and Farr 1999). Tracks from the following species were observed in the Project area during the winter track count surveys:

- Snowshoe hare;
- Red squirrel;
- Grouse;
- Fisher;
- Moose;
- Microtine (voles and muskrats);
- Marten;
- Canada lynx;
- Otter;
- Ermine;
- Woodland caribou;
- Mink; and
- Red fox.

5.5.5 Ungulate Pellet Group/Browse Availability

Pellet group/browse availability transects were completed between June 9 and 20, 2017, and June 6 and 12, 2018 to collect baseline data on the presence and relative abundance of ungulates (moose and woodland caribou), carnivores, and game birds (grouse/ptarmigan species). The

transects were also used to determine the frequency of occurrence and abundance of terrestrial and arboreal lichen, as this species is vital to the woodland caribou population.

Pellets or scats of the following seven species were detected during the pellet group/browse availability surveys:

- Grouse/ptarmigan;
- Moose;
- Woodland caribou;
- Black bear;
- Red fox;
- Mink; and
- Martin.

The pellet group/browse availability surveys will provide baseline data to support future impact assessments and to allow for potential future follow-up and monitoring requirements.

Terrestrial lichen was observed in all ecosite/vegetation cover types sampled, except in areas where black spruce/balsam poplar/river alder swamp and willow shrubby rich fen covers were most prominent. Frequency of occurrence was the highest (greater than 99%) in areas covered by jack pine/blueberry/lichen.

Arboreal lichen occurred in 79% of ecosites/vegetation cover types surveyed throughout the Project area and were observed to be most abundant in areas covered by jack pine/blueberry/lichen.

5.5.6 Woodland Caribou Aerial Survey

In 2018, Denison submitted a permit application for an aerial survey to collect local-regional wildlife (most specifically woodland caribou and moose) data to present regional comparison values (occurrence/relative density) and habitat affiliations of species in the region, and provide context for results recorded in the Project area to date. The aerial survey permit application was denied by Saskatchewan Ministry of the Environment (SK MOE). SK MOE advised that a Project-specific aerial survey was unnecessary; SK MOE advised that in the EIA, Denison should assume presence of woodland caribou in the Project area and reference available regional data on distribution, density and movement. Although regional woodland caribou data is available in an interim, summarized form (i.e., McLoughlin et al. 2016), raw data is currently unavailable to Denison.

5.5.7 Small Mammal Identification, Abundance, and Tissue Chemistry

A small mammal trapping program was completed between September 24 and October 2, 2016 to determine the species composition and relative abundance of voles, mice, and shrews, as well as to collect specimens for baseline metal and radionuclide tissue analyses.

With an overall capture rate of 7.7 captures per 100 trap nights, a total of 197 individual small mammals from the following three species were captured during the program: red-backed voles, meadow voles, and dusky shrews.

The small mammal trap lines were stratified by three general areas: Gryphon deposit, Phoenix deposit, and a reference location. A total of 124 red-backed vole specimens were submitted for metals and radionuclide analysis. Samples collected at the Phoenix deposit indicated elevated levels of aluminum, titanium, uranium, and radium-226 in comparison to other sites surveyed.

5.5.8 Amphibian Nocturnal Call and Visual Identification Surveys

Amphibian surveys were completed to establish the presence/not-absence and relative abundance of amphibian species within the local and regional study areas. Amphibian auditory surveys were completed between June 16 and 20, 2017 and June 6 and 9, 2018. The provincial species detection protocol for amphibian auditory surveys (Government of Saskatchewan 2014c) was used to establish methodology for the amphibian nocturnal call survey.

Visual search surveys were completed between June 7 and 14, 2018. The provincial species detection protocol for amphibian visual surveys (Government of Saskatchewan 2014d) was used to establish methodology for the amphibian visual search surveys.

Wood frogs and boreal chorus frogs were detected.

5.5.9 Breeding Songbird Identification and Abundance

Breeding songbird point count surveys were undertaken in June 2017 to document the diversity and relative abundance of breeding songbirds within the Project study area, as well as to determine the presence of known or potential avian species at risk. The breeding songbird point count survey methodology was developed with guidance from the Saskatchewan Ministry of Environments species detection survey protocol for forest bird surveys (Government of Saskatchewan 2014e). Three hundred and nineteen indicated pairs were observed in the Project study area. The highest number of breeding songbird pairs were detected in jack pine/white birch/feathermoss cover. The following list provides the ten most common species detected:

- Ruby-crowned kinglet;
- Dark-eyed junco;
- Gray jay;
- Yellow-rumped warbler;
- Swainson's thrush;
- Hermit thrush;
- Lincoln sparrow;
- Chipping sparrow;

- Fox sparrow; and
- American robin.

5.5.10 Semi-Aquatic Furbearer Abundance

Semi-aquatic furbearer shoreline surveys were conducted along shorelines of select creeks, lakes, and ponds between September 29 and October 3, 2016 to provide quantitative data on the occurrence and relative abundance of semi-aquatic furbearing mammals (muskrat, mink, beaver, and otter) and to collect spatial data on the distribution within the Project and regional study areas. Signs of three target species, namely muskrat, beaver, and river otter, were observed during the survey.

5.5.11 Aerial Waterfowl and Raptor Identification and Abundance

The aerial waterfowl and raptor stick nest survey was completed across 33 survey sections containing 353 water bodies on June 15 and 16, 2017 to document the presence, diversity, and abundance of breeding waterfowl (including species at risk), as well as to identify the occurrence of active, inactive, and old raptor nests (i.e. bald eagle, osprey, and red-tailed hawk). The survey recorded 20 confirmed unique species and six species groups, for a total of 681 individual waterfowl/raptor(s). The ten most commonly observed species were:

- Ring-necked duck;
- Common merganser;
- Common loon;
- Mallard;
- White-headed gull;
- Bald eagle;
- Canada goose;
- Lesser scaup;
- Yellow legs spp; and
- Bufflehead.

A total of 24 active (currently occupied), inactive (not currently occupied), and old (dilapidated) nests were observed in the Project area during the survey. Eleven nests were active including four bald eagle nests, four osprey nests, one raven nest, one herring gull nest, and one common loon nest, as well as one mew gull colony of 12-15 nests.

5.6 Species at Risk and Sensitive Species

Wildlife resources in the regional area of the Project have been identified as being important due to their contributions to biodiversity, social and economic value, and importance to local culture. A

literature review of available wildlife information identified a number of past inventory and habitat mapping studies within the local and regional study areas, many of which contribute to understanding local animal behaviour, habitat use, and anthropogenic and biological influences.

5.6.1 Wildlife Species

The Saskatchewan Conservation Data Centre (SKCDC) were consulted to identify wildlife species that may occur in the Project area. A total of five amphibians, 219 birds, and 41 mammals potentially occur within the Project area. Of the list of vertebrates known, or with potential to occur in the Project area, thirteen sensitive or federally/provincially listed species at risk were observed. Five are listed as “threatened” or “special concern” under the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and four are listed as Schedule 1 under *Species at Risk Act* (SARA).

Table 5.1 presents the list of sensitive or federally/provincially listed species at risk observed within the Wheeler area, along with setback distances.

5.6.2 Aquatic Species

There are no observations of aquatic species (meaning wildlife that is a fish as defined in section 2 of the *Fisheries Act*) in the Project area with the status of threatened, endangered or special concern under SARA or COSEWIC.

Table 5.1: Vertebrate Sensitive or Species at Risk Observations in the Wheeler River Project Area

| Common Name | Scientific Name | Observation Source | Observation Type | Observations Per Type | Total Observations* | SK Status ¹ | COSEWIC Status ² | SARA Status ³ | SARGSS ⁴ | Setback Distance (high disturbance) ⁵ |
|------------------------|------------------------------|--------------------|------------------------|-----------------------|---------------------|------------------------|-----------------------------|--------------------------|------------------------------|--|
| Common loon | Gavia immer | Field Survey | Auditory and/or Visual | 77 | 106 | S5B, SUN,S5M | Not at Risk | | Breeding Bird May 15-July 15 | 200 m |
| | | Incidental | Auditory and/or Visual | 28 | | | | | | |
| | | Incidental | Nest | 1 | | | | | | |
| Woodland caribou | Rangifer tarandus caribou | Field Survey | Track | 72 | 94 | S3 | Threatened | Threatened | | |
| | | Field Survey | Pellet | 4 | | | | | | |
| | | Incidental | Track/Browse | 5 | | | | | | |
| | | Field Survey | Crater | 13 | | | | | | |
| Bald eagle | Haliaeetus leucocephalus | Field Survey | Visual | 47 | 53 | S5B, S5N,S4M | Not at Risk | | Nest Site Mar. 15-July 15 | 1,000 m |
| | | Incidental | Visual | 3 | | | | | | |
| | | Incidental | Nest | 3 | | | | | | |
| Common nighthawk | Chordeiles minor | Incidental | Auditory and/or Visual | 26 | 33 | S4B, S4M | Threatened | Threatened | Breeding Bird May 1-Aug. 31 | 200 m |
| | | Incidental | Nest | 2 | | | | | | |
| | | SCDC | Visual | 5 | | | | | | |
| Mew gull | Larus canus | Field Survey | Auditory and/or Visual | 16 | 29 | S4B, S4M | | | Nesting Colony May 1-July 15 | 400 m |
| | | Field Survey | Nest | 13 | | | | | | |
| Osprey | Pandion haliaetus | Field Survey | Visual | 8 | 15 | S2B, S2M | | | Nest Site May 1-Aug. 15 | 1,000 m |
| | | Field Survey | Nest | 5 | | | | | | |
| | | Incidental | Visual | 2 | | | | | | |
| Olive-sided flycatcher | Contopus cooperi | Field Survey | Auditory and/or Visual | 8 | 14 | S4B, S4M | Threatened | Threatened | Breeding Bird May 1-Aug. 31 | 300 m |
| | | Incidental | Auditory and/or Visual | 6 | | | | | | |
| River otter | Lontra canadensis | Field Survey | Track | 10 | 11 | S3 | | | | |
| | | Incidental | Visual | 1 | | | | | | |
| Bonaparte's gull | Chroicocephalus philadelphia | Field Survey | Visual | 10 | 11 | S4B, S4M | | | Nesting Colony May 1-July 15 | 400 m |
| | | Incidental | Visual | 1 | | | | | | |
| Herring gull | Larus argentatus | Field Survey | Auditory and/or Visual | 6 | 7 | S5B, S5M | | | Nesting Colony May 1-July 15 | 400 m |
| | | Field Survey | Nest | 1 | | | | | | |
| Barn swallow | Hirundo rustica | Field Survey | Auditory and/or Visual | 4 | 4 | S5B, S5M | Threatened | | | |
| Horned grebe | Podiceps auritus | Incidental | Visual | 1 | 1 | S5B, S5M | Special Concern | Special Concern | | |
| Common tern | Sterna hirundo | Field Survey | Visual | 1 | 1 | S5B, S5M | Not at Risk | | Nesting Colony May 1-July 15 | 400 m |

* Species detections included visual/auditory observations, scat/pellet groups, winter tracking trails and general sign during 2017 and 2018 surveys

¹ SKCDC Rankings:

2 = Imperiled/Very rare

3 = Vulnerable/Rare to uncommon

4 = Apparently Secure

5 = Secure/Common

M = for a migratory species, rank applies to the transient (migrant) population

B = for a migratory species, applies to the breeding population in the province

N = for a migratory species, applies to the non-breeding population in the province

U = status is uncertain in Saskatchewan because of limited or conflicting information (unrankable)

² Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and its recommendations for listing, go to: <http://www.cosewic.gc.ca>

³ Species at Risk Act (SARA) and its registry of protected species go to: <http://www.sararegistry.gc.ca>

⁴ SARGSS: Saskatchewan Activity Restriction Guidelines for Sensitive Species (Government of Saskatchewan 2017c)

5.6.3 Plant Species

Rare vascular plant surveys were completed to identify rare vascular plant occurrence(s) within the Project local and regional study areas, as well as to provide a scientifically defensible baseline for potential follow-up/monitoring requirements. The rare plant survey was completed according to the Government of Saskatchewan (2017d) Rare Vascular Plant Survey Protocol. Alaskan clubmoss (*Diphasiastrum sitchense*), ranked as imperiled/ very rare (SK2), and three-seeded sedge (*Carex trisperma*), ranked as vulnerable/ rare to uncommon (SK3), were observed in the Project area.

5.7 Human Environment

5.7.1 Socio-Economic Context

The following is a summary of social and economic conditions, land use, communities, surface leases, disturbances, and existing infrastructure around the Project area.

The economy in northern Saskatchewan is dominated either directly or indirectly by natural resources. Economic activity is generated through commercial fishing, tourism, harvesting and sale of country foods such as mushrooms, wild rice and berries. The forestry industry is also a significant contributor to the region's economic base. That being said mineral exploration and the mining industry are by far the most dominant contributors to northern Saskatchewan's economy through direct employment, contracting of northern based businesses and the procurement of a multitude of supplies and services. The recent suspension of an operating uranium mine and mill in northern Saskatchewan resulted with layoffs of approximately 550 employees of which approximately half of those individuals were registered as northern residents.

As a remote site, there are no communities in relatively close proximity to Wheeler (Figure 3.4). Calculated using a straight line, the closest communities are approximately 150 km away in the northern settlement of Wollaston Lake and the neighbouring reserve of Lac La Hache (Table 3.2 and Figure 3.4). Travelling by existing roads the closest community to the Project is Pinehouse which is approximately 260 km away (Table 3.2).

A number of recreational leases are held, and it is assumed that cabins are used by both non-Indigenous and Indigenous people (Table 3.1). There are ten (10) recreational leases within 22 km of Wheeler. The federal lands within 150 km of Wheeler are reserve lands (Figure 3.5 and Table 3.3), none of which have permanent residences.

Ground access to Wheeler is along Highway 914; access to the highway north of Key Lake is controlled at the Cameco Key Lake gatehouse. Existing infrastructure in the area includes Highway 914, the provincial power line which is adjacent to the highway, infrastructure for Key Lake Operation, and infrastructure for McArthur River Operation (Figure 1.2). Existing disturbances are from exploration activities such as line cutting drilling and access routes.

Industrial leases in proximity to Wheeler are held for mineral exploration, power supply and road maintenance (Figure 3.2 and Table 3.1).

5.7.2 Heritage Resources

The Project footprints from the preliminary economic assessment stage were submitted to the Heritage Conservation Branch (HCB), Saskatchewan Ministry of Parks, Culture and Sport for heritage screening in 2017. It was identified that portions of the proposed infrastructure and access road options could impact hilly terrain and prominent uplands located within heritage sensitive areas. Accordingly, a Heritage Resource Impact Assessment requirement was attached to the Project, pursuant to Section 63 of *Heritage Property Act*.

A heritage resources baseline study was initiated on July 5, 2017 under Archaeological Resource Investigation, Permit 17-091. Heritage sensitive areas were assessed through a combination of pedestrian reconnaissance and visual inspection field programs, complimented by the excavation of 258 shovel probes and 5 shovel tests. The assessment identified an Artifact Find site (HiNi-6) of an unknown precontact cultural affiliation located on the western terrace of a lake adjacent to the Phoenix 2 access road option. The find was a large, grey quartzite secondary flake. At this stage in the Project design, the Phoenix 2 access road option is no longer being considered.

Upon completion of the Heritage Resources Impact Assessment, it was submitted to the HCB for review. The HCB determined that the new site was small, consisting of a single artifact so it was considered to have limited interpretative value. The HCB determined that the regulatory requirements were satisfactorily completed, and the office had no concerns regarding development occurring within the areas surveyed. An approval letter was issued to Denison by the HCB on December 14, 2017.

Denison recognizes that Project footprints (location, size) assessed in 2017 may change as the Project advances through the EIA and licensing phases. Additional heritage resource baseline studies will be undertaken, and approval will be received prior to executing future land disturbances, as required.

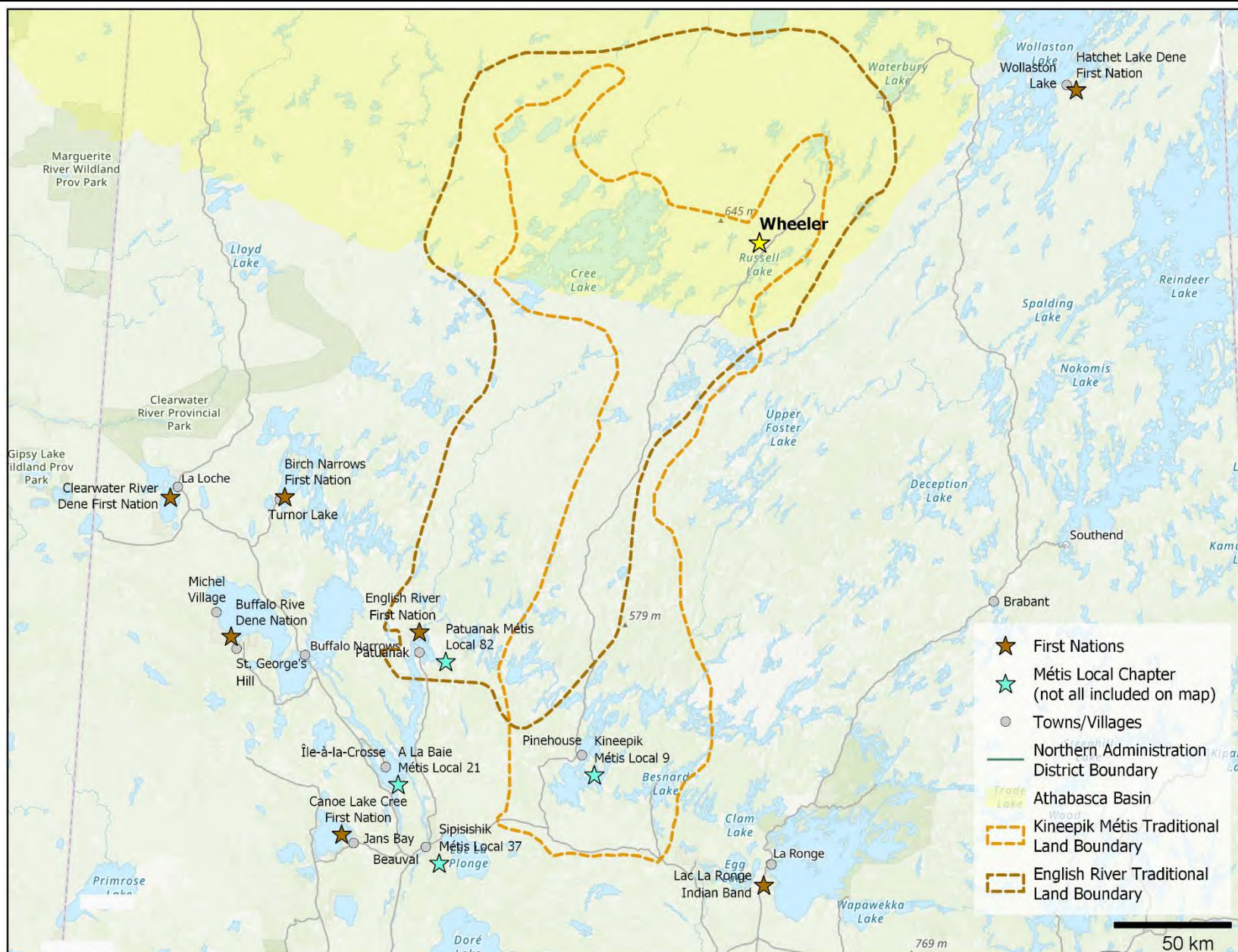
5.7.3 Current Traditional Land Use by Indigenous Communities

Wheeler is located in the Treaty 10 area (Figure 3.1) and the local and regional area surrounding the proposed Project has been claimed by four distinct Indigenous communities as partially or entirely falling within their traditional territories, where traditional land use activities have been historically or are currently practiced. These groups consist of the English River First Nation and the Kineepik, Sipishik and A La Baie Métis locals of the communities of Pinehouse, Beauval and Ile a la Crosse, respectively. Traditional territory boundaries from English River First Nation and Pinehouse Kineepik Métis are provided in Figure 5.7. These traditional land use maps were provided to Denison along with permission to use the maps.

The traditional activities practiced within the immediate and regional area of the Project consist of subsistence hunting and fishing. The immediate area also falls within the trapping block of N18, which is operated by a member of the English River First Nation (Figure 3.2 and Table 3.1).

Seasonal harvesting of native plants for food and medicinal purposes is also common throughout the regional area.

During the open water season the rivers and lakes in the area serve as transportation routes to and from areas of harvest of plants and game as well as preferred campsites and/or cabins. During the winter months the frozen lakes, river banks and muskegs are used as transportation routes to cabins, trap lines and/or preferred hunting areas.



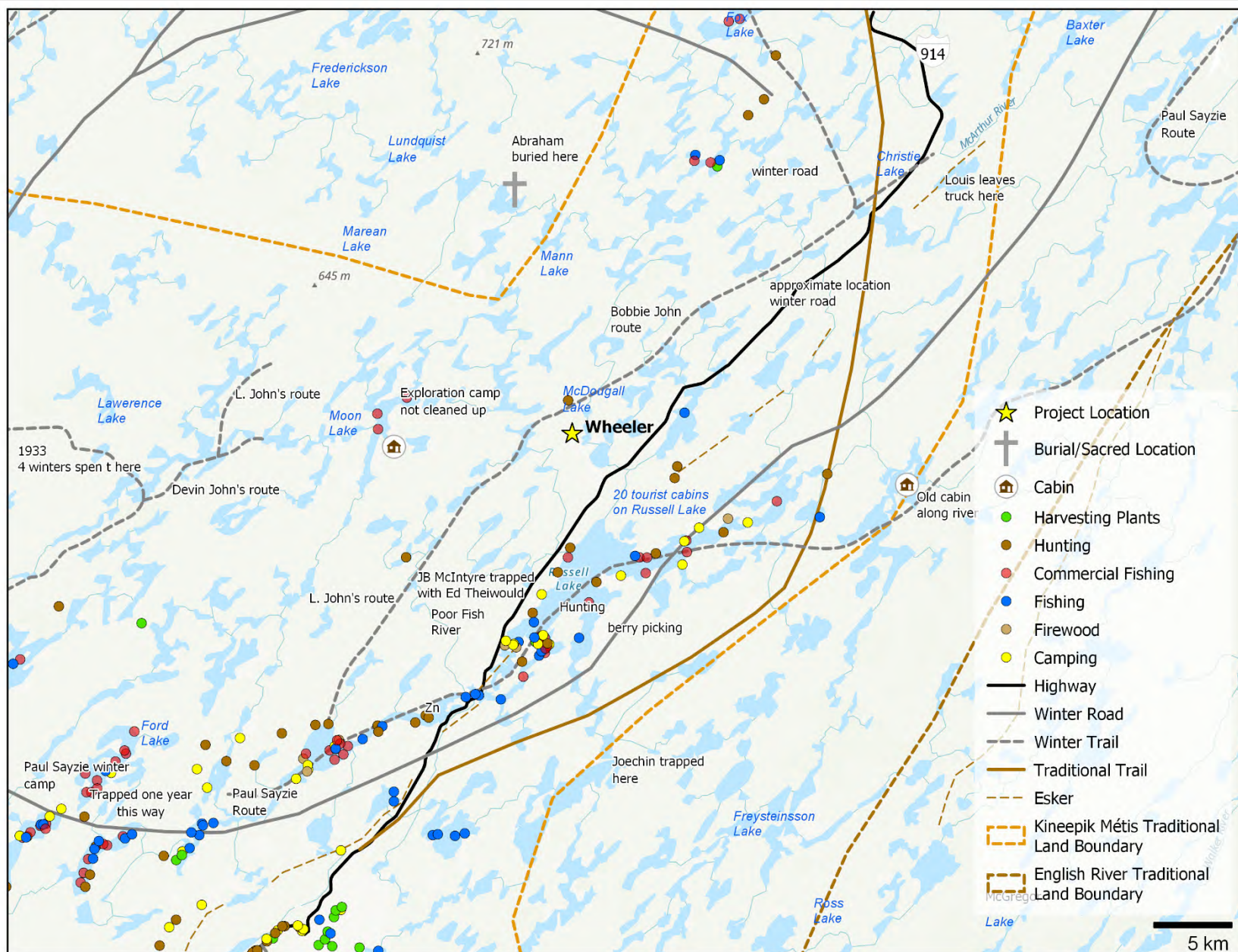
Note: Not all Indigenous traditional territories are included on the map

Enison Mines

Wheeler River Project
Provincial Technical Proposal and Federal Project Description

Figure 5.7: Traditional Territory Boundaries Provided by English River First Nation and Pinehouse Kineepik Métis

May 2019



Note: Traditional territory boundaries provided by English River First Nation and Pinehouse Kineepik Métis

Enison Mines

Wheeler River Project
Provincial Technical Proposal and Federal Project Description

Figure 5.8: Available Traditional Land Use Data around Wheeler

May 2019

6 Environmental Effects

6.1 Overview of Potential Project Effects and Mitigation Measures

This section provides a brief description of changes that may be caused by the Wheeler Project and the proposed mitigations. It includes a high-level summary of potential effects during the construction, operation, decommissioning and post-decommissioning phases under normal operating conditions and potential accidents and malfunctions scenarios. General mitigation measures to minimize or eliminate potential effects are presented for the biophysical or human environment component discussed below. This evaluation is not comprehensive or final; potential effects of the Project at the site, local and regional assessment areas will be rigorously and transparently assessed and presented in the EIA following the general approach of:

- Identifying component- or activity-specific characteristics and site-specific environmental characteristics;
- Identifying both positive and negative interactions between those characteristics (Project-environment interactions) through Project pathways;
- Identifying robust mitigation measures; and
- Assessing the likelihood and significance of these interactions following application of the mitigation measures, the acceptability of these residual risks, if any, and the resulting potential effects they may have on biophysical and human environment valued components (VCs).

In addition to predictions made, monitoring programs will be developed based on results of the environmental assessment and implemented as part of the plan, do, check, act model (Section 6.3).

6.1.1 Biophysical Environment

6.1.1.1 Terrain and Geology

Changes in terrain are expected to be minor as both the footprint and volume of earthworks required for construction of the Project components are minimal. Earthworks are expected for construction of surface infrastructure such as roads, building, and the airstrip. Large volumes for cut and fill are not anticipated, and detailed designs will be tailored to minimize and balance the cut and fill needs of the Project footprint.

Due to the depth of the deposit (~400m below surface), low vertical profile of the deposit (~6-8 m on average) and the fact that the mining only removes uranium from the ground leaving virtually all other material in place, surface ground subsidence is not expected. Ground subsidence may be experienced directly above the deposit, but those effects will be localized and are expected to dissipate in a short distance. To be conservative the potential for any ground subsidence at surface during the post-decommissioning phase as a result of allowing the freeze wall to thaw will be evaluated in the EIA.

General mitigation measures to minimize or eliminate potential effects to terrain and geology:

- Design Project to minimize footprint, and incrementally reclaim where possible;
- Design Project to minimize cut and fill volumes for surface facilities;
- Include freeze wall to provide geotechnical stability during mining;
- Assess the potential for subsidence post-mining and monitor the geochemical and geotechnical conditions within the mine chamber during the decommissioning phase; and
- Evaluate options to backfill the mining area if subsidence during the post-decommissioning is identified.

6.1.1.2 Hydrogeology

Groundwater quality within the mining chamber is expected to change as a result of direct contact with the mining solution during operations. This effect will be localized and groundwater in the mining chamber will be remediated during decommissioning before the freeze wall is allowed to thaw.

Mining solution and uranium rich mining solution may enter groundwater outside of the mining chamber via accidents or malfunctions. Examples of types of accidents and malfunctions could be: well damage and release outside of the mining chamber, groundwater contamination from surface through spills at the pumphouses or leaks along the pipelines. However, all flows within the ISR mining system from the processing plant to the mining chamber are metered and monitored for pressure losses which will allow for early identification of leaks in wells and along pipelines throughout the entire closed circuit. Wells and pipelines will be designed with secondary containment (or equivalent protections) and leak detection monitors. The monitoring and safeguards put in place will allow for the stoppage of any leaks quickly by turning off wells or reversing flows at select wells within the wellfield, thereby minimizing any effects on groundwater quality. If required, Denison will be able to drill additional wells into any potentially contaminated areas for recovery of the mining solution back to surface. Denison will develop emergency response plans to prevent and clean-up surface spills. In addition, groundwater monitoring wells will be established at key locations within and outside of the wellfield to monitor for any changes in groundwater quality.

Groundwater quality may be changed by discharge of treated effluent into the groundwater environment. Options and potential effects associated with potential discharge of treated effluent into groundwater via deep well injection will be thoroughly examined in the EIA.

Groundwater quality may also be changed by accidents and malfunctions related to: spills or leaks from waste pads and ponds, spills of hazardous substances including reagents and fuels, leaks from water treatment plant ponds, and leaching from the landfill. During normal operating conditions, Denison expects these interactions will be fully mitigated through appropriate Project design (e.g., waste pad will be double lined with leak detection capabilities; hazardous substances stored

in approved storage areas with secondary containment as required) and implementation of management plans (e.g. material sorting for items destined for onsite landfill, hazardous waste handling and storage). Groundwater monitoring wells will be established near the processing plant terrace, landfill, and fuel and hazardous waste storage area to allow for detection of any changes in groundwater quality.

While the freeze wall is in place, groundwater flow will be changed at the site level (e.g., immediately surrounding the mining chamber) as groundwater within and outside of the freeze wall will not be able to interact. This will be reversed post-decommissioning once the mining chamber has been remediated and the freeze wall is allowed to thaw. Potential changes in site and local groundwater flow regime will be evaluated as part of the hydrogeological model in the EIA.

Given our understanding of the extent of the hydrogeological environment in the site, local and regional Project areas we do not expect any aspect of the Project will influence groundwater quantity. However, the influence of the wellfield and the in situ recovery mining method on groundwater quantity will be examined and assessed as part of the hydrogeological assessment in the EIA. The assessment will include the potential for localized drawdown in groundwater outside of the mining chamber. Groundwater withdrawal for the fresh water distribution system (fire water system, the potable WTP, the processing plant and the wash bay) will also be evaluated for any potential changes on groundwater quantity. Groundwater monitoring wells will be established at key locations within and outside of the wellfield to monitor any changes in groundwater levels.

General mitigation measures to minimize or eliminate potential effects to the hydrogeological environment:

- Establish freeze wall before mining operations to create the mining chamber, effectively isolating the area with mining solution (area inside the mining chamber) from the surrounding groundwater environment;
- Design injection and recovery wells to have secondary containment, or adequate containment (e.g. cementing the annulus of injection and recovery wells);
- Recognize option to drill additional wells in order to recover mining solution excursions;
- Design pipelines to have secondary containment or catchment;
- Have leak detection in place for wells and pipelines;
- Remediate groundwater in mining chamber as part of decommissioning;
- Have appropriately designed and monitored storage areas for waste, reagents, and hazardous substances; and
- Design processing plant to allow for collection of any spills.

6.1.1.3 Atmospheric and Acoustic Environment

There is potential for radon and radon progeny degassing from uranium rich mining solution in the wellfield components (i.e., injection and recovery wells, pumphouses, pipelines) and in the

processing plant. Ventilation will be designed to provide sufficient worker protection and monitoring systems will be in place to ensure worker health and safety. Discharge into atmosphere should provide sufficient dilution, although modelling for EIA will indicate if other mitigations are required.

The processing plant exhaust, mainly from drying and packaging areas, will be directed through a stack and released outside of the building. The stack height will be designed based on results of air dispersion modelling to be an appropriate height for optimal dispersion. If the modelling suggests the need, scrubbers will be installed to control atmospheric emissions. Best available technology, with respect to workplace cleanliness will be implemented inside the processing plant in order to reduce radiological exposures. Denison anticipates stack monitoring, ambient radon monitoring and high-volume air to confirm EIA predictions with respect to calculated source terms and dispersion modelling results.

Fugitive dust from access roads, the airstrip and the clean waste rock pile have potential to locally impact vegetation and soil and therefore wildlife habitat. This will be considered as a physical effect of clean dust in the terrestrial environment section of the EIA; elevated metal and radionuclides are not expected at either roads due to the mining method selected or the clean waste rock pile due to sorting of drill cuttings during wellfield development. The need for dust control will be evaluated based on results of modelling predictions results documented in the EIA. These predictions will be calibrated with dustfall or high-volume monitoring during operations and if necessary additional mitigations measures will be implemented.

Dust from material on the waste pad has the potential to contain metals and radionuclides. The pile will be managed to minimize dust and fugitive dust leaving the pad will be monitored. If necessary, dust control mitigation will be implemented. The current plan is to pack precipitate waste or impurities from the processing plant in tote bags that are then placed on the pad, providing an additional level of containment, eliminating dust from this source and reducing potential volumes of contaminated contact water. Options for disposal of the material on the waste pad (mineralized waste rock, precipitates, and water treatment plant solids) will be evaluated in the EIA.

By tying into the provincial power grid and the nearby Island Falls hydroelectric station, greenhouse gases (GHGs) emissions associated with the Project will be minimized. GHGs are expected from operation of back-up diesel generators, vehicles, drill rigs, and exhaust from propane use in the kitchen and camp for heating. Selection of high-quality, low emissions equipment and regular maintenance will help reduce emissions of GHGs. Denison will examine options to further reduce GHG emissions by using alternate emergency generators, electric vehicles, an electric drill rig for wellfield development, and electrical heat in buildings. Denison will assess greenhouse gas emissions and evaluate their significance in the EIA. This will include evaluating whether the Project is a large GHG emitter, or not. Emissions of NO_x, SO_x, and particulate matter will be evaluated in the EIA as a potential input into the human health and ecological risk assessment (HHERA).

Denison plans to operate an incinerator to dispose of food waste. It is expected that selection of an appropriate incinerator will have design components to mitigate emissions to air. Correct operation and regular maintenance of the incinerator will be important to achieve the design parameters and procedures will be in place to achieve this. If required, the exhaust from the incinerator will be examined as part to the air dispersion modelling.

Compared to traditional uranium mining operations in Canada, the Wheeler noise levels are expected to be low. The main sources of noise will be related to transport of people and goods to and from the site via air and land, drilling of holes for the freeze wall and wellfield, operation of the batch plant, operation of the processing plant, and operation of the pumphouses. Selection of high-quality, low sound emission equipment and regular maintenance will help reduce noise associated with Project activities. Denison will examine options to further reduce noise emissions by using electric vehicles and an electric drill rig for wellfield development. Sensory disturbances to wildlife will be examined as required in the terrestrial section of the EIA.

Overall, Denison anticipates that air emissions and noise from Project activities will dissipate very rapidly to background levels within a few hundred metres from the source.

General mitigation measures to minimize or eliminate potential effects to the atmospheric and acoustic environments:

- Implement a waste rock segregation plan;
- Provide dust control along roads and at the airstrip as required;
- Install scrubbers in stacks and incinerator, as necessary;
- Tie into provincial power grid and hydroelectric station at Island Falls as the main way to minimize GHG emissions;
- Evaluate electric vehicles, electric drill rigs and electric heating in buildings to further minimize greenhouse gas emissions;
- Select and purchase equipment to minimize emissions to air and noise generation;
- Follow operating procedures for equipment;
- Conduct regular maintenance of equipment;
- Develop methods for minimizing radon exposure from the venting of wells, pumphouses or anywhere that there is a potential for the degassing of radon in the system; and
- Evaluate options to reduce noise emissions by using electric vehicles and an electric drill rig for wellfield development.

6.1.1.4 Aquatic Environment

Changes in water quality will be examined through various pathways including: discharge of treated effluent, discharge from the clean waste rock pond, potential for contaminated groundwater to affect surface water bodies, construction and maintenance of water crossings, and any on land

activities near water bodies. Changes in water quality have the potential to affect other components of the aquatic environment including sediment, benthic invertebrates, plankton, and fish. The discharge of treated effluent to a surface water body is expected to be the main Project interaction with water, sediment, and aquatic biota.

The Project may be subject to the Metal and Diamond Mining Effluent Regulations (depending on the volume of treated effluent discharge) which outline requirements for effluent monitoring, effluent discharge limits, and biological effects monitoring program in the receiving environment. Details on expected treated effluent quality and volumes will be presented in the EIA. Based on the current Project design with a focus on water recycle in the processing plant and the minimal discharge volumes to surface water, downstream impacts are considered unlikely outside of the local study area. This includes water and sediment quality, changes in benthic invertebrate, plankton, and fish communities, and benthic invertebrate tissue chemistry and fish tissue chemistry. A thorough evaluation of the potential effects of treated effluent in the receiving environment will be completed as part of fate and transport modelling in the EIA. This is an exercise to predict water and sediment quality at locations downstream of the treated effluent discharge point. The results of the water and sediment modelling will be used to predict effects on benthic invertebrates, plankton, fish, semi-aquatic VCs, terrestrial VCs and humans as part of the HHERA.

Changes in certain components of the aquatic environment (e.g., surface water quality, benthic invertebrate communities, fish populations, etc.) may result from accidents and malfunctions related to spills or leaks from pipelines, processing plant, waste pads, ponds, and hazardous substance storage area. During normal operating conditions, Denison expects these interactions will be fully mitigated through integration of best available technology in the Project design (e.g., leak detection and secondary containment along pipelines; hazardous substances stored in approved storage areas with secondary containment as required) and implementation of various management programs, standard operating procedures and monitoring plans (e.g. material sorting for items destined for onsite landfill, hazardous waste handling and storage).

Potential changes in water quantity as measured by water level and flows will be examined through various pathways including: discharge of treated effluent, discharge from the clean waste rock pond, withdrawals for the fresh water distribution system (fire water system, the potable WTP, the processing plant and the wash bay), recharge of groundwater to surface water bodies, possible drawdown from mining activities, and construction and maintenance of water crossings. All interactions are anticipated to be minor as water intake and output volumes are low relative to the baseline flows in the Project drainage areas. Any changes in local drainage around the site due to infrastructure are expected to be minimal and have negligible effects on site and local study area flows and water levels. Flows are not expected to change at the proposed water crossings as the crossing types will be selected, designed and constructed to avoid causing harm to fish and fish habitat. All potential changes in water levels and flow will be examined as part of the hydrological assessment in the EIA.

Potential effects on fish and fish habitat from in-water works and activities near water are expected to be minor and may be managed by following the Department of Fisheries and Oceans Canada's (DFO's) measures to avoid and mitigate impacts to fish and fish habitat into Project planning and implementation. Two water crossings will be required along the road from the site to the airstrip. The crossing types will be selected and designed to avoid causing harm to fish and fish habitat. Installation of a water intake and a treated effluent discharge pipeline will require in-water works which will be done following best management practices and incorporate measures to avoid causing harm to fish and fish habitat. The water intake will be screened to prevent entrainment of fish and the treated effluent release point will be designed to reduce erosion. A 100 m buffer zone will be established along the shoreline of fish bearing water bodies for working near water, where possible, and best management practices such as erosion and sediment control measures will be implemented. Denison does not expect any Project activities will require a *Fisheries Act* Authorization from DFO. As such, Project review for effects to fish and fish habitat will be conducted by the CNSC as per the MOU between the CNSC and DFO (dated December 16, 2013).

General mitigation measures to minimize or eliminate potential effects to the aquatic environment:

- Minimize volume of treated effluent discharge to the environment by recycling mining solution in the processing plant;
- Design water treatment plant to produce treated effluent which meets or is lower than regulatory discharge requirements;
- Design water intake to avoid fish entrainment;
- Design treated effluent release point to reduce erosion;
- Design and monitor storage areas for waste and hazardous substances;
- Design pipelines to have secondary containment or catchment;
- Design surface facilities to allow for the collection of spills;
- Design and construct water crossings to avoid causing harm to fish and fish habitat;
- Follow best management practices for working in and near water; and
- Develop a robust emergency response plan to minimize the impacts of accidents and malfunctions.

6.1.1.5 Terrestrial Environment

Site preparation and construction will involve ground clearing for all facilities including the roads, processing plant area, wellfield, waste pads and ponds, water treatment plant ponds, and support building such as the camp and operations centre. Best management practices will be followed such as completing all site preparation activities outside of the breeding bird season (and or pre-clearing the area outside of breeding periods), maintaining set-backs from water and saving brush for reclamation. Some of the site and local study areas to be cleared have already been disturbed and/or cleared as a result of exploration activities which will help minimize new disturbance.

Construction and operation of the Project will result in a small loss of soil, vegetation and wildlife habitat in the site and local study areas. However, following decommissioning and reclamation, soil, vegetation and wildlife habitat are expected to recover to baseline conditions. During operations progressive reclamation activities will be completed where possible and the progress and success of these activities will be assessed annually.

Project interactions with wildlife may include direct effects (i.e., potential for wildlife-vehicle collisions) and indirect effects such as changes in movement in response to activity and noise. Woodland caribou are of particular interest due to their conservation status (COSEWIC and SARA status of threatened). Mitigation measures to reduce Project footprints, minimize habitat disturbance, and minimize noise will contribute to reducing potential effects of the Project on woodland caribou in the site, local and regional study areas. A Woodland Caribou Management Plan consistent with the management goals of SK-1 zone will be developed as part of the EIA and will assess the needs for habitat offsets.

Migratory birds are present in the Project area. The main potential interaction of the Project with migratory birds is expected to be site clearing activities (primarily during construction) with breeding times for migratory birds. The Project will be designed and planned to avoid disruption of migratory birds' nests and eggs.

The primary pathways for contaminants to interact with terrestrial wildlife includes release of treated effluent and release of contaminated dust. The potential for radiological and non-radiological contaminants to affect the health of terrestrial wildlife will be evaluated in the EIA as part of the HHERA.

Changes in certain components of the terrestrial environment such as soil quality and vegetation quality may result from accidents and malfunctions related to spills or leaks from pipelines, processing plant, waste pad, ponds, and hazardous substances. During normal operating conditions, Denison expects these interactions will be fully mitigated through appropriate Project design (e.g., leak detection and secondary containment along pipelines; hazardous substances stored in approved storage areas with secondary containment as required) and implementation of various management programs and plans (e.g. material sorting for items destined for onsite landfill, hazardous waste handling and storage, a site emergency response plan).

General mitigation measures to minimize or eliminate potential effects to the terrestrial environment:

- Design Project to minimize disturbance of terrestrial habitat;
- Stockpile brush when possible to use in reclamation;
- Complete ongoing decommissioning when possible;
- Design surface pipelines to have secondary containment or catchment;
- Have leak detection systems in place at key locations;

- Develop a caribou management plan and evaluate the need for caribou habitat offsets in the EIA; and
- Design and plan Project activities to avoid disruption of migratory birds' nests and eggs.

6.1.2 Human Environment

6.1.2.1 Worker Health and Safety

Worker health and safety will be evaluated for both conventional health and safety and radiological health and safety. Worker exposure to non-radiological and radiological elements will be evaluated as part of the HHERA in the EIA.

The main conventional health and safety concerns will be working with hazardous substances such as reagents used throughout the ISR mining and uranium extraction processes as well as fuels, lubricants and greases common to an industrial operation. Denison will have a comprehensive health and safety program in place that meets the requirements of both the federal and provincial governments in order to protect workers and to minimize the potential for conventional health and safety incidents.

With respect to radiation protection, there is the potential for worker exposure to radon and radon progeny degassing from uranium rich mining solution in the wellfield components and in the processing plant. Ventilation will be designed with the ALARA principle (as low as reasonably achievable) in mind to provide sufficient worker protection. Monitoring systems will be in place to ensure these mitigation measures are meeting design specifications. Dust control and good housekeeping practices throughout the plant will also form a critical component of the Radiation Protection Management Plan developed for the Project. Radiological exposures will stay under regulatory limits and keeping with the ALARA principal every effort will be made to maintain all exposures below all licenced action levels. The EIA will present an assessment of potential worker dose and quantify the likely range of doses.

The proposed location for the camp facilities was selected to be upwind of the processing plant, waste pile, and other main sources of contaminants to air.

General mitigation measures to minimize or eliminate potential effects to Worker Health and Safety:

- A radiation protection program derived from a robust radiation exposure assessment;
- An occupational health and safety program;
- Programs for any area deemed critical to safety or in the core CNSC safety assessment areas;
- Clear separation of clean and potentially contaminated areas on site for equipment and personnel;
- Appropriate monitoring and reporting;
- Design pumphouses and processing plant to have proper ventilation; and
- Design Project layout to have office and camp upwind of processing plant.

6.1.2.2 Traditional Land Use

The construction and operation phases of Wheeler may positively or negatively change access for any Indigenous or other resource users in the site and local study areas. There are no potential effects expected from the Project at the regional study area. Denison has integrated traditional knowledge provided by several Indigenous groups practicing traditional land use in the regional and local areas in the early design stages of the Project (refer to Section 8.2.1.2). This practice will continue throughout the EIA and all components of the Project will be assessed in an effort to limit or eliminate effects of the Project on traditional land use. One of the principle decommissioning and reclamation objectives will be to reclaim the site and local study areas to a self-sustaining natural environment capable of supporting pre-mining land use. Successfully meeting this decommissioning and reclamation objective will allow for traditional land use in the site, local and regional study area to continue throughout the post decommissioning and reclamation phase of the Project.

General mitigation measures to minimize or eliminate potential effects to Traditional Land Use:

- Continue engagement with Indigenous groups currently practicing traditional land use activities in the Project area throughout the EIA, feasibility and detailed design stages;
- Identify and incorporate any mitigation or accommodation measures obtained during engagement with Indigenous groups currently practicing traditional land use activities in the Project area;
- Implement Caribou and other Wildlife Management Plans, which will limit or eliminate harvesting of fish and game throughout the construction, operation and decommissioning and reclamation phases of the Project by Project staff;
- Ensure the design and construction of all water crossings over navigable waters are constructed in a manner that does not impede the use of these water courses as a means of transportation for traditional users;
- Ensure the implementation of monitoring programs for all three study areas and present the results of these monitoring programs to key Indigenous groups on regular intervals, demonstrating the environmental protection management plans being implemented are meeting their objectives;
- Design and implement a decommissioning and reclamation plan that incorporates best management practices; and
- Design Project with minimal footprint.

6.1.2.3 Heritage Resources

It is expected that effects on heritage resources will be mitigated through the completion of heritage resource impact assessments and avoidance of any known heritage resources. Procedures will be in place to appropriately respond to any unanticipated heritage resource encounters. These

unanticipated encounters would primarily be expected during site clearing and construction activities.

General mitigation measures to minimize or eliminate potential effects to heritage resources:

- Complete heritage surveys and avoid areas with known resources;
- Submit results of heritage resource impact assessments to Heritage Conservation Branch for review;
- Develop and implement a Heritage Resource Management Plan for the construction and operating phases of Wheeler in accordance with Saskatchewan's *Heritage Property Act*;
- Obtain Indigenous feedback on and incorporate feedback into the Heritage Resource Management Plan; and
- Design Project with minimal footprint.

6.1.2.4 Members of the Public

Exposure to non-radiological and radiological elements for members of the public will be evaluated as part of the HHERA in the EIA. Based on the Project design, Denison anticipated any effects on members of the public will be fully mitigated.

Releases to the environment will be controlled and monitored by the effluent, emissions and environmental monitoring program. Results of these monitoring and control activities will be used to validate results of the HHERA for dose and exposure to members of the public.

6.1.2.5 Socio-Economics

It is expected that the Project will provide a net positive socio-economic effect. This effect will be realized at national, provincial and local northern community levels. All of these socio-economic benefits will be assessed as part of the EIA.

Briefly, the Project will contribute to the national and provincial economies through taxes and royalties as well as through out of province employment generated through downstream processing and transportation requirements of the Wheeler final product. In addition, socially the Project will contribute a significant supply of GHG free energy, in a GHG friendly manner, supporting Canada and Saskatchewan's commitment to addressing global climate change.

The Project itself will generate significant employment and business opportunities throughout all four phases of the operation: construction, operation, decommissioning and post-decommissioning.

In line with Denison's MOUs, direct and indirect employment opportunities as well as business development opportunities will preferentially target individuals and businesses residing in and based in northern Saskatchewan, respectively. Denison is also committed to support education and training opportunities as well as community investment within local northern and Indigenous

communities. Progress on all of these commitments is currently being realized in northern and Indigenous communities and will continue throughout all phases of the Project. The existing commitments and future commitments will be evaluated as part of the EIA.

Denison is an equal opportunity employer and has established strong policies against harassment in the workplace and unlawful discrimination. Denison will continue to work with regulatory agencies, government and communities to reduce employment barriers for all people.

There is currently no tourism land use documented on the site or local study area. However, there is tourism use documented within the regional study area. There are no effects anticipated from the Project that would impact tourism in the regional study area. However, this will be assessed as part of the EIA under the socio-economic aspects of the Project.

General mitigation measures to minimize or eliminate potential negative effects and continue the growth of socio-economic benefits associated with the Project:

- Continue Denison's Indigenous and non-Indigenous engagement program;
- Continue to fulfill commitments outlined in Denison's existing MOUs with Indigenous groups and communities;
- Continue employment practices and efforts to reduce employment barriers for all people;
- Involve and inform representatives of the tourism industry active in the regional study area as part of the ongoing implementation of the engagement program;
- Ensure the implementation of monitoring programs for site, local and regional study areas and present the results of these monitoring programs to regulatory agencies, Indigenous groups and members of the public on regular intervals, demonstrating the environmental protection management plans being implemented are meeting their objectives; and
- Design Project with minimal footprint.

6.1.2.6 Indigenous Peoples

It is anticipated that Wheeler will have a net positive effect on the Indigenous peoples of northern Saskatchewan. Many of these effects have been discussed above, in Sections 6.1.2.1 through Section 6.1.2.5. However, Denison believes they have an additional obligation to the Indigenous peoples who assert claim of the site, local and regional study area as being part of their traditional territory.

The ongoing implementation of the Indigenous engagement program (Section 8.2) will help to identify programs that can be developed within the spirit of the objectives of Denison's existing MOUs with northern and Indigenous groups. These programs will be included as part of the socio-economic aspects of the Project's EIA.

Denison has already engaged with Indigenous peoples to obtain and incorporate feedback directly into the Project designs (refer to Section 8.2.1.2). Denison intends to continue this process to help

minimize impacts through design. Denison intends to continue to engage Indigenous groups on any of the Project's potential impacts to their potential or established Indigenous and/or treaty rights. Engagement efforts will continue as the Project advances and additional conversations will be held once potential Project effects are more thoroughly understood and assessed as part of the EIA process.

As part of ongoing engagement and the EIA process, Denison can review cultural programs in place at other mine sites and brainstorm with Indigenous groups to identify effective cultural support programs that could be implemented at Wheeler.

Examples of additional programs that could be assessed as part of the EIA are:

- Employ Elders at site throughout the construction, operation and decommissioning phases of the program to provide cultural support to Indigenous employees;
- Initiate cultural awareness training for employees periodically throughout the construction and operational phases of the Project; and
- Work with Saskatchewan's northern medical health office to initiate additional programs that may not be currently easily accessed in remote communities. These programs could be made available at site to the Project's work force to encourage wellness and healthy lifestyle choices.

6.1.3 Summary of Environmental Effects under CEAA 2012

This section provides a summary of information presented in Section 6.1.1 and Section 6.1.2 in order to clearly address the requirements of CEAA 2012, s. 5(1).

6.1.3.1 Fish and Fish Habitat

There is potential for contaminants in water to affect fish health and fish communities. The two main pathways for contaminants to enter fish bearing water bodies are anticipated to be 1) release of treated effluent and 2) spills or leaks of hazardous substances.

The volume of treated effluent (if any) is expected to be minimal with maximum water recycle in the processing plant. In addition, the quality of the effluent will meet or be lower than regulatory limits designed to protect the aquatic environment. This will be fully evaluated as part of the HHERA in the EIA.

Through Project design, best management practices, monitoring, and development of a robust emergency response plan, it is anticipated that the potential for accidents and malfunctions will be minimized.

Potential effects on fish and fish habitat from in-water works and activities near water are expected to be minor and can be mitigated by following the Department of Fisheries and Oceans Canada's (DFO's) measures to avoid and mitigate impacts to fish and fish habitat. The design and installation of any in-water Project components such as water crossings, a water intake, and a treated effluent discharge pipeline and release point will incorporate measures to avoid causing harm to fish and

fish habitat. Work near the shoreline of fish bearing water bodies will be avoided where possible and all work will follow best management practices such as erosion and sediment control.

Denison does not expect any Project activities will require a *Fisheries Act* Authorization from DFO. As such, Project review for effects to fish and fish habitat will be conducted by the CNSC as per the MOU between the CNSC and DFO (dated December 16, 2013).

Based on the above, no significant impacts to fish or fish habitat (as defined in subsection 2(1) of the *Fisheries Act*) are expected from Project activities.

6.1.3.2 Aquatic Species

There are no observations of aquatic species (meaning wildlife that is a fish as defined in section 2 of the *Fisheries Act*) in the Project area with the status of threatened, endangered or special concern under SARA or COSEWIC.

6.1.3.3 Migratory Birds

Migratory birds as defined in the Migratory Birds Convention Act are present in the Project area. The main potential interaction of the Project with migratory birds is expected to be site clearing activities (primarily during construction) with breeding times for migratory birds. The Project will be designed and executed to avoid disruption of migratory birds' nests and eggs. This may involve pre-clearing Project footprints outside of breeding periods.

6.1.3.4 Changes to the Environment on Federal Lands, in a Province other than Saskatchewan, or outside Canada

Denison does not anticipate any changes to the environment on federal lands, in a province other than Saskatchewan, or outside Canada as a result of construction, operation and decommissioning of Wheeler. Potential effects of the Project are expected to be limited to the VC-specific local study areas. No impacts outside of the province of Saskatchewan are expected.

The nearest federal land is 16 km away (Table 3.3 and Figure 3.5). This is reserve land registered to English River First Nation which currently and has no permanent residences.

Any potential changes to the environment on federal lands, outside of Saskatchewan or Canada will be fully evaluated in the EIA.

6.1.3.5 Effects on Indigenous People

Health and Socio-economic Conditions

Exposure to non-radiological and radiological elements for members of the public will be evaluated as part of the HHRA in the EIA. Based on the Project design, Denison anticipated any effects on members of the public will be fully mitigated.

Denison anticipates a net positive socio-economic effect on Indigenous peoples. In line with Denison's MOUs with Indigenous groups, direct and indirect employment opportunities as well as

business development opportunities will preferentially target individuals and businesses residing in and based in northern Saskatchewan, respectively. Denison is also committed to support education and training opportunities as well as community investment within local northern and Indigenous communities.

Physical and Cultural Heritage

Based on traditional knowledge shared with Denison to date, physical areas of cultural importance have not been identified in the Project local study area. Protection of cultural heritage will be incorporated into potential initiatives such as cultural awareness training to employees and employing Elders at site throughout the construction, operation and decommissioning phases of the Project to provide cultural support to Indigenous employees.

Current use of lands and resources for traditional purposes:

Denison has integrated Indigenous knowledge provided by several Indigenous groups practicing traditional land use in the regional area in the early design stages of the Project (refer to Section 8.2.1.2). This practice will continue throughout the EIA and all components of the Project will be assessed in an effort to limit or eliminate effects of the Project on traditional land use.

Traditional land users in the Project area could be affected by restricted access to the site for hunting and fishing during construction and operation; however, following decommissioning, access to the site and resources harvesting will be fully restored. Denison intends to continue to engage Indigenous groups on any of the Project's potential impacts to their potential or established Indigenous and/or treaty rights. Denison will also identify and incorporate any mitigation or accommodation measures obtained from engagement activities. Engagement efforts will continue as the Project advances and additional conversations will be held once potential Project effects are more thoroughly understood and assessed as part of the EIA process.

Any structure, site or thing that is of historical, archaeological, paleontological or architectural significance:

Based on knowledge of the existing environment, Project effects on any structure, site or thing that is of historical, archaeological, paleontological or architectural significance are not expected.

Denison is committed to completing heritage surveys for all Project footprints and avoiding areas with known resources. Denison will also develop and implement a Heritage Resource Management Plan which will outline steps to be taken should an unexpected artifact be encountered. Denison is committed to obtaining Indigenous feedback on and participation with the Heritage Resource Management Plan.

6.1.4 Conclusions

The selection of ISR results in a uranium mining and milling Project with no tailings, a relatively small footprint, minimal volumes of clean waste rock, minimal volumes of waste rock, minimal

generation of other contaminated wastes, and limited water treatment and discharge. Wheeler will be designed to contain potential contaminants and careful consideration will be taken to ensure contaminated areas are kept separate from non-contaminated areas.

Groundwater quality will be a main focus in the EIA in order to fully describe the potential range of effects of any leaks or spills of mining solution to the area outside of the mining chamber. Planning for mining chamber restoration at the end of operations provides confidence that protection of groundwater quality will be a primary focus for decommissioning. Denison anticipates that air emissions and noise from Project activities will dissipate very rapidly to background levels within a few hundred metres from the source. Aquatic effects are expected to be low as the Project will minimize volumes of treated effluent through water recycling in the processing plant. Effects on fish and fish habitat are expected to be avoided and mitigated and it is anticipated that a *Fisheries Act* Authorization will not be required. Disturbance of terrestrial habitat will be minimized to the extent possible; progressive reclamation will be practiced throughout operations and a robust decommissioning and reclamation plan will be implemented following the operations phase of the Project. Potential Project effects on woodland caribou will be carefully considered in the EIA. A Caribou Management Plan will be developed and the need for any caribou habitat offsets will be presented in the EIA. Worker health and safety is of the utmost importance and effects on members of the public are not expected. Any effects on traditional land use will be limited to the site and local study areas and these effects will be short term limited to the construction and operating phase of the Project. No effects on traditional land use will occur in the regional study area. Wheeler is expected to provide a net positive effect on socio-economics throughout all levels of the Canadian economy with the most significant positive impact being realized by the Project's local Indigenous and non-Indigenous communities through direct employment and business opportunities. Wheeler can be decommissioned and reclaimed to meet decommissioning objectives resulting in a site that is safe and stable where traditional land use activities may be freely conducted. The site is expected to be accepted into the provincial Institutional Control Program or possibly released back into the Crown land inventory within five years following final decommissioning and reclamation.

In the EIA Denison will demonstrate that the Wheeler Project can be constructed, operated, and decommissioned with no significant adverse effects on the biophysical and human environments. An HHERA will be performed as part of the EIA to demonstrate the overall low impacts of the Project. The preliminary EIA results will be provided for discussion and feedback with local Indigenous and non-Indigenous communities as part of Denison's ongoing engagement activities.

6.2 Cumulative Effects

For the purposes of a cumulative effects assessment, the Project's net environmental effects (i.e. after mitigation) are assessed in combination with the environmental effects of past activities, existing projects and projects or activities that can be reasonably predicted to occur in the region. A

cumulative effects assessment is required in both the federal and provincial environmental assessment processes. Denison commits to including an assessment of how other developments or activities in the area may impact the proposed development, its potential impacts on Valued Components (VCs), and whether they contribute to any cumulative environmental impacts. This will take the form of a cumulative environmental effects assessment as part of the description of Project impacts and mitigations that describes the net cumulative impact of the Project. The assessment would also include an assessment of potential impacts due to reasonable emergency or upset conditions.

Potential cumulative impacts will be identified in the assessment of potential Project impacts during baseline environmental work, subsequent analysis and pathways modelling. This will include an examination of any potential cumulative effects identified in the consultation and engagement processes. The potential impacts will be assessed against proposed mitigations to determine if there is any residual risk. Should the residual risk remain high, different mitigations may be necessary.

Wheeler lies within the eastern Athabasca Basin between two existing uranium operations; Cameco's McArthur River mine, and the Key Lake mill and tailings management facility where ore from the McArthur River mine is processed. The Project would also utilize the existing Highway 914, which includes the haul road between McArthur River and Key Lake. There are considerable amounts of information available for use in a cumulative effects assessment, including, but not limited to:

1. Existing site baseline and monitoring data, including any modelling;
2. Baseline and project information from previous EIAs;
3. Government monitoring information;
4. Monitoring data available from uranium projects in the area (i.e. annual monitoring reports; Environmental Performance Reports);
5. Regional monitoring studies, such as the Northern Mines Monitoring Secretariat program with the Northern Saskatchewan Environmental Quality Committee;
6. Eastern Athabasca Regional Monitoring Program;
7. Community monitoring programs in the Athabasca funded by the companies; and
8. State of the Environment reports and CNSC independent third-party reviews of environmental performance at existing uranium operations.

This information combined with the Project specific baseline and pathways modelling should allow for a sufficient cumulative effects assessment. The main areas with potential to generate cumulative effects are due to:

1. Any effluent discharge, as Wheeler will share a watershed with the Key Lake Operation, and possibly Millennium project;

2. Overlap of air emissions with other projects;
3. Vehicle traffic to and from the site. This will include shipments of supplies, construction materials, reagents and fuel to the site, and shipments of uranium and recyclables from the site to the south;
4. Habitat disturbance for operations and ancillary facilities, including any access road. This may have an impact on caribou habitat that will have to be assessed through the site's Caribou Management Plan;
5. Emergency or upset conditions;
6. Requirements for employees from northern communities in competition with other operations;
7. Traditional use and harvesting; and
8. Requirements for services from northern businesses.

At Wheeler, the potential for the development of the Gryphon deposit is a reasonably foreseeable project, and it would be included as part of the cumulative effects assessment.

Cameco's proposed Millennium uranium mining project, although currently withdrawn from the federal regulatory process, is the only project that might reasonably be expected to proceed during the life of the Wheeler Project. While that is the only project currently identified, any project subsequently identified during the environmental assessment process with a reasonable chance of affecting the cumulative effects assessment would be added. Other projects that have potential for consideration for inclusion include UEX's West Bear cobalt/nickel deposit, but there are few details at this time.

Although largely covered in other sections of the EIS, the cumulative effects assessment will also require an examination of any potential to impact traditional Indigenous use of lands and resources, or on communities in a cumulative sense. There is an expectation of meaningful public and Indigenous participation in environmental assessments, and that the discussion of cumulative effects is included in consultations as part of the Wheeler engagement program with feedback recorded and included in the environmental assessment.

6.3 Monitoring

An effective monitoring program is important in a modern mining operation as it provides the proof that the Project is operating legally and within the bounds of its permissions. Both the federal and provincial regulators require comprehensive monitoring programs and reporting. While the focus here is on the federal requirements due to the broader scope of those requirements, the provincial requirements are no less important.

The CNSC has defined several safety and control areas, and all of these require monitoring and reporting as part of the ongoing performance assessment, improvement and management review within the respective management systems. The CNSC's safety and control areas are:

- Management
 - Management systems
 - Human performance management
 - Operational performance
- Facilities and Equipment
 - Safety analysis
 - Physical design
 - Fitness for service
- Core Controls and Processes
 - Radiation Protection
 - Human health and safety
 - Environmental Protection
 - Emergency management and fire protection
 - Waste management
 - Security
- Safeguards and Non-proliferation
- Packaging and Transport

All these areas will require a structured program that demonstrates effective management and control, usually within an ISO/CSA plan-do-check-act style system (PDCA). While all the safety and control areas will have monitoring, the environmental program is further described here as an example.

Environmental monitoring is performed to demonstrate the Project's environmental and safety performance, and to provide the necessary feedback to manage that performance in the areas of:

- Gaseous and liquid discharges;
- The transport of nuclear and hazardous substances within the environment;
- Public exposure and dose;
- Exposure and effects on terrestrial and aquatic biota; and
- Any changes in habitat and effects on species that rely on that habitat.

Through the baseline program and environmental risk assessment, predictions on the Project's performance will be made in the above areas and monitoring is essential in tracking and managing

that performance. Denison will incorporate the results of the EIA predictions into the Environmental Management System (EMS), including the effluent and environmental monitoring plans (CNSC 2017). The EIA predictions for physical disturbances and releases, and the associated environmental responses and potential effects, will be measured and tested using site-specific monitoring data during construction, operation, decommissioning and post-decommissioning phases. As such, a comprehensive monitoring program will be required as part of the Project's ISO/CSA 14001-2015 compliant EMS, providing the necessary feedback to:

1. Demonstrate compliance with applicable laws and permit conditions;
2. Inform the required follow-up program(s), especially within the EMS;
3. Demonstrate continual improvement;
4. Provide process feedback to operations and to management;
5. Provide warning of process changes or upsets;
6. Provide data for maintaining up to date site models; and
7. Information to Indigenous groups, regulatory agencies, and the public.

The EMS will be based on the ISO/CSA PDCA methodology with monitoring playing a critical role in the check process, providing the necessary information for management to act, if necessary, to implement changes in performance. The Canadian Standards Association, as a natural offshoot of its ISO/CSA EMS requirements (e.g. ISO 14001-2015) has been working with the nuclear industry in Canada and have issued standards for Environmental Risk Assessment (CSA N288.6), which lead directly to effluent monitoring (CSA N288.5), environmental monitoring (CSA N288.4), and supplementary studies. The CSA standards are specifically referenced within the CNSC's REGDOC 2.9.1 (CNSC 2017) as functioning parts of the overall EMS.

For radiation, the offsite monitoring is included in the environmental monitoring program while the on-site worker radiation safety program and monitoring activities are subject to a stand-alone Radiation Safety Management program with its own management plan, structure and reporting.

While there are discharge limits for mining in the Saskatchewan Mineral Industry Environmental Protection Regulations, 1996, and the federal Metal and Diamond Mining Effluent Regulations (MDMER), the expectation of the federal regulator will be that a modern uranium mine will have effluent concentrations protective of the environment and well below the values in the above regulations. The MDMER in addition to defining discharge limits also defines a biological effects monitoring program to ensure that discharges remain with limits that are protective of the environment.

Monitoring for potential impacts on traditional use or northern communities may be done through several mechanisms such as surface leases conditions, licence conditions, commitments in the EIA, agreements directly with potentially affected parties, etc. This monitoring would become part of the Project's monitoring and reporting program.

Monitoring is not done in isolation by the company as both the federal and provincial governments will undertake inspections of the operations, including side-by-side sampling to verify compliance. The CNSC will also periodically contract independent third-party consultants to undertake an assessment of an operation's environmental performance. In addition, there are other independent groups that provide monitoring such as the Northern Saskatchewan Environmental Quality Committee (NSEQC), which is composed of members from communities across northern Saskatchewan who meet to review monitoring data and tour the operations to monitor performance, providing feedback and recommendations to regulators and proponents.

7 Stakeholder Engagement

Denison recognizes the importance of engaging with local and Indigenous communities, residents, businesses, organizations, land users and the various regulatory authorities, collectively referred to as 'Stakeholders.' Since 2016 Denison had been engaging with Stakeholders in ongoing efforts to build positive relationships with all parties. Broadly speaking, Denison has categorized the Stakeholders into three categories:

- Regulatory agencies;
- The general public; and
- Indigenous communities.

Further details regarding engagement with specific Indigenous communities can be found in Section 8.

In accordance with Denison's Environmental and Social Management System, a Stakeholder engagement program has been developed to capture all Stakeholder groups within the categories identified above. The design and considerations associated with stakeholder engagement activities for the Project are in compliance with provincial (Government of Saskatchewan 2014f), federal (CNSC 2016a; Canadian Environmental Assessment Agency 2015a) and international guidance (International Finance Corporation 2012) for stakeholder engagement.

Denison is committed to operating Wheeler in a fully sustainable manner, giving consideration to not only maintaining high standards of safety, and environmental compliance, but also financial discipline.

Generally speaking, stakeholder engagement is an exercise of building and maintaining relationships with groups, communities and individuals who are potentially affected by, interested in and/or may be in a position to influence the direction of the Project throughout its entire life cycle. To that end, the following six key principles of stakeholder engagement apply:

1. Provide meaningful, relevant information in a culturally appropriate format and language that is easily understandable by each specific stakeholder group.
2. Conduct all stakeholder engagement in a manner that respects local traditions, culture, timeframes, and the decision-making processes of each stakeholder group.
3. Conduct stakeholder engagement in a variety of ways, venues and make every effort to identify and include all stakeholders.
4. Where relevant, complete stakeholder engagement activities in advance of final decisions, allowing for the consideration and inclusion of comments and recommendations received to be incorporated into Project decisions.
5. Provide frequent feedback, including the results of meetings, incoming suggestions, requests and key recommendations.

6. Provide frequent monitoring and evaluation of the effectiveness of the Plans during and after each engagement session and adjust the engagement program as required and/or suggested by the participating stakeholders in order to improve follow up engagement sessions.

7.1 Engagement with Regulatory Agencies

The Project will undergo a joint provincial- federal environmental assessment process which will be led by Saskatchewan Ministry of Environment's Environmental Assessment and Stewardship branch and the CNSC. The CNSC will be the federal responsible authority for Wheeler's environmental assessment under CEAA 2012. Wheeler will be subject to a number of provincial and federal acts and regulations (Section 1.3.1) and Denison anticipates involvement of other federal and provincial departments once the Wheeler EIS has been submitted and is under review.

With respect to the schedule for engagement with regulatory agencies Denison believes that engagement will largely be initiated in conjunction with the initiation of Wheeler's environmental impact assessment process. In an effort to be proactive and in accordance with existing guidance documents, engagement with CNSC staff and SK MOE staff was initiated during the completion of the prefeasibility engineering and early collection of the environmental baseline data (Table 7.1). The purpose of the engagement meetings in early 2018 was to provide the regulatory agencies with an update on Wheeler with respect to: the technical/engineering aspects, the environmental baseline collection programs, the Indigenous engagement activities and how the selection of these communities were made, as well as an update on the socio-economic activities resulting from these early engagement activities. The more recent meetings in late 2018 were intended to serve as pre-engagement meetings i.e., prior to submission of this document. Denison provided a Project overview, sought guidance and addressed questions before submission of the Technical Proposal and Project Description.

7.2 Engagement with General Public

Members of the public may have an interest in the development of Wheeler. Denison has identified nearby cabin owners, commercial lodges and the villages of Patuanak, Pinehouse, Ile a la Crosse and Beauval as potentially interested in the Project.

Non-Indigenous people who reside near or within one of the four local communities (Patuanak, Pinehouse, Ile a la Crosse and Beauval) were included and invited to participate in the engagement sessions scheduled in those communities along with their Indigenous neighbours (Table 7.1). In addition, Denison has engaged with mayors, council and economic development entities in the local communities (Table 7.1).

As part of Denison's early engagement activities, one of the existing recreational cabin owners located within the Project area requested an update on the status of the Project via a telephone call to a Denison representative. The cabin owner indicated that he has a positive existing relationship with Denison employees given the proximity of his cabin to the existing Wheeler exploration camp and was hopeful that this relationship could continue.

Table 7.1 Summary of In-Person Stakeholder Engagement (Excluding Indigenous Communities)

| Group | Organization or Individual | Date | Summary of Engagement |
|---------------------|--|-------------------|--|
| Regulatory Agencies | Canadian Nuclear Safety Commission, Uranium Mines and Mills Division | February 14, 2018 | Introduced Denison and the Wheeler River Project; provided an overview of the Project from the Preliminary Economic Assessment and scope for the Prefeasibility Study which is underway; discussion and Q&A. |
| | Saskatchewan Ministry of Environment, Mining Industry and Audit Environmental Protection Branch | March 1, 2018 | Introduced Denison and the Wheeler River Project; provided an overview of the Project from the Preliminary Economic Assessment and scope for the Prefeasibility Study which is underway; discussion and Q&A. |
| | Canadian Nuclear Safety Commission, Uranium Mines and Mills Division and Environmental Assessment Division | April 25, 2018 | Introduced Denison and the Wheeler River Project; provided an overview of the Project from the Preliminary Economic Assessment and scope for the Prefeasibility Study which is underway; discussion and Q&A. |
| | Canadian Nuclear Safety Commission, Uranium Mines and Mills Division and Environmental Assessment Division | November 13, 2018 | Denison provided a Project update including an overview of the Prefeasibility Study and the Project scope for the Project Description. Answered any questions about the Project. Denison advised on plans to submit a Project Description in 2019 and the group discussed plans for regulatory process moving forward. |
| | Saskatchewan Ministry of Environment, Environmental Assessment Branch and Uranium and Northern Operations branch | November 21, 2018 | Denison provided a Project update including an overview of the Prefeasibility Study and the Project scope for the Technical Proposal. Denison advised on plans to submit a Technical Proposal in 2019 and the group discussed plans for regulatory process moving forward. |
| | Saskatchewan Ministry of Environment, Uranium and Northern Operations | December 3, 2018 | Denison provided a Project update including an overview of the Prefeasibility Study and the Project scope for the Technical Proposal. Denison advised on plans to submit a Technical Proposal in 2019 and the group discussed plans for regulatory process moving forward. |

| Group | Organization or Individual | Date | Summary of Engagement |
|----------------|--|-------------------|---|
| General Public | Local community members (Patuanak) | July 27, 2016 | Following a community meal, introductory presentations on Denison Mines, the company and its Wheeler River Project were given to those in attendance. The presentations were followed by a Question and Answer session. |
| | Mayor, Councillors, community members and the leadership team of Pinehouse Business North (Pinehouse Lake) | September 7, 2016 | Following a community meal, introductory presentations on Denison Mines, the company and its Wheeler River Project were provided to those in attendance. These presentations were followed by a Question and Answer session. This session was followed by a presentation to Denison from Pinehouse Business North focused on their current capacity. |
| | Mayor, Councillors, Co-management board, Métis local community members (Beauval) | December 6, 2016 | Following a community meal, introductory presentations on Denison Mines, the company and its Wheeler River Project were provided to those in attendance. These presentations were followed by a Question and Answer session. |
| | Mayor, Councilors, Co-management Board, Métis Honorable Member of the Legislature (Athabasca riding) and other local community members (Ile a la Crosse) | December 7, 2016 | Following a coffee and snacks, introductory presentations on Denison Mines, the company and its Wheeler River Project were provided to those in attendance. These presentations were followed by a Question and Answer session. |
| | Local community members (Pinehouse) | January 16, 2018 | Held a community workshop in Pinehouse. A workshop was completed with participants at the meeting to help identify (1) the most effective mine access route from the existing public highway to the project, (2) the pros and/or cons with respect to which lake would be the most appropriate lake to select in terms of discharging treated effluent once the mine was operational and, (3) the pros and/or cons the community saw with respect to the mining methods under evaluation at the time. |
| | Local community members (Beauval) | January 18, 2018 | Held a community workshop in Beauval. A workshop was completed with participants at the meeting to help identify (1) the most effective mine access route from the existing public highway to the project, (2) the pros and/or cons with respect to which lake would be the most appropriate lake to select in terms of discharging treated effluent once the mine was operational and, (3) the pros and/or cons the community saw with respect to the mining methods under evaluation at the time. |

| Group | Organization or Individual | Date | Summary of Engagement |
|----------------|---|-------------------|---|
| General Public | Local community members (Patuanak) | May 3, 2018 | Denison representatives traveled to Patuanak to provide a Project update. A workshop was completed with participants at the meeting to help identify (1) the most effective mine access route from the existing public highway to the project, (2) the pros and/or cons with respect to which lake would be the most appropriate lake to select in terms of discharging treated effluent once the mine was operational and, (3) the pros and/or cons the community saw with respect to the mining methods under evaluation at the time. |
| | Local community members (Ile a la Crosse) | January 17, 2018 | Held a community workshop in Ile a La Crosse. A workshop was completed with participants at the meeting to help identify (1) the most effective mine access route from the existing public highway to the project, (2) the pros and/or cons with respect to which lake would be the most appropriate lake to select in terms of discharging treated effluent once the mine was operational and, (3) the pros and/or cons the community saw with respect to the mining methods under evaluation at the time. |
| | Mayor, Business Development Corporation (Ile a la Crosse) | January 18, 2019 | Provide an update to leadership regarding: the finalization of the Project Description for submission to the CNSC and the Province of Saskatchewan to initiate the environmental assessment of the Wheeler River Project; provide an overview of the details of the pending environmental assessment submission |
| | Business Develop Corporation (English River First Nation) | January 31, 2019 | Provide an update to leadership regarding: the finalization of the Project Description for submission to the CNSC and the Province of Saskatchewan to initiate the environmental assessment of the Wheeler River Project; provide an overview of the details of the pending environmental assessment submission; discuss future opportunities |
| | Business Development Corporation (Pinehouse) | February 1, 2019 | Provide an update to leadership regarding: the finalization of the Project Description for submission to the CNSC and the Province of Saskatchewan to initiate the environmental assessment of the Wheeler River Project; provide an overview of the details of the pending environmental assessment submission |
| | Mayor (Beauval) | February 1, 2019 | Provide an update to leadership regarding: the finalization of the Project Description for submission to the CNSC and the Province of Saskatchewan to initiate the environmental assessment of the Wheeler River Project; provide an overview of the details of the pending environmental assessment submission |
| | Northern Saskatchewan Environmental Quality Committee | November 28, 2018 | General overview of the Project, including the ISR methodology. |

Note: Since 2016, additional engagement has been completed via letters, emails, and phone calls.

7.3 Planned Engagement Activities with Regulatory Agencies and the General Public

Denison is committed to continued engagement via various methods of engagement for all groups including regulatory agencies and the general public. Denison is also prepared to engage with any representative of these groups on an as-needed basis should any specific requests to do so be received. Denison will ensure the CNSC and the SK MOE are kept up-to-date on scheduling and the scope of future engagement activities so they have the opportunity to be included in the planning and ultimately participate when desired.

It is anticipated interest from these groups will largely be expressed as part of the formal environmental impact assessment process once this process has been initiated.

Records of these engagements will continue to be documented and meeting notes will be created to maintain a record of the discussions, questions, concerns and answers provided. All of these written records will be added to the Stakeholder engagement section of the Wheeler EIS.

7.4 Socio-Economics

The early engagement activities completed to date have developed the foundations of genuine relationships between Denison and the Indigenous and non-Indigenous groups local to the Project. These relationships have precipitated follow up meetings and discussions with the economic development divisions of these groups and communities who are expressing a strong interest in continuing an open dialogue with Denison in order to afford them access to socio-economic opportunities associated with the Project. Denison has committed to continue to support these discussions.

8 Engagement with Indigenous Communities

Denison is committed to continuing meaningful engagement with Indigenous communities potentially affected by the Project, and to maintaining relationships with these communities throughout all phases of the Project. The approach to engagement has considered relevant guidance, specifically CNSC's REGDOC-3.2.2 Aboriginal Engagement (CNSC 2016a), the Government of Saskatchewan's guidelines for Consultation with First Nations and Métis in Saskatchewan Environmental Impact Assessment (2014f), the Canadian Environmental Assessment Agency's reference guide on considering Aboriginal traditional knowledge in environmental assessments (2015b) and the IFC Performance Standards on Environmental and Social Sustainability (2012).

The following information outlines the list of Indigenous communities identified for engagement activities, including the rationale for inclusion / exclusion; a summary of the activities conducted to date; and an outline of planned activities and associated milestones. Indigenous engagement activities will be adapted, modified and reported on at various points during the associated regulatory process for the Project.

General Guiding Principles

Indigenous peoples' have a unique and important relationship with the environment, and importantly, Indigenous and Treaty Rights which must be fully respected during the process of project development, construction, operation and decommissioning. To this end, Denison's objectives with respect to Indigenous engagement associated with the Project are as follows:

- Build and maintain authentic relationships built on trust and transparency;
- Create a respectful dialogue process that promotes communication between Denison and Indigenous communities, in a timely and accurate fashion; and
- Understand how the proposed development of the Project may adversely impact Indigenous' peoples ability to exercise collective Indigenous and/or treaty rights.

8.1 Identified Communities and Supporting Criteria

The Northern Administration District (NAD) of Saskatchewan (northern Saskatchewan) includes approximately half of Saskatchewan's land area, but less than four per cent of the province's population. Northern Saskatchewan is approximately 250,000 square kilometres, or about 44% of Saskatchewan's area and is home to about 38,000 people (Statistics Canada 2017) living in approximately 45 communities which include incorporated municipalities (such as towns, villages, hamlets and settlements – most of which self-identify as Métis communities), First Nation reserves, and unincorporated areas. More than 80% of people who live in northern Saskatchewan self-identify as Indigenous. Within the NAD, the communities are roughly divided between three regions: the Athabasca Basin region, the North Central region, and the West Side region

(Figure 8.1). The NAD, while sparsely populated, celebrates a diversity amongst Indigenous communities that requires a unique approach to engagement activities.

Consistent with the history associated with other uranium mining projects located within the NAD, Denison recognizes that all of the communities within the NAD typically have an interest in uranium activities, but that an approach based on appropriate criteria to determine those included in the Program is required.

It is important to note that, as a remote site, there are no communities in relatively close proximity to Wheeler. Calculated using a straight line, the closest communities are approximately 150 km from the site (Table 3.2). Travelling by existing roads, the closest community to the Project is approximately 260 km away.

The following criteria have been used to appropriately evaluate the significant number of communities located in the NAD to those Indigenous communities that will be engaged by Denison.

- Treaty 10 signatory (Treaty in which the Project is located);
- Potential or established Indigenous and/or treaty rights within the Project area;
- Geographic proximity of community and / or reserve land to the Project site;
- Known traditional territory in and around the Project site, including travel routes;
- History of relationship with operating companies, the CNSC, and the Province, in relation to other projects located near the Project (McArthur River, Key Lake, Millennium); and
- The potential for collective exercising of Indigenous and/or treaty rights in proximity to the Project

The results of the initial assessment against the above criteria determined that English River First Nation, the Kineepik Métis Local 9, the Sipisishik Métis Local 37, and the A La Baie Métis Local 21 would form part of Denison's initial focus for Indigenous engagement activities (Table 8.1). Upon further evaluation and identified through various engagement activities, Denison also recognizes that the Patuanak Métis Local 82 should be included as part of the Indigenous engagement program.

It is also important to note that the communities of Ile a la Crosse, Beauval, and Pinehouse, and most of the community-members residing in these communities self-identify as Métis communities and members. Denison recognizes and follows the Métis Nation of Saskatchewan's approach to formal consultation, which occurs with the elected Métis representation; however, it is noted that there is often overlap in engagement activities when, for example, community meetings occur. More often than not, the elected officials of Métis locals are also elected members of the municipality and therefore represent both their Indigenous community as well as their municipality, and rarely acknowledge a separation between the two entities.

The following outlines the criteria used to support the inclusion of the above Indigenous communities into the Program.

Table 8.1: Indigenous Communities

| Indigenous Stakeholder Group | Brief Description |
|------------------------------|---|
| English River First Nation | <ul style="list-style-type: none"> • Treaty 10 signatory • Potential or established Indigenous and/or treaty rights within the Project area • Geographic proximity of community and / or reserve land to the Project site (Slush Lake reserve approximately 16 km away; Barkwell Bay reserve 39 km away; community of Patuanak 229 km away); • Known traditional territory in and around the Project site, including travel routes (see Figure 5.7 and Figure 5.8); • History of relationship with operating companies, the CNSC and the Province in relation to other projects located near the Project (McArthur River, Key Lake, Millennium); • The potential for collective exercising of Indigenous and/or treaty rights in proximity to the Project |
| Kineepik Métis Local 9 | <ul style="list-style-type: none"> • Potential or established Indigenous Rights within the Project area • Geographic proximity of community and / or reserve land to the Project site (233 km away); • Known traditional territory in and around the Project site, including travel routes (see Figure 5.7 and Figure 5.8); • History of relationship with operating companies, the CNSC and the Province in relation to other projects located near the Project (McArthur River, Key Lake, Millennium); • The potential for collective exercising of Indigenous rights in proximity to the Project |
| Sipisishik Métis Local 37 | <ul style="list-style-type: none"> • Potential or established Indigenous Rights within the Project area • Known traditional territory in and around the Project site, including travel routes; • Familial ties through the ERFN Membership and La Plonge reserve (immediately adjacent to Beauval) • The potential for collective exercising of Indigenous rights in proximity to the Project |
| A La Baie Métis Local 21 | <ul style="list-style-type: none"> • Potential or established Indigenous Rights within the Project area • Known traditional territory in and around the Project site, including travel routes; • Familial ties through the ERFN Membership • the provision of 'script' to Métis residents during the signing of Treaty 10 • The potential for collective exercising of Indigenous rights in proximity to the Project |
| Patuanak Métis 82 | <ul style="list-style-type: none"> • Potential or established Indigenous Rights within the Project area • Known traditional territory in and around the Project site, including travel routes; • Familial ties through the ERFN Membership and Wapachewunak 192D reserve (immediately adjacent to Patuanak) • The potential for collective exercising of Indigenous rights in proximity to the Project |

Indigenous Organizations

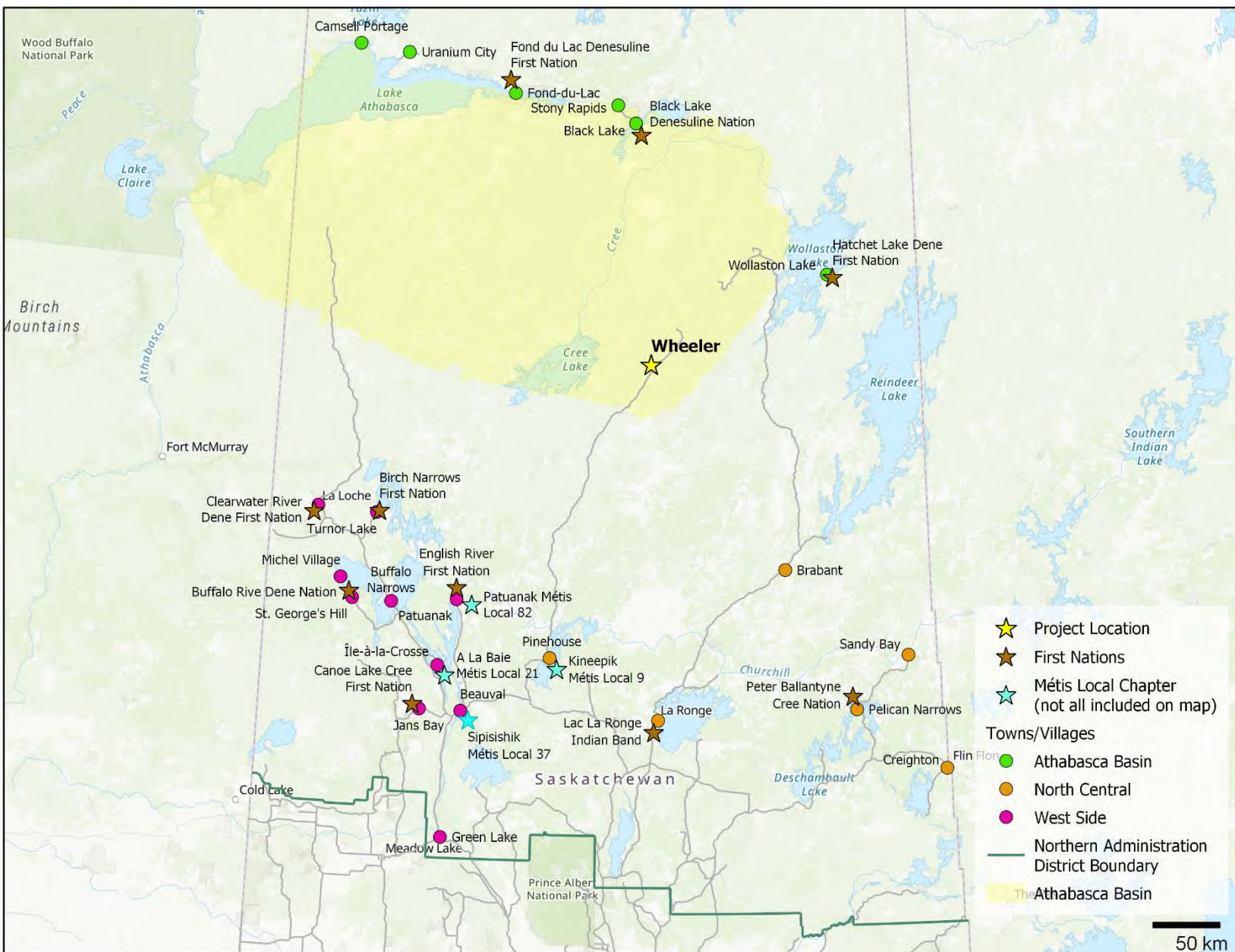
Indigenous organizations can provide a single point of contact for Denison to share information more broadly to a wide variety of Indigenous communities and their leadership regarding Project information, company information, etc. These organizations can also provide specific information regarding their members, interests their members may have, opportunities for Denison to work collaboratively together on various initiatives, etc.

As such, Denison has identified three Indigenous organizations to be included in the Program. The following outlines the criteria for their inclusion:

Ya'thi Nene Land and Resource Office: The Ya'thi Nene Lands and Resources Office (YTNLRO) was created as a not-for-profit organization to be the single point of contact between industry, government and the local Athabasca communities of Hatchet Lake First Nation, Black Lake First Nation, Fond du Lac First Nation, Camsell Portage, Stony Rapids, Uranium City and Wollaston Post. Hatchet Lake First Nation is a Treaty 10 signatory. Denison has evaluated the information currently available online (<http://yathinene.ca/#open-map>) which suggests that there are limited contemporary traditional land use activities near the Project location, relative to the high concentration of traditional land use activities in the Athabasca Region. However, Denison recognizes that these communities may have an interest in the Project and therefore, Denison intends to engage with the YTNLRO in order to better understand contemporary traditional land use activities that are currently being undertaken in the Project area by the member Indigenous communities of the YTNLRO.

Métis Northern Region I: The Project is located within Métis Region I in Saskatchewan. The Métis in Saskatchewan are currently structured with a President, an Executive, Regional Presidents, and Local Presidents. As noted on the Métis Nation of Saskatchewan's (MNS) website, the MNS identifies that 'consultations must be with the Métis government structures that are elected and supported by the Métis people.' As a result, since the Regional Presidents are elected (in addition to the Local Presidents), Denison will engage with the MNS Regional President I regarding the Project.

Métis Northern Region II: While the Project is not located within Métis Region II, a number of key Métis communities with whom Denison is engaging, are located in Northern Region II. The Métis in Saskatchewan are currently structured with a President, an Executive, Regional Presidents, and Local Presidents. As noted on the Métis Nation of Saskatchewan's (MNS) website, the MNS identifies that 'consultations must be with the Métis government structures that are elected and supported by the Métis people.' As a result, since the Regional Presidents are elected (in addition to the Local Presidents), Denison will engage with the MNS Regional President II regarding the Project.



8.2 Summary of Indigenous Engagement Activities to Date

Since the spring of 2016, Denison has completed over 20 in-person engagement events (Table 8.2) involving the leadership and general public of the communities of Patuanak, Pinehouse, Ile a la Crosse and Beauval, involving representatives of English River First Nation, the Kineepik, the A La Baie, and the Sipisishik Métis Locals and non-Indigenous residents of these communities as well.

In all cases, Denison's reception by the Indigenous leadership as well as the general populations at each of the communities visited was positive. This early and frequent engagement fostered the development of a positive, mutually respectful relationship between Denison and the community leadership and members at large, and as a result, Denison was complimented by the communities for their decision to come to the communities at the very early stages of the proposed project. In addition, it allowed the Denison team to solicit feedback on aspects of the project engineering early enough in the design phase of the project such that this feedback could be integrated into the designs (Section 8.2.1.2).

Table 8.2 Summary of In-Person Indigenous Engagement Activities

| Indigenous Community | Organization or Individual | Date | Summary of Engagement |
|----------------------------|---|-------------------|---|
| English River First Nation | Chief | July 6, 2016 | Denison introduced their leadership team to leadership of English River First Nation and requested permission to visit the community and provide an introductory presentation to the community |
| | English River First Nation Members | July 27, 2016 | Following a community meal, introductory presentations on Denison Mines, the company and its Wheeler River Project were given |
| | High School Students and Teachers | November 17, 2016 | Denison staff hosted a booth at the English River First Nation job fair, providing advice to high school students on the career opportunities in the mining and exploration industries. |
| | Lands and Resources Manager | November 30, 2016 | Discussed the upcoming schedule of the Wheeler River Project as well as the best way of obtaining and incorporating English River First Nation Traditional Knowledge into the Project's 2017 environmental baseline data collection. |
| | Lands and Resources Manager | March 3, 2017 | Obtained and discussed the English River First Nation Traditional Knowledge map of their Traditional Territory |
| | Chief of English River First Nation, English River First Nation Members | May 3, 2018 | Denison representatives traveled to Patuanak to provide a Project update. A workshop was completed with participants at the meeting to help identify (1) the most effective mine access route from the existing public highway to the project, (2) the pros and/or cons with respect to which lake would be the most appropriate lake to select in terms of discharging treated effluent once the mine was operational and, (3) the pros and/or cons the community saw with respect to the mining methods under evaluation at the time. |
| | Land & Resources Officer, Elder | January 31, 2019 | Provide an update to leadership regarding: the finalization of the Project Description for submission to the CNSC and the Province of Saskatchewan to initiate the environmental assessment of the Wheeler River Project; provide an overview of the details of the pending environmental assessment submission; discuss future opportunities |

| Indigenous Community | Organization or Individual | Date | Summary of Engagement |
|--------------------------------|---|-------------------|---|
| Pinehouse Kineepik Métis Local | Local President, community councillors, local community members, and Business Development Corporation | September 7, 2016 | Following a community meal, introductory presentations on Denison Mines, the company and its Wheeler River Project were provided to those in attendance. These presentations were followed by a Question and Answer session. This session was followed by a presentation to Denison from Pinehouse Business North focused on their current capabilities. |
| | Local President, Community Councillor | November 29, 2016 | Discussed upcoming activities at the Wheeler project and how best to obtain and incorporate community Indigenous Knowledge into the 2017 environmental baseline data collection. In addition, spoke about potential training and employment opportunities with Denison's exploration activities. |
| | Local President, Community representatives, Business Development Corporation | September 6, 2017 | Provide the community Leadership with an update on the development of the Wheeler River project |
| | Local President, Community Representative | November 3, 2017 | Discussions regarding maintaining the strong relationship developed to date between Pinehouse and Denison. |
| | Local community members | January 16, 2018 | Held a community workshop in Pinehouse. The workshop was completed with participants at the meeting to help identify (1) the most effective mine access route from the existing public highway to the project, (2) the pros and/or cons with respect to which lake would be the most appropriate lake to select in terms of discharging treated effluent once the mine was operational and, (3) the pros and/or cons the community saw with respect to the mining methods under evaluation at the time. |
| | Local President | February 1, 2019 | Provide an update to leadership regarding: the finalization of the Project Description for submission to the CNSC and the Province of Saskatchewan to initiate the environmental assessment of the Wheeler River Project; provide an overview of the details of the pending environmental assessment submission |

| Indigenous Community | Organization or Individual | Date | Summary of Engagement |
|------------------------------|--|------------------|---|
| Beauval Sipishik Métis Local | Local President and representatives, local community members | December 6, 2016 | Following a community meal, introductory presentations on Denison Mines, the company and its Wheeler River Project were provided to those in attendance. These presentations were followed by a Question and Answer session. |
| | Local community members | January 18, 2018 | Held a community workshop in Beauval. A workshop was completed with participants at the meeting to help identify (1) the most effective mine access route from the existing public highway to the project, (2) the pros and/or cons with respect to which lake would be the most appropriate lake to select in terms of discharging treated effluent once the mine was operational and, (3) the pros and/or cons the community saw with respect to the mining methods under evaluation at the time. |
| A La Baie Métis Local | Local representatives, and local community members | December 7, 2016 | Following a coffee and snacks, introductory presentations on Denison Mines, the company and its Wheeler River Project were provided to those in attendance. These presentations were followed by a Question and Answer session. |
| | Local community members | January 17, 2018 | Held a community workshop in Ile a La Crosse. The workshop was completed with participants at the meeting to help identify (1) the most effective mine access route from the existing public highway to the project, (2) the pros and/or cons with respect to which lake would be the most appropriate lake to select in terms of discharging treated effluent once the mine was operational and, (3) the pros and/or cons the community saw with respect to the mining methods under evaluation at the time. |
| | High School Students and Teachers | May, 2018 | Denison Geologists hosted a booth at the high school job fair, providing advice to high school students on the career opportunities in the mining and exploration industries. |

Note: Since 2016, additional engagement has been completed via letters, emails, and phone calls.

Early and frequent engagement also fostered the development of a positive, mutually respectful relationship between Denison and the community leadership and members at large. It has allowed the Denison team to solicit feedback on aspects of the Project engineering early enough in the design phase of the Project such that this feedback could be integrated into the designs.

Some examples of successes achieved with Indigenous communities as a result of Denison's commitment to early and effective engagement are listed below in Section 8.2.1.

8.2.1 Achievements

8.2.1.1 Memorandums of Understanding

In order to formalize Denison's commitment to its local Indigenous communities (and their associated non-indigenous communities), Memorandums of Understanding (MOU) have been signed between Denison and:

- English River First Nation;
- Kineepik Métis Local and the community of Pinehouse;
- A La Baie Métis Local 21 and the community of Ile a la Crosse; and
- Sipsisishik Métis Local 37 and the community of Beauval.

These non-binding MOUs formalize the signing parties' intent to work together in a spirit of mutual respect to cooperate in order to collectively identify practical means by which to avoid, mitigate, or otherwise address potential impacts of the Project upon the exercise of the indigenous rights, treaty rights, and interests. In addition, the MOUs formalize the signing parties' intent to work together regarding the benefits that will flow from the Project, provide a process for continued Project engagement and information-sharing about the project and establishes a relationship to identify business, employment and training opportunities for the parties with respect to the Project.

8.2.1.2 Integration of Indigenous Knowledge

Indigenous knowledge (IK) has been incorporated into the early design stages of the Project.

English River First Nation provided their IK map to Denison along with the permission to use it. Denison provided the map to consultants responsible for the collection of the baseline data prior to the development and initiation of these studies in 2016. This allowed Denison's consultants to incorporate English River First Nation IK data into the early designs of their field programs. More recent IK data has been received from Pinehouse Kineepik Métis Local 9, and this IK, along with that from English River First Nation, will be incorporated into the design of all subsequent baseline programs, the selection of VCs and ultimately, the Environmental Impact Statement. In addition, Indigenous field support staff worked closely with consultants during baseline field programs whenever possible, which, in Denison's experience, also provides a valuable Indigenous worldview when undertaking the supporting activities for the eventual EIS preparation.

Knowledge from Indigenous community members was also included in the Project design and influenced the selection of access road alignments, mining method, and proposed treated effluent discharge location. Engineering options developed as part of the prefeasibility study were taken to the Indigenous communities and discussed in focussed workshops. Project design options under the following three topics were discussed:

- Preferred access road routing to the site from Highway 914. Three different options analyzed in the prefeasibility engineering studies were presented.
- Preferred surface water course, to be used for the discharge of treated effluent associated with the proposed Project: six options that were shortlisted as a result of the hydrological and biological data collection were presented.
- Two mining methods under consideration for the Project were presented.

Participants at these workshops consisted of general members of the public (divided into groups of Elders and youth) as well as high school students who were specifically invited to the workshops through each school's administration.

Each group was led through a series of slides explaining the options within all three of the topic areas. Participants were then asked to identify the pros and cons of each of the options within the three topics. The participants were specifically asked to consider these pros and cons from their perspective and backgrounds. In all three topics discussed at the workshop, the options identified by the Indigenous communities as carrying the highest number of pros were ultimately chosen as the preferred options to advance through the Project's Prefeasibility Study (Denison 2018).

Denison's work to collect and integrate IK into the Project design will continue as the Project design is refined through feasibility and detailed design stages and as the regulatory process advances. Updates on any new and continued integration of IK will be included in updates to the IER and the environmental impact statement (EIS).

8.2.2 Summary of Questions and Feedback from Indigenous Engagement

All questions and answers provided during the community engagement sessions as well as one set of written questions provided to Denison by two residents of Beauval have been recorded and captured by Denison (Table 8.3). The themes arising out of many of the engagement sessions generally followed two main areas: economic development opportunities for northerners and environmental protection associated with the eventual operation of the Project.

Table 8.3: Summary of Project Questions and Feedback from Indigenous Groups

| Date | Type of Meeting | Question or Feedback | Denison Response |
|-----------------------------------|-------------------|---|--|
| English River First Nation | | | |
| 27-Jul-16 | Community Meeting | Band Asking for a monetary agreement based on percentage | Denison recorded the request |
| | | Request to see results of environmental studies | The environmental work is just starting; our consultants have been mandated to maximize northern employment. |
| | | Request for employment, including drilling and environmental disciplines. Insistence on hiring now. | We share benefits between communities and look for opportunities to hire northerners. |
| | | How much money have you and your investors made so far? | We have made none; our investors may have made some, but likely very little. We, and they, are investing for the future. |
| | | Specific questions from Marius Paul regarding safety, cleanup, funding, taxes, health & safety, emergency cleanup, tailings, long-term contamination, weapons, environmental impact, pollution, worker mortality, | Written answers would be provided to all questions given that they were provided in writing as well as verbally. |
| | | | The government does not allow Canadian uranium to be used for nuclear weapons. |
| | | Concern about ongoing access to the Wheeler River; and protection of whitefish spawning and moose/caribou calving areas. Some changes to the landscape take time to manifest. | Denison recorded the concern. |
| | | Will the project be sold to another company? | Denison plans to stay with the project throughout production as the Operator. |
| | | Noted that a road will be required between McArthur River and Cigar lake to transport the ore. The province will come to the people for approval, but Province is likely to do it anyway. | This road is key for the Gryphon deposit. Without that road the Gryphon project may not be viable. |
| | | We need an agreement that benefits us ahead of the mine or the government. | We understand. As a small example, Denison has switched its grocery supplier from La Ronge to the ERFN store at Beauval Forks. |

| Date | Type of Meeting | Question or Feedback | Denison Response |
|-----------|--------------------|---|---|
| 03-May-18 | Community Workshop | The Chief outlined some historical and cultural considerations. Insisting that ERFN is the only community that should benefit. Denison does not need to speak with any other communities about the project. You don't need MOUs with anyone but us. | We have your traditional land use map posted at camp and are using it to help steer the project. |
| | | People want to work. What types of jobs will be available? What can Denison do to help build capacity in elementary and middle school students? | Our hiring priorities are from here. |
| | | | Initially, environmental or geological technicians. For technical positions, they need math and science skills. For management positions, the same plus experience. |
| | | | We're open to scholarship programs. |
| | | Would like a resident elder at site. | Denison noted the request. |
| | | Concern about additional impact to Russell Lake; there are already many cabins on that lake. | The cumulative effect will be considered in the environmental assessment. |
| | | If you sell or merge, what happens to the contracts? | The buyer would take over the contracts previously established. |
| | | Questions about the ISR mining method | The mining method was explained and the environmental protection measures that come with Denison's planned application of the method. |
| | | Could you power the mine using solar and wind? ERFN has considered power generation as an economic development opportunity. | Would probably need grid power for the base load; solar and wind could be supplemental sources. If ERFN chose to generate, we would be open to buying power. |
| | | Is there cell service at the site? | With a booster, or on a high hill coverage from the Key Lake cell tower can be obtained. |
| | | We want more ERFN people being trained in the drill helper program. | Denison noted the comment. |

| Date | Type of Meeting | Question or Feedback | Denison Response |
|--|--------------------|---|--|
| Kineepik Métis Local / Pinehouse Lake | | | |
| 07-Sep-16 | Community Meeting | What are environmental baseline studies are being completed? | Local and regional data is being collected. Denison is also hoping to use existing data from Cameco's Millennium project and the provincial government. Cumulative Effects Monitoring is part of the monitoring that is needed as well. |
| | | We as a community want to start to understand the science involved so we can create local capacity – our area will always have commodities and mining and require services. | Denison is happy to work with the community to help them develop capacity. |
| | | How do current markets affect your decisions? | They are very important to our decisions. We expect prices to be better by 2025 when we start production. |
| | | What is Denison's market cap? | About \$370 million. If the price was \$55/lb, our market cap could be as high as \$1.5 billion. |
| | | Where does your revenue come from? | Some from toll milling Cigar Lake ore at McClean Lake., and some from our environmental services division. A little from managing Uranium Participation Corp. We have a 25% interest in GoviEx Uranium, and 12% in Skyharbour Resources. |
| 16-Jan-18 | Community Workshop | What is a shareholder and how do I become one? | Denison explained to process of how to purchase shares in a public company. Noting there is risk of losing money as well. |
| | | Discussion on price and markets. | |
| | | How would you get Gryphon ore to surface? Technical questions about ground conditions and mining method. | Skipped as rock up a conventional mine shaft, not pumped as slurry. |
| | | | Gryphon Ore is in hard basement rock; no freezing necessary the ground conditions are very good. |
| | | Cost of ISR vs. jet boring | ISR is much cheaper; too deep for jet boring from surface. ISR only works on some ore bodies. You can't use it on the Gryphon deposit as we understand the technology today. |

| Date | Type of Meeting | Question or Feedback | Denison Response |
|-----------------------------------|----------------------|--|---|
| | | How do you treat tailings | There are no tailings produced with ISR. |
| | | Need for independent water sampling program alongside of the company’s sampling program. | Governments require independent sampling for the State of the Environment Report every five years. Environment Canada requires independent Environmental Effects Monitoring every three years. |
| | | We never get this independent information | Part of the MOU process is to establish what information the community wants, so as to allow Denison to provide it to the community. |
| | | Can you prove there is no long-range impact – that cumulative effects are zero. | Through the environmental assessment process, we expect to prove that the Project will be below guidelines and that there is no cumulative effect in the regional assessment area. Cumulative Effects Monitoring is usually the government’s responsibility; however, we will need to address the issue of potential cumulative effects as part of the environmental assessment. We do not believe the project will negatively affect tourism activities in the region. |
| | | At what point is tourism affected? | |
| A La Baie Métis / Ile a la Crosse | | | |
| 07-Dec-16 | Community Engagement | Why hire drillers from BC when there are drillers in La Ronge? | Hy-Tech hires locally and has a shop in Saskatoon. Local companies sometimes do not bid on the job. It’s sometimes a financial decision. |
| | | Requested copy of feasibility study | It will be public when it is completed. |
| | | Will you present to schools on future jobs? | Denison would be happy to do so. |
| | | How are you financed? | We seek investors from global capital markets; we get a portion of revenue from McClean Lake mill and our environmental services division. |
| | | How much are you investing in the north? | We’re in the early stages and trying to invest as much as we can in the north. |
| | | How can this project be feasible given recent shutdowns? | We are planning for production when prices rise again. The world is moving towards more nuclear energy. |

| Date | Type of Meeting | Question or Feedback | Denison Response |
|------|-----------------|---|---|
| | | We are developing a goods and services database of northern businesses. | We're encouraged to hear that and would welcome the opportunity to receive a copy. |
| | | Is this consultation? | Formal consultations will start when the project description is written, and the environmental assessment starts. We are trying to be proactive. |
| | | Can we see the EA before it goes to government? | The process will be interactive with the communities, so you will have opportunities to see it and make comments during that process. |
| | | We would like Sakitawak Development Corporation to be involved in mine development and operation. | Hopefully we can work something out as we go forward. |
| | | We would like to have northerners work with your human resources people on hiring. | So far we only need drillers. We can train driller helpers. Environmental sampling is part-time. We are at early stages of developing the project. |
| | | One attendee spoke of his changed attitude to uranium mining and nuclear power – He is now in full support of the industry stating he has seen a lot of jobs go to northerners as a result of the uranium mines in northern Saskatchewan. | Denison thanked him for his support. |
| | | Any Impact Management Agreement should be made with the whole north, not just specific communities. It puts the others at a disadvantage. | That's the next stage of discussions. While it could be much easier for the company, it is also a challenging proposition. |
| | | We need a north-wide fund to draw from. | |
| | | Are there still investment possibilities for First Nations, development corporations or individuals? | We already have two other partners, but the door is never closed for investment. |
| | | Why not process ore at the closer Key Lake mill? | Our share of the ore is expected to go to McClean Lake, which we part-own. Cameco may take their 30% to Key Lake. Each company can decide what to do with their portion of the ore. |

| Date | Type of Meeting | Question or Feedback | Denison Response |
|-----------|--------------------|---|---|
| 17-Jan-18 | Community Workshop | Concern that this is engagement, not duty to consult. | Denison was in the community to gather input from the members to help inform the project design and continue to build a relationship with the communities. |
| | | What will be left behind at the site after the mine is closed? | Probably there will be a decommissioned landfill at site but not much more than that. Almost everything is taken off site. |
| | | Concern that the Métis Nation (Region) was not formally invited to be part of the MOU. Students need to understand what a MOU is. | The MOU names the La Baie Métis Local and the community and has been discussed with representatives of the Local. The MOU is a commitment to talk and work together for mutual support in the areas of environmental sustainability, education, employment and training, business opportunities and community investment. |
| | | Concern about who the agreements will be with. | |
| | | Again, white people telling us what they want to do. Would like to hear from the Serpent River First Nation (Elliot Lake). | This is a dialogue; we want your input. Denison is considering having local community liaison people added to the team as the project advances. |
| | | The students need to know this information. | Denison agrees, that is why we invited them to be a part of this workshop and why they are here. |
| | | Are the jobs transferable to the community? | Most, if not all, of the trades needed are transferable across the country. Other more specific mining jobs are strictly mining-related. It's a risk you take depending on what training you select. |
| | | Any news on the McArthur - Cigar Lake road? | We have met with the province. If the road is not built, the Gryphon component of the project is unlikely to go ahead. |
| | | When will you sign a surface lease agreement? | After the environmental assessment is successfully completed. Before construction begins. |
| | | Northerners can supply a lot of goods and services. Look at Sakitawak Development Corp. | We agree. One of the components of the MOU is to help identify these opportunities. |

| Date | Type of Meeting | Question or Feedback | Denison Response |
|---------------------------------|-------------------|---|---|
| | | Should work with local people on culture and climate change. | Denison is happy to do that. We have English River's Traditional Territory map. and have asked for similar information if available from Pinehouse, Ile a la Crosse and Beauval. |
| Sipishik Métis / Beauval | | | |
| 06-Dec-16 | Community Meeting | | Currently these are supplied from La Ronge. |
| | | Our local post plant could produce core boxes | We are in communication with KCDC on the topic of career development. |
| | | What jobs are and will be available? | Drillers are the main employment opportunity at this stage of the project. Geologists and environmental specialists are also going to be needed. At the feasibility stage, also need additional safety people. There are only about 10-12 people on site at this stage. Workers to build roads, power lines etc. will be needed once construction starts. |
| | | Do you have a HR department? | Yes |
| | | Need for a more sophisticated human resource development strategy to attract high school students into some of the careers in mining. | Denison noted the comment. |
| | | There's still a trust gap between development and peoples' relationship to the land. It's time to build environmental monitoring liaisons to help build trust. | Denison noted the comment. |
| | | To help develop opportunities, Beauval has Northwest Communities (NWC), Primrose Lake Economic development Corp (PLEDCO), the resources of the Gabriel Dumont Institute (GDIO) for apprenticeship training. | Denison noted the comment and welcomed the opportunity to work with these groups as the project advanced. |
| | | What is the potential for you to invest in our communities? | The next stage of discussion is to explore those options as the project moves forward. |

| Date | Type of Meeting | Question or Feedback | Denison Response |
|-----------|--------------------|--|--|
| 18-Jan-18 | Community Workshop | Could we invest in, say, heavy equipment? | |
| | | We need to plan properly to get a piece of the action. | We will keep you informed as to what we're doing in order to help you prepare. |
| | | Questions about hiring drillers, community response and logistics of accessing site. | Hired 2 driller helper trainees. One from Cole Bay and one from Pinehouse. Hy-Tech Drilling is the company running the training program. |
| | | Preference to avoid spawning areas and general stress to fish and animals when choosing a discharge point. Preference to discharge into swift-flowing water at a point that allows flow through the entire river system. Preference not to discharge directly to Russell Lake. | Denison noted comments. |
| | | Questions about the ISR technique and directional drilling. Glad to hear of closed-loop system, no waste water and no tailings. | Comments were noted by Denison. |
| | | Concern that ore bodies may be under lakes | Denison indicated that both orebodies are under land approximately 500 metres below surface. |
| | | How many employees will be needed for the ISR mining method. | Denison indicated about 100 to 150. |

8.3 Planned Indigenous Engagement Activities

The Indigenous engagement activities initiated by Denison in 2016 are part of an ongoing commitment by Denison to actively engage both Indigenous and non-Indigenous communities throughout all phases of the Project. In addition, Denison's ongoing engagement program honours the commitments outlined in the MOUs.

The ongoing engagement schedule is also a product of the results of the previous engagement sessions. Denison has agreed to visit the Indigenous communities and provide project updates as the development activities advance. It is currently envisioned that community meetings will be held at least once per year with the Patuanak Métis, the Kineepik Métis, the A la Baie Métis Local 21 Sipishik Métis Local 37, English River First Nation, along with their associated municipal communities. Denison will meet more frequently if desired and warranted.

Denison is also committed to meeting with the leadership of each of these Indigenous communities as and when they make a request to do so. In addition, Denison has a standing commitment to respond to any enquires to meet and/or make presentations on the Project to informal or formalized groups.

As the project advances, Denison will continue to utilize local community radio stations, social media as well as print media that may reach appropriate Indigenous audiences.

In accordance with current guidance documents and illustrated in Table 8.4, Denison will undertake engagement activities during the Project's stages as outlined below.

Table 8.4: General Engagement Schedule

| Project Evolution | Indigenous Groups Engaged | Coordination to include Federal and Provincial Governments | Rationale |
|---|---|---|---|
| Prefeasibility engineering and environmental baseline collection | Indigenous communities potentially affected and interested in the Project | Denison will contact federal and provincial governments to coordinate attendance at engagement events wherever possible | Allows for Indigenous communities to be engaged at earliest stage of the Project, allows for adjustments to baseline collection if needed |
| Initiation of environmental impact assessment – submission of Project Description | Indigenous communities potentially affected and interested in the Project | | Allows continued engagement |
| Throughout completion of environmental impact assessment | Indigenous communities potentially affected and interested in the Project | | Allows continued engagement throughout entire process |

Detailed schedules and work plans for engagements will be developed in consultation with the various Indigenous groups at the appropriate stage of the Project's evolution. As referred to above in Table 8.4, some engagements will be mandatory requirements of the EIA process and as such, the scheduling of those sessions may be determined by the regulatory schedule. Denison and individual Indigenous communities will work together to propose an appropriate schedule for follow-up discussions. In general, it has been agreed between each of the Indigenous communities and Denison to attempt to hold update meetings every quarter or half year with leadership representatives and an open invitation for each group to request a meeting with Denison as and when desired.

Denison will include the CNSC and the Province of Saskatchewan in the planning and participation within ongoing engagement activities. Denison's Community Social Responsibility Manager will contact the CNSC Project Officer once formal and specific engagement plans have been developed for the various stages of the Project.

It is expected that a more formalized schedule will be developed as part of the EA process.

8.3.1 Ongoing Engagement – Specific Topics for Upcoming Engagement

In addition to Project updates, a number of specific topics will be the focus of ongoing engagement as Denison prepares the EIS. The anticipated topics for the foreseeable future are:

- Contemporary traditional land use activities occurring in proximity to the Project and potential impacts of taking up the land associated with the surface lease during construction and operation.
- Identification of both biophysical and human environment VCs.
- Traditional / contemporary local names for features such as lakes and other geographic areas or features.

Other topics will likely arise as outcomes of the engagement activities with Indigenous communities present themselves and as the Project advances.

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Appendix A:
Table of Concordance with Prescribed Information for the Description of a Designated Project
Regulations

Table of Concordance with Prescribed Information for the Description of a Designated Project Regulations

| Section in <i>Prescribed Information for the Description of a Designated Project Regulations</i> | | Wheeler Technical Proposal and Project Description Document Section |
|--|---|---|
| General Information | 1 The project's name, nature and proposed location. | Section 1 Introduction |
| | 2 The proponent's name and contact information and the name and contact information of their primary representative for the purpose of the description of the project. | Section 1.1 Project Proponent |
| | 3 A description of and the results of any consultations undertaken with any jurisdictions and other parties including Aboriginal peoples and the public. | Summary in Section 1.5 Engagement |
| | | Details in Section 7 Stakeholder Engagement and Section 8 Engagement with Indigenous Communities |
| | 4 The environmental assessment and regulatory requirements of other jurisdictions. | Section 1.3.1.2 Provincial |
| | 4.1 A description of any environmental study that is being or has been conducted of the region where the project is to be carried out. | Section 1.4 Regional Studies |
| Project Information | 5 A description of the project's context and objectives. | Section 2.1.4 Objective and Overview of Wheeler In Situ Recovery |
| | | In addition, context on the Project components and activities is provided in Section 2, context on the Project's location is in Section 3, and context on the existing biophysical and human environment is provided in Section 5 |
| | 6 The provisions in the schedule to the Regulations Designating Physical Activities describing the project in whole or in part. | Section 1.3.1.1 Federal |
| | 7 A description of the physical works that are related to the project including their purpose, size and capacity. | Section 2.3 Project Components |
| | 8 The anticipated production capacity of the project and a description of the production processes to be used, the associated infrastructure and any permanent or temporary structures. | Section 2.3 Project Components and Section 2.4 Project Activities and Schedule |
| | 9 A description of all activities to be performed in relation to the project. | Section 2.3 Project Components and 2.4 Project Activities and Schedule |
| | 10 A description of any waste that is likely to be generated during any phase of the project and of a plan to manage that waste. | Section 2.3 Project Components and Section 2.4 Project Activities and Schedule |

| Section in <i>Prescribed Information for the Description of a Designated Project Regulations</i> | | Wheeler Technical Proposal and Project Description Document Section |
|--|--|---|
| | 11 A description of the anticipated phases of and the schedule for the project's construction, operation, decommissioning and abandonment. | Section 2.4 Project Activities and Schedule |
| Project Location Information | 12 A description of the project's location, including (a) its geographic coordinates; | Section 3 Project Location |
| | (b) site maps produced at an appropriate scale in order to determine the project's overall location and the spatial relationship of the project components; | Section 2 Project Information, including Figure 2.7 and Figure 2.8 |
| | | Section 3 Project Location, including Figure 3.1, Figure 3.2, Figure 3.3, Figure 3.4, Figure 3.5, Figure 3.6 and Figure 3.7 |
| | (c) the legal description of land to be used for the project, including the title, deed or document and any authorization relating to a water lot; | Section 2.2.2 Land Tenure |
| | (d) the project's proximity to any permanent, seasonal or temporary residences; | Section 3 Project Location, including Table 3.1, Table 3.2, Figure 3.2 and Figure 3.4 |
| | (e) the project's proximity to reserves, traditional territories as well as lands and resources currently used for traditional purposes by Aboriginal peoples; and | Section 3 Project Location, including Table 3.3, Table 3.2, Figure 3.2, Figure 3.4 and Figure 3.5 |
| | | Section 5.7.3 Current Traditional Land Use by Indigenous , including Figure 5.7 and Figure 5.8 |
| | (f) the project's proximity to any federal lands. | Section 3 Project Location, including Table 3.3 and Figure 3.5 |
| Federal Involvement | 13 A description of any financial support that federal authorities are, or may be, providing to the project. | Section 4 Federal Involvement Federal Involvement |
| | 14 A description of any federal land that may be used for the purpose of carrying out the project. | Section 4 Federal Involvement Federal Involvement |
| | 15 A list of the permits, licences or other authorizations that may be required under any Act of Parliament to carry out the project. | Section 1.3.3 Licensing and Permitting |
| Environmental Effects | 16 A description of the physical and biological setting. | Section 5 Existing Environment |
| | 17 A description of any changes that may be caused, as a result of carrying out the project, to (a) fish and fish habitat as defined in subsection 2(1) of the Fisheries Act; | Section 6.1.3.1 Fish and Fish Habitat (see 6.1.1.4 Aquatic Environment for supporting information) |

| Section in <i>Prescribed Information for the Description of a Designated Project Regulations</i> | | Wheeler Technical Proposal and Project Description Document Section |
|--|--|---|
| | (b) aquatic species, as defined in subsection 2(1) of the Species at Risk Act; and | Section 6.1.3.2 Aquatic Species |
| | (c) migratory birds, as defined in subsection 2(1) of the Migratory Birds Convention Act, 1994. | Section 6.1.3.3 Migratory Birds |
| | 18 A description of any changes to the environment that may occur, as a result of carrying out the project, on federal lands, in a province other than the province in which the project is proposed to be carried out or outside of Canada. | Section 6.1.3.4 Changes to the Environment on Federal Lands, in a Province other than Saskatchewan, or outside Canada |
| | 19 Information on the effects on Aboriginal peoples of any changes to the environment that may be caused as a result of carrying out the project, including effects on health and socioeconomic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes or on any structure, site or thing that is of historical, archaeological, paleontological or architectural significance. | Section 6.1.3.5 Effects on Indigenous People (see 6.1.2 Human Environment for supporting information) |
| Summary | 20 A summary of the information required under Sections 1 to 19. | Summary – English version Page ii |
| | | Summary – French version Page x |
| | | Summary – Dene version Page xx |
| | | Summary – Cree version Page xxviii |



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Wheeler River Project

Notice of Commencement of an Environmental Assessment

Wheeler River Project

The Canadian Nuclear Safety Commission (CNSC) has received a project description from Denison Mines Corp. for the Wheeler River Project, a proposed new uranium mining and processing operation. The proposed project is located in the Athabasca Basin in northern Saskatchewan, approximately 600 km north of the city of Saskatoon, 4 km west of Highway

914 and midway between Cameco Corporation's Key Lake Mill and McArthur River Mine. The proposed Wheeler River Mine would produce up to 5400 tonnes of U_3O_8 annually for 20 years.

The proposed project includes underground and surface facilities to support the mining and processing of uranium ore using the In Situ Recovery (ISR) mining method. The main components include: an ISR wellfield; two freeze plants on the surface to establish a frozen isolated mining chamber underground; an on-site plant to process the mining solution recovered from the ISR wellfield; surface facilities to support the short and long term storage of waste rock; water handling infrastructure and a water treatment plant and additional infrastructure to support mining activities.

The CNSC has determined that the project requires a federal environmental assessment (EA) pursuant to the *Canadian Environmental Assessment Act, 2012 (CEAA 2012)*. An EA under CEAA 2012 is a planning and decision-making tool. Its objectives are to minimize or avoid adverse environmental effects before they occur, incorporate environmental factors into decision making, and identify the elements of a follow-up monitoring program. The project will also require a provincial environmental assessment (EA) under the Saskatchewan *Environmental Assessment Act*.

The availability of PFP funding for this project will be announced at a later date.

For further information on this EA, please contact:

Marcelle Phaneuf, Environmental Assessment Officer

Canadian Nuclear Safety Commission

P.O. Box 1046 Station B

280 Slater Street

Ottawa ON K1P 5S9

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Directorate of Environmental and Radiation Protection and Assessment

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File: 80178

August 29, 2019

Ms. Pamela Bennett
Environment Manager
Denison Mines Corp.
230 22nd St. East, Suite 200
Saskatoon, SK. S7K 0E9
Email: pbennett@denisonmines.com

Subject: Changes to Federal Legislation and Implications for the Wheeler River Project

Dear Ms. Bennett,

The purpose of this letter is to inform your organization of recent changes to federal legislation, particularly transition provisions relevant to the Wheeler River Project (the Project), and next steps.

On August 28, 2019, the *Impact Assessment Act* (IAA) came into force, repealing the *Canadian Environmental Assessment Act, 2012* (CEAA 2012). The IAA contains transitional provisions for EAs of designated projects commenced under CEAA 2012 and for which the Canadian Nuclear Safety Commission (CNSC) is the Responsible Authority.

The Wheeler River Project has been subject to an EA commenced under CEAA 2012, since May 31st, 2019. As per the transition provision described in subsection 182 of the IAA: “*Any environmental assessment of a designated project by the Canadian Nuclear Safety Commission or the National Energy Board commenced under the 2012 Act, in respect of which a decision statement has not been issued under section 54 of the 2012 Act before the day on which this Act comes into force, is continued under the 2012 Act as if that Act had not been repealed.*”

As outlined in subsection 182, given that the Project was commenced under CEAA 2012 and a decision statement has not yet been issued, and therefore will continue and be completed under its current process.

The “Assessment Type” on the project-specific page of the Public Registry website, Reference Number: [80178](#), has been updated to indicate “Environmental Assessment under CEAA 2012”. In addition, this letter will be posted on the Public Registry website as the official record of notification.

If you have any questions, do not hesitate to contact Marcelle Phaneuf, Environmental Assessment Officer responsible for the Project, by phone 613-947-3209 or email *Marcelle.Phaneuf@canada.ca*.

Sincerely,

<Personal Information Redacted>

Candida Cianci
Director, Environmental Assessment Division
Canadian Nuclear Safety Commission

c.c.: P. Fundarek (CNSC); C. Cattryse (CNSC); S. Akhter (CNSC); M. Phaneuf (CNSC)



Generic Guidelines for the Preparation of an Environmental Impact Statement – Pursuant to the Canadian Environmental Assessment Act, 2012

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Disclaimer

This document is not a legal authority, nor does it provide legal advice or direction; it provides information only, and must not be used as a substitute for the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) or its regulations. In the event of a discrepancy, the CEAA 2012 and its regulations prevail. Portions of the CEAA 2012 have been paraphrased in this document, but will not be relied upon for legal purposes.

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Part 1 – Background

1. Introduction

The purpose of this document is to provide information to proponents on the requirements for the preparation of an environmental impact statement (EIS) for a designated project to be assessed pursuant to the *Canadian Environmental Assessment Act, 2012* (CEAA 2012). This document specifies the nature, scope and extent of the information required. Part 1 of this document provides guidance and general instruction on the preparation of the EIS, and Part 2 outlines the information that must be included in the EIS.

Section 5 of the CEAA 2012 requires an assessment of the proposed project's potential environmental effects:

5. (1) For the purposes of this Act, the environmental effects that are to be taken into account in relation to an act or thing, a physical activity, a designated project or a project are:

- (a) a change that may be caused to the following components of the environment that are within the legislative authority of Parliament:

- (i) fish and fish habitat as defined in subsection 2(1) of the *Fisheries Act*

- (ii) aquatic species as defined in subsection 2(1) of the *Species at Risk Act*

- (iii) migratory birds as defined in subsection 2(1) of the *Migratory Birds Convention Act, 1994*

- (iv) any other component of the environment that is set out in Schedule 2

- (b) a change that may be caused to the environment that would occur
 - (i) on federal lands
 - (ii) in a province other than the one in which the act or thing is done or where the physical activity, the designated project or the project is being carried out
 - (iii) outside Canada
- (c) with respect to Aboriginal peoples, an effect occurring in Canada of any change that may be caused to the environment on
 - (i) health and socio-economic conditions
 - (ii) physical and cultural heritage
 - (iii) the current use of lands and resources for traditional purposes
 - (iv) any structure, site or thing that is of historical, archaeological paleontological or architectural significance

5. (2) However, if the carrying out of the physical activity, the designated project or the project requires a federal authority to exercise a power or perform a duty or function conferred on it under any Act of Parliament other than this Act, the following environmental effects are also to be taken into account:

- (a) a change, other than those referred to in paragraphs (1)(a) and (b), that may be caused to the environment and that is directly linked or necessarily incidental to a federal authority's exercise of a power or performance of a duty or function that would permit the carrying out, in whole or in part, of the physical activity, the designated project or the project
- (b) an effect, other than those referred to in paragraph (1)(c), of any change referred to in paragraph (a) on
 - (i) health and socio-economic conditions
 - (ii) physical and cultural heritage

- (iii) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance

The Canadian Nuclear Safety Commission (CNSC) uses the proponent's EIS and other information received during the environmental assessment (EA) process to prepare an EA report that will inform the issuance of a decision statement by the Commission. Therefore, the EIS must include a full description of the changes the project will cause to the environment that may result in potential effects on areas of federal jurisdiction (i.e., section 5 of the CEAA 2012), including changes that are directly linked or necessarily incidental to any federal decisions that would permit the project to be carried out. The EIS should also include a list of key mitigation measures that the proponent proposes to undertake in order to avoid or minimize any adverse environmental effects of the project. It is the proponent's responsibility to provide sufficient data and analyses of potential changes to the environment.

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2. Guiding principles

2.1 Government of Canada's interim measures

On January 27, 2016, the Minister of Environment and Climate Change Canada and the Minister of Natural Resources Canada announced an interim approach that includes principles and plans for major projects. These principles are the first part of a broader strategy to review and restore confidence in Canada's EA processes.

In particular, the Government of Canada has introduced a principle under which direct and upstream greenhouse gas emissions linked to the projects under review will be assessed. The proponent is expected to take the

necessary steps to provide sufficient information and evidence, in accordance with this principle. For more information on assessing greenhouse gas emissions, refer to section 5.1 (Part 2).

2.2 Environmental assessment as a planning tool

An environment assessment (EA) is a planning tool used to ensure that projects are considered in a careful and precautionary manner in order to avoid or mitigate possible environmental effects and to encourage decision makers to take actions that promote sustainable development.

2.3 Public participation

One of the purposes of the EA identified in the CEAA 2012 is to ensure opportunities for meaningful public participation during an EA. The CNSC ensures that the public is provided with opportunities to participate in the EA. Meaningful public participation is best achieved when all parties have a clear understanding of the proposed project as early as possible in the review process. The proponent is required to provide current information about the project to the public and especially to the communities likely to be most affected by the project.

2.4 Engagement with Indigenous groups

A key objective of the CEAA 2012 is to promote communication and cooperation with Indigenous peoples, which include the First Nations, Inuit and Métis. The proponent is expected to engage with Indigenous groups that may be affected by the project as early as possible in the project planning process. The proponent will provide Indigenous groups with opportunities to learn about the project and its potential effects, communicate their concerns about the project's potential effects and discuss measures to mitigate those effects. The proponent is strongly

encouraged to work with Indigenous groups to establish an engagement approach that is reasonable to both parties. The proponent will make reasonable efforts to consider traditional Indigenous knowledge in the assessment of environmental impacts. For more information on considering Indigenous traditional knowledge, refer to section 3.3.2 (Part 1).

Information gathered through the EA process and associated engagement by the proponent with Indigenous groups will be used to inform decisions under the CEAA 2012. In providing information to the CNSC, the proponent will ensure that any confidential information shared with them by Indigenous groups is treated in the appropriate manner. This information will also contribute to the Crown's understanding of any potential adverse impacts of the project on potential or established Indigenous or treaty rights and the effectiveness of measures proposed to avoid or minimize those impacts, and will assist the Crown in meeting its duty-to-consult obligations.

The proponent is encouraged to consult the following resources:

- REGDOC-3.2.2, *Indigenous Engagement* (CNSC)
- Aboriginal and Treaty Rights Information System (Indigenous and Northern Affairs Canada)

2.5 Application of the precautionary approach

In documenting the analyses included in the EIS, the proponent will demonstrate that all aspects of the project have been examined and planned in a careful and precautionary manner in order to avoid significant adverse environmental effects.

A document by Canada's Privy Council Office, *A Framework for the Application of Precaution in Science-based Decision Making About Risk*, sets out guiding principles for the application of precaution to science-based decision making.

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3. Preparation and presentation of the EIS

3.1 Guidance

The proponent is encouraged to consult the CNSC's [REGDOC-2.9.1, Environmental Protection: Environmental Policy, Assessments and Protection Measures](#) for additional guidance on the preparation of the EIS. The proponent may also consider consulting the relevant EA policy and guidance documents provided on the [Impact Assessment Agency of Canada's website](#).

The proponent is further encouraged to consult with the CNSC and, if applicable, other federal authorities, during the planning and development of the EIS and supporting documentation.

3.2 Study strategy and methodology

The proponent is expected to respect the intent of these guidelines and to consider the effects that are likely to arise from the project (including situations not explicitly identified in these guidelines), the technically and economically feasible mitigation measures that will be applied, and the significance of any residual effects. Except where specified by the CNSC, the proponent has the discretion to select the most appropriate methods to compile and present data, information and analysis in the EIS, as long as the methods are transparent, justifiable and replicable.

These guidelines may include matters that the proponent does not deem relevant or significant to the project. If such matters are omitted from the EIS, the proponent will clearly indicate this and provide a justification so that the CNSC, federal authorities, Indigenous groups, the public and any other interested party have an opportunity to comment on this decision. If the CNSC disagrees with the proponent's decision, the proponent will be required to provide the specified information.

The proponent must explain and justify the methods used to predict the impacts the project will have on each valued component (VC). VCs include biophysical and socioeconomic components, the interactions among them and their relationships within the environment. The information presented must be substantiated; in particular, the proponent must describe how the VCs were identified and what methods were used to predict and assess the project's potential adverse environmental effects on these components. The value of a component not only relates to its role in the ecosystem, but also to the value that humans place on it. The culture and way of life of the people using the area affected by the project may be considered VCs themselves. The EIS will also explain and justify methods used to identify mitigation measures and follow-up program elements.

The EIS will document how scientific, engineering, traditional and local knowledge were used to reach conclusions. Assumptions will be clearly identified and justified. All data, models and studies will be documented such that the analyses are transparent and reproducible. All data collection methods will be specified. The uncertainty, reliability and sensitivity of models used to reach conclusions must be indicated. The sections in the EIS regarding the existing environment and the potential adverse environmental effects predictions and assessment must be prepared, using best available information and methods, to the highest standards in the relevant subject area. All conclusions must be substantiated.

The EIS will identify all significant gaps in knowledge and understanding related to key conclusions, and the steps to be taken by the proponent to address these gaps. Where the conclusions drawn from scientific, engineering and technical knowledge are inconsistent with the conclusions drawn from traditional and local knowledge, the EIS will contain a balanced presentation of the issues and a statement of the proponent's conclusions.

3.3 Use of information

3.3.1 Federal coordination of information or knowledge

Section 20 of the CEAA 2012 requires that every federal authority with specialist or expert information, or knowledge with respect to a project subject to an EA, make that information or knowledge available to the CNSC. The CNSC will coordinate the involvement of federal departments and other jurisdictions with expert and specialist knowledge specific to the EA and notify the proponent.

3.3.2 Community knowledge and Indigenous traditional knowledge

Subsection 19(3) of the CEAA 2012 states, “the environmental assessment of a designated project may take into account community knowledge and Aboriginal traditional knowledge”.

The proponent will consider the community and Indigenous traditional knowledge to which it has access or that is acquired through Indigenous and public engagement activities, in keeping with appropriate ethical standards and obligations of confidentiality. Agreement should be obtained from Indigenous groups regarding the use, management and protection of their existing traditional knowledge during and after the EA.

Where community and Indigenous traditional knowledge has been considered by the proponent, the EIS will document the following:

- the traditional knowledge gathered
- how the traditional knowledge was gathered (e.g., interviews with key community leaders and elders, collaborative field research, Indigenous traditional knowledge studies, etc.)
- the source of the traditional knowledge
- how the proponent considered the traditional knowledge gathered in the assessment, including both methodology (e.g., identifying VCs, establishing spatial and temporal boundaries, defining significance criteria) and analysis (e.g., baseline characterization, effects prediction, development of mitigation measures)

3.3.3 Existing information

In preparing the EIS, the proponent is encouraged to make use of existing information relevant to the project. When relying on existing information to meet the requirements of the EIS guidelines, the proponent will either include the information directly in the EIS or clearly direct readers to it (i.e., by cross-referencing). When relying on existing information, the proponent will also comment on how the data was applied to the project, separate factual lines of evidence from inference and state any limitations on the inferences or conclusions that can be drawn from the existing information.

3.3.4 Confidential information

In implementing the CEAA 2012, the CNSC is committed to promoting public participation in the EAs of projects and providing access to the information on which EAs are based. All documents prepared or submitted by the proponent or any other stakeholder in relation to the EA are posted or referenced on the [Canadian Impact Assessment Registry](#) (formerly the

Canadian Environmental Assessment Registry) and/or the CNSC's website and made available to the public upon request. For this reason, the EIS should not contain information that:

- is sensitive or confidential (i.e., financial, commercial, scientific, technical, personal, cultural) under the *Privacy Act* and the *Access to Information Act*, is treated consistently as confidential, and the person affected has not consented to the disclosure
- may cause harm to a person or harm to the environment through its disclosure

If the EIS contains information that should be treated as confidential or protected under the *Privacy Act* and the *Access to Information Act*, the proponent should identify that information and request that the CNSC treat it accordingly.

Part 2 – Content of the Environmental Impact Statement

Part 2 of this document provides specific instructions for the content of each section in the EIS. The EIS as a whole must reflect the guiding principles in Part 1 of this document.

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1. Presentation and Organization

To help identify the documents submitted, the title page of the EIS and related documents contains the following information:

- project name and location
- title of the document, including the term “environmental impact statement”

- subtitle of the document
- proponent name and contact information
- date

The EIS will be written in clear, precise language. A glossary of technical terms and a list of acronyms and abbreviations will be included. It will include charts, diagrams, tables, maps and photographs where appropriate to clarify the text. Perspective drawings that clearly convey the various components of the project will also be provided. Wherever possible, maps will be presented in common scales and datum to allow for comparison and overlay of mapped features.

For brevity and to avoid repetition, cross-referencing within the EIS is preferred. The EIS may make reference to information that has already been presented in other sections of the document, rather than repeating it.

Detailed studies (including all relevant and supporting data and methodologies) will be provided in separate appendices and will be referenced by appendix, section and page in the text of the main document. The EIS will explain how information is organized in the document. This will include a list of all tables, figures and photographs referenced in the text. A complete list of supporting literature and references will also be provided. A table of concordance which cross-references the information presented in the EIS with the information requirements set out in the EIS guidelines will be provided. The proponent will provide copies of the EIS and its summary for distribution, as directed by the CNSC, including paper and electronic versions in unlocked, searchable PDF format.

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2. Executive Summary

For efficiency, the proponent may consider preparing a summary of the EIS in both official languages (English and French) to be provided to the CNSC at the same time as the EIS. The proponent is also encouraged to consider making the executive summary available in the language(s) spoken by Indigenous communities in close proximity to the project (e.g., Cree, Dene).

The summary, provided as a separate document, will include:

- a concise description of all key project components and related activities
- a summary of the consultation held with Indigenous groups, the public and government agencies, including a summary of the issues raised and the proponent's responses
- an overview of the key environmental effects of the project and proposed technically- and economically-feasible mitigation measures
- the proponent's conclusions on the residual environmental effects of the project after taking mitigation measures into account and the significance of those effects
- sufficient details for the reader to learn about and understand the project, its potential environmental effects, mitigation measures, the significance of the residual effects and the follow-up program

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3. Introduction and Overview

3.1 About the proponent

In the EIS, the proponent will:

- provide contact information (e.g., name, address, phone, fax, email)

- identify itself and provide the name of the legal entity or entities that would develop, manage and operate the project
- describe corporate and management structures
- identify key personnel, contractors and/or sub-contractors responsible for preparing the EIS

3.2 Project overview

The EIS will describe the project, key project components and associated activities, scheduling details, the timing of each phase of the project and other key features. If the project is part of a larger sequence of projects, the EIS will outline the larger context.

The overview identifies the key project components rather than providing a detailed description which is presented in a different section of the EIS.

3.3 Project location

The EIS will contain a description of the geographical setting in which the project will take place. This description should include those aspects of the project and its setting that are key to understanding the project's potential adverse environmental effects, including:

- geographical maps of the project location (at an appropriate scale) that includes project components, boundaries of the proposed project site with Universal Transverse Mercator (UTM) coordinates, the lease boundary, site study area, local study area, regional study area, the major existing infrastructure, adjacent land uses and any important environmental features
- current land use in the area
- the distance of the project facilities and components to any federal lands

- the environmental significance and value of the geographical setting in which the project will take place and the surrounding area
- environmentally sensitive areas, such as national, provincial and regional parks, ecological reserves, wetlands, estuaries and habitats of federally (Schedule 1 of *Species at Risk Act* (SARA)) or provincially listed species at risk and other sensitive areas
- a description of local and Indigenous communities
- traditional Indigenous territories, treaty lands, and Indian reserve lands and Métis harvesting regions and/or settlements

3.4 Regulatory framework and the role of government

The EIS should identify:

- the environmental and other regulatory approvals and legislation, including the CEAA 2012, that are applicable to the project at the federal, provincial, regional and municipal levels
- government policies, resource management plans, planning or study initiatives pertinent to the project and/or EA and their implications
- any treaty or self-government agreements with Indigenous groups that are pertinent to the project and/or EA
- any relevant land use plans, land zoning or community plans
- regional, provincial and/or national objectives, standards or guidelines that have been used by the proponent to assist in the evaluation of any predicted environmental effects

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4. Project description

4.1 Purpose of the project

The EIS will describe the purpose of the project by providing the rationale for the project. It explains the background, the problems or opportunities that the project is intended to satisfy and the stated objectives from the proponent's perspective. If the objectives of the project are related to broader private or public sector policies, plans or programs, this information should also be included.

4.2 Alternative means of carrying out the project

The EIS shall identify and describe alternative means to carry out the project that are, from the perspective of the applicant, technically and economically feasible. The alternative means identified by the proponent include options for locations, development and implementation methods, routes, designs, technologies and mitigation measures. Alternative means may also be related to the construction, operation, expansion, decommissioning and abandonment of a physical work.

The approach and level of effort applied to addressing alternative means is established on a project-by-project basis, taking into consideration:

- the characteristics of the project
- the environmental effects associated with the potential alternative means
- the health or status of VCs that may be impacted by the alternative means
- the potential for mitigation and the extent to which mitigation measures may address potential environmental effects
- the level of concern expressed by the public and Indigenous groups

The EIS should also describe the environmental effects of each of the alternative means. It should list the criteria used to identify an alternative means as unacceptable and explain how these criteria are applied, as

should the criteria used to examine the environmental effects of each remaining alternative means to identify the preferred alternative.

The proponent will complete the following procedural steps for addressing alternative means:

- Identify and describe in sufficient detail the alternative means to carry out the project:
 - develop criteria to determine the technical and economic feasibility of the alternative means
 - identify those alternative means that are technically and economically feasible
- Identify the effects of each technically and economically feasible alternative means:
 - identify those elements of each alternative means that could produce effects in sufficient detail to allow a comparison with the effects of the project
 - the effects referred to above include both environmental effects and potential adverse impacts on potential or established Indigenous and treaty rights and related interests
- Describe the methodology used for the analysis of alternative means and the conclusion reached (i.e., preferred means)

For further information regarding “purpose of” and “alternative means”, please consult the Impact Assessment Agency’s operational policy statement, *Addressing “Purpose of” and “Alternative Means” under the CEAA 2012* (see bibliography).

The CNSC recognizes that projects may be in the early planning stages when the EIS is being prepared. Proponents are strongly encouraged to conduct an environmental effects analysis where they have not made final decisions about the placement of project infrastructure or the technologies to be used, or if several options exist for various project components.

4.3 Scope of project

The scope of the project for the purpose of the EA includes all the phases, components, activities and federal decisions proposed by the proponent as described in the project description that has been determined to meet the requirements of the *Prescribed Information for the Description of a Designated Project Regulations*. The CNSC's Commission may also determine that other components and/or activities in relation to the project are to be included in the project scope.

The proponent will consider all phases, components, activities and federal decisions identified in the scope of project as part of the effects assessment.

4.3.1 Project components

The EIS will describe the project by presenting the project components, associated and ancillary works, and other characteristics that will assist in understanding the environmental effects.

4.3.2 Project activities

The EIS will include descriptions of each phase associated with the proposed project.

This will include descriptions of the activities to be carried out during each phase, the location of each activity, expected outputs and an indication of the activity's magnitude and scale.

Although a complete list of project activities should be provided, the emphasis will be on activities with the greatest potential to have environmental effects. Sufficient information will be included to predict environmental effects and address concerns identified by the public and

Indigenous groups. Highlight activities that involve periods of increased environmental disturbance or the release of materials into the environment.

The EIS will include a summary of the changes that have been made to the project since originally proposed, including the benefits of these changes to the environment, Indigenous peoples, and the public.

The EIS will include a schedule including time of year, frequency, and duration for all project activities.

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5. Scope of the environmental assessment

5.1 Factors to be considered

Scoping establishes the EA's parameters and focuses the assessment on relevant issues and concerns. The EA of the designated project must take into account the following factors, as listed in subsection 19(1) of the CEAA 2012:

- a. the section 5 environmental effects of the designated project (such as changes to fish and fish habitat, aquatic species, migratory birds), including the environmental effects of malfunctions or accidents that may occur in connection with the designated project, and any cumulative environmental effects likely to result from the designated project in combination with other physical activities that have been or will be carried out
- b. the significance of those environmental effects
- c. comments from the public that are received in accordance with the CEAA 2012

- d. mitigation measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the designated project
- e. the requirements of the follow-up program in respect of the designated project
- f. the purpose of the designated project
- g. alternative means of carrying out the designated project that are technically and economically feasible and the environmental effects of any such alternative means
- h. any changes to the designated project that may be caused by the environment
- i. the results of any relevant study conducted by a committee established under section 73 or 74 of the CEEA 2012
- j. any other matter relevant to the EA that the CNSC requires to be taken into account, in accordance with the *Nuclear Safety and Control Act*

Pursuant to subsection 19(2) of the CEEA 2012, the scope of the factors to be taken into account under paragraphs 19(1)(a), (b), (d), (e), (g), (h) and (j) is determined by the CNSC, as the responsible authority.

In conjunction with subsections 4.1 and 4.4 of REGDOC-2.9.1, *Environmental Protection: Environmental Policy, Assessments and Protection Measures*, the CNSC requires an environmental risk assessment (ERA) and a human health risk assessment (HHRA) as part of the EIS. An ERA is a systematic process that identifies, quantifies and characterizes the risk posed by nuclear or hazardous substances and physical stressors in the environment. The ERA:

- identifies facility- or activity-specific characteristics and site-specific environmental characteristics
- identifies interactions between those characteristics
- assesses the likelihood and significance of these interactions and the resulting potential effects on the environment and the public

An HHRA is completed as a sub-element of an ERA for both nuclear and hazardous substances.

To implement the Government of Canada's interim measure with respect to upstream greenhouse gas emissions, the CNSC may require consideration of these types of emissions in the scope of the EA. On March 19, 2016, a definition of upstream greenhouse gas (GHG) emissions was published by Environment Canada and Climate Change in the *Canada Gazette*. The proposed definition of upstream includes "all industrial activities from the point of resource extraction to the project under review." The processes to be considered as upstream activities will vary by type of resource and nature of the project being assessed. In general, upstream activities include extraction, processing, handling and transportation.

Where a reliable and feasible methodology exists for calculating upstream GHG emissions linked to the project, the proponent will be required to provide sufficient information to estimate these types of emissions. This information should be presented by individual pollutant and summarized in carbon dioxide equivalent units per year. If upstream GHG emissions are not considered in the assessment, the proponent will provide a rationale in the EIS.

5.2 Scope of factors

5.2.1 Valued components to be examined

Valued components (VCs) refer to environmental biophysical or human features that may be impacted by a project. The value of a component relates not only to its role in the ecosystem, but also to the value people place on it. For example, it may have scientific, social, cultural, economic, historical, archaeological or aesthetic importance.

The EIS identifies the VCs linked to section 5 of the CEAA 2012, including those identified in section 9.2 (Part 2), that may be affected by changes in the environment, as well as species at risk and their critical habitat as per the requirement outlined in section 79 of the SARA.

Under section 73 of the SARA, the Minister of Environment and Climate Change Canada may grant permits authorizing an activity affecting a listed wildlife species or any part of its residence or critical habitat that would otherwise be prohibited. Where the proponent determines that a listed wildlife species or any part of its residence or critical habitat would be affected by the project activities, it should consult directly with the Canadian Wildlife Service as early as possible in the process.

The final list of VCs to be presented in the EIS will be completed according to the evolution and design of the project and reflect the knowledge about the environment acquired through public consultation and Indigenous engagement. The EIS will describe the methods used to predict and assess the potential adverse environmental effects the project would have on these components.

The VCs will be described in sufficient detail to allow the reviewer to understand their importance and to assess the potential for environmental effects arising from the project activities. The EIS will provide a rationale for selecting specific VCs and for excluding any VCs or information specified in these guidelines. Challenges with particular exclusions may arise, so it is important to document the information and criteria used to make each determination. Examples of justification include primary data collection, computer modelling, literature references, public consultation, expert input or professional judgement. The EIS will identify those VCs, processes and interactions that were raised as concerns during any workshop or meeting held by the proponent, or that the proponent considers will likely be affected by the project. In doing so, the EIS will indicate to whom these

concerns are important and why, including environmental, Indigenous, social, economic, recreational and aesthetic considerations. If comments are received on a component that has not been included as a VC, the comments will be summarized, and the rationale for excluding the VC will be provided.

5.2.2 Spatial and temporal boundaries

The spatial and temporal boundaries used in the EA may vary depending on the VC and will be considered separately for each one. The proponent is encouraged to consult with the CNSC, federal and provincial government departments and agencies, local government and Indigenous groups. It is also encouraged to take into account public comments when defining the spatial boundaries used in the EIS.

The EIS will describe the spatial boundaries, including local and regional study areas, for each VC to be used to assess the potential adverse environmental effects of the project and provide a rationale for each boundary. Spatial boundaries are defined by taking into account the following criteria. This list is not exhaustive:

- a. the physical extent of the proposed project, including any off-site facilities or activities
- b. the extent of aquatic and terrestrial ecosystems potentially affected by the project
- c. the extent of potential effects arising from noise, light and atmospheric emissions
- d. the extent to which traditional land use or treaty rights could potentially be affected by the project
- e. current land and resource use for residential, commercial, industrial, recreational, cultural and aesthetic purposes by communities whose areas include the physical extent of the project

- f. the size, nature and location of past, present and reasonably foreseeable projects and activities which could interact with items (b), (c), (d) and (e)
- g. community and Indigenous traditional knowledge, and ecological and technical considerations

The following geographic study areas should serve as the basis for developing project- and effect-specific study areas:

Site study area: The site study area is the project's footprint. In other words, it is where project activities would be undertaken, and it includes the project's proposed facilities, buildings and infrastructure.

Local study area: The local study area is defined as the area that exists outside the site study area boundary, where measurable changes to the environment may be anticipated as a result of the proposed activities at any phase of the project, either through normal activities or from possible accidents or malfunctions. The boundaries must change if appropriate following an assessment of the spatial extent of potential effects. The geographic boundary depends on the factor being considered (e.g., a local study area defined for the aquatic environment will differ from that defined for the atmospheric environment).

Regional study area: The regional study area is defined as the area within which the potential effects of this project may interact with the effects of other projects, resulting in potentially cumulative effects. The geographic boundary for the regional study areas is also specific to the factor being considered.

Within these study areas, the boundary of concern will extend to a depth that will include the full extent of the surface water and groundwater.

The EA's temporal boundaries will span all phases of the project determined to be within the scope of the project, as specified in section 4.3. If impacts are predicted after project decommissioning, this should be taken into consideration when defining boundaries. At a minimum, the assessment is expected to include the period of time during which the maximum impact is predicted to occur. Community and Indigenous traditional knowledge should factor into decisions about temporal boundaries. If the temporal boundaries do not span all phases of the project, the EIS will identify the boundaries used and provide a rationale.

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6. Public and stakeholder consultation

In accordance with CNSC's REGDOC-3.2.1, *Public Information and Disclosure*, the EIS will describe the ongoing and proposed participation activities that the proponent will undertake or that it has already undertaken on the project. It will describe the efforts made to distribute project information, and describe the information and materials that were distributed during the public consultation process. The EIS will indicate the methods used, where the consultation was held, the persons and organizations consulted, the concerns voiced and the extent to which this information was incorporated into the project design and EIS. The EIS will provide a summary of the key project issues raised and their potential environmental effects, as well as describe any outstanding issues and ways to address them.

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7. Indigenous engagement

In accordance with the CNSC's REGDOC-3.2.2, *Indigenous Engagement*, the EIS will describe the proponent's engagement activities with potentially affected Indigenous groups.

The EIS will include, and the proponent should consider engaging with potentially affected Indigenous groups to obtain their views on the following, to be included in the EIS:

- the objectives of Indigenous engagement activities and the methods used
- each Indigenous group's potential or established rights, including geographical extent, nature, frequency, timing, maps and data sets (e.g., fish catch numbers), when this information is provided by a group to the proponent or available through public records
- comments, specific issues and concerns raised by Indigenous groups and how the key concerns were addressed
- the potential adverse impacts of the project on potential or established Indigenous or treaty rights
- the effects of changes to the environment on Indigenous peoples (health and socio-economic conditions; physical and cultural heritage, including any structure, site or thing that is of historical, archaeological, paleontological or architectural significance; and current use of lands and resources for traditional purposes), pursuant to paragraph 5(1)(c) of the CEEA 2012
- VCs suggested by Indigenous groups for inclusion in the EIS, whether they were included and the rationale for any exclusions
- measures identified to mitigate or accommodate potential adverse impacts of the project on the potential or established Indigenous or treaty rights and effects of changes to the environment for Indigenous peoples, including suggestions made by Indigenous groups

One suggested format for providing this information is a table to track the key issues raised by each Indigenous group, including concerns raised about the project, proposed mitigation options and where appropriate, a reference to the proponent's analysis in the EIS.

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8. Description of the environment

8.1 Baseline environment

The EIS will include a description of the environment, including the components of the existing environment and environmental processes, their interrelations and interactions, and the variability in these components, processes and interactions over time scales appropriate to the EIS. In characterizing the environmental effects of the project, the proponent will consider the current baseline environment and environmental trends within the project area. The description of the existing baseline and environmental trends should consider past projects and activities carried out by the proponent and/or others in the project area.

Based on the scope of the project, the EIS will present sufficiently detailed baseline information to determine the effects the project could have on the VCs and analyze those effects. If other VCs are identified while conducting the EA, the baseline condition for these components will also be described in the EIS. The baseline description should include results from studies done prior to any physical disruption of the environment due to initial project activities (e.g., site preparation). To determine the appropriate spatial boundaries to describe the baseline information, refer to

section 5.2.2 (Part 2) of these guidelines. As a minimum, the EIS will include a description of the following biophysical and human (health/socio-economic) environmental components.

8.2 Atmospheric environment

The atmospheric environment includes the climate conditions at the site and in the local and regional study areas. It includes the seasonal variations in weather conditions in the study areas to allow the assessment of effects on the facility or activity.

The applicant or licensee should provide a description of the existing ambient air quality in the study areas, with emphasis on characterizing radiological and non-radiological analytes.

The description should include meteorological information, such as air temperature, relative humidity, precipitation, wind speed and direction, atmospheric pressure and solar radiation. It should also include the occurrence of weather phenomena (e.g., lightning, temperature inversions, fog). Special consideration should be given to analyzing extreme and rare meteorological phenomena (e.g., tornadoes). Uncertainties should be described and taken into account when discussing the reliability of the information presented.

The description should also include current ambient daytime and nighttime noise levels at the site and local study areas, and include information about its source(s), geographic extent and temporal variations. The description should provide ambient noise levels for other areas that could be affected by the facility or activity. Some examples are:

- increased traffic along transportation corridors to and from the site during construction

- receptors at residences and sensitive sites (such as hospitals, schools, daycare facilities, seniors' residences and places of worship)

The applicant or licensee should describe the influence of regional topography or other features that could affect weather conditions in the study areas.

The baseline information should be sufficient to support the use of an atmospheric dispersion model to conduct a site-specific ERA and to support an assessment of environmental effects on the project (e.g., tornadoes).

8.3 Surface water environment

The surface water environment includes all surface water features and hydrology that affect surface water at the site or in the local and regional study areas. The applicant or licensee should include delineation of drainage basins at appropriate scales.

When documenting the water quality of all surface water, the applicant or licensee should demonstrate the use of appropriate sampling and analytical protocols for the range of analytical parameters that could potentially be influenced by the facility or activity. This information should be presented using tables, maps and figures to provide an understanding of surface water characteristics and conditions at the site and in the local and regional study areas.

The applicant or licensee should describe hydrological regimes within the drainage basin, including seasonal fluctuations and the year-to-year variability of all surface waters. The applicant or licensee should assess the normal flow, flooding and drought properties of water bodies, as well as the interactions between surface water and groundwater flow systems. The

applicant or licensee should describe all water sources used for drinking water in the area, including source water intakes for drinking water treatment facilities.

The baseline information should be sufficient to support the use of an aquatic dispersion model to conduct a site-specific ERA and to support an assessment of the effects (e.g., flooding) of the environment for the facility or activity.

The applicant or licensee should document the sediment quality of all water bodies to be affected by the facility or activity and demonstrate the use of appropriate sampling and analytical protocols for the range of analytical parameters with the potential to be influenced by the facility or activity. This information should provide an appropriate understanding of sediment characteristics and conditions on the site and in the local and regional study areas.

The study design should be fully described, including the allocation of samples in space and time, measurement methods and results.

The applicant or licensee should include an assessment of any limitations or gaps in the quality and extent of baseline data and methods, as well as the method(s) by which they have been addressed.

8.4 Aquatic environment

The aquatic environment includes the aquatic and wetland species at the site and within the local and regional study areas, including the flora and fauna and their habitats.

The applicant or licensee should seek information from relevant authorities (e.g., Environment and Climate Change Canada, Fisheries and Oceans Canada and provincial or territorial authorities) on aquatic and wetland

species and habitat for the local and regional study areas. The applicant or licensee should also undertake independent studies to gather the necessary information.

The applicant or licensee should include a description of the food chain and food web dynamics as a habitat component, as this relates to fish populations, and the potential effects (e.g., impingement and entrainment) the facility or activity will have.

The applicant or licensee should provide detailed habitat mapping that demonstrates habitat usage by fish within the study areas. This information should include depth profiles, substrate mapping, water temperature profiles and a description of known and potential habitat usage (e.g., spawning, nursery, rearing, feeding and migration) by fish in the study areas.

The applicant or licensee should identify any biological species that have natural conservation status – in other words, that are deemed rare, vulnerable, endangered, threatened or uncommon at a federal, provincial or municipal level – and their critical habitats, if any are identified.

The applicant or licensee should provide baseline characterization of radionuclide and hazardous substance levels in aquatic biota to support human and ecological risk assessments.

The applicant or licensee should fully describe the study design, including the allocation of samples in space and time, measurement methods and results.

The applicant or licensee should include an assessment of any limitations or gaps in the quality and extent of baseline data and methods, as well as the method(s) by which they have been addressed.

8.5 Geological and hydrogeological environment

The geological and hydrogeological environment includes the bedrock and overburden geology at both the local and regional scales.

8.5.1 Geology

The applicant or licensee should characterize the geomorphology, topography, quaternary geology and soil characteristics, structural geology, petrology, geochemistry, economic geology and hydrogeology. The applicant or licensee should also describe the geomechanical properties that apply to the region and at the site that will be disturbed.

The applicant or licensee should provide the geotechnical properties of the overburden, including shear strength and liquefaction potential, to allow for the assessment of slope stability and the bearing capacity of foundations under both static and dynamic conditions.

The description of the structural geology should include regional, local and site-specific documentation of fractures and faults. It should include a description of primary geological features and deformation fabrics, both at the site and in the local and regional study areas.

If applicable, the applicant or licensee should describe the coastal geomorphology and include the characteristics of any lakefront, ocean bluff or shoreline, and both near-shore and offshore zones.

The baseline characterization should be sufficient to assess the effects of the environment on the facility or activity (e.g., seismic effects).

The applicant or licensee should present a geological model that incorporates all overburden and bedrock information. If extrapolation is required to derive the stratigraphy, the applicant or licensee should explicitly discuss the uncertainties and the need for additional field investigations to reduce those uncertainties.

The applicant or licensee should describe the geotechnical and geophysical hazards, including consideration of subsidence, uplift, seismicity (and active faulting), and it should consider the potential for movement at the ground surface (including co-seismic rupture) and earthquake ground motions. A seismic hazard assessment should be provided. Where appropriate, narrative descriptions should be supplemented by geological maps, figures, cross-sections, borehole logs and photographs (with specific location information).

8.5.2 Hydrogeology

The applicant or licensee should describe the hydrogeology at the site and in the local and regional study areas. The description should characterize the physical and geochemical properties of all overburden and bedrock hydrogeological units (from the ground surface to the uppermost basement unit, which is site dependent).

Units may be characterized as aquifers or aquitards, and unit descriptions should include their geochemical characteristics, vertical and lateral permeabilities, transport mechanism (diffusion versus advection) and the directions of groundwater flow.

The applicant or licensee should identify the groundwater recharge and discharge areas, and describe in detail groundwater interactions with surface waters.

The applicant or licensee should present a conceptual and numerical hydrogeological model that discusses the hydrostratigraphy and groundwater flow systems.

The applicant or licensee should provide a description of baseline groundwater quality at the site and in the local study area. The applicant or licensee should also describe local and regional potable groundwater supplies, including their current use and potential for future use.

8.6 Terrestrial environment

The terrestrial environment includes flora and fauna, their habitats, any wildlife corridors and the soil.

The applicant or licensee should describe the terrestrial species at the site and within the local and regional study areas, including flora, fauna and their habitat. The applicant or licensee should identify all biological species at risk (i.e., endangered, threatened, special concern, extirpated at a federal, provincial or municipal level) known to occur in the area or where the site is within range of the species.

The applicant or licensee should describe the presence and importance of wildlife habitat within the study areas, including critical habitats for any listed species. The applicant or licensee should also describe any wildlife corridors and physical barriers to movement.

The applicant or licensee should identify all protected and conservation areas established by federal, provincial and municipal jurisdictions (e.g., wilderness areas, parks, sites of historical or ecological significance, nature reserves, federal migratory bird sanctuaries and wildlife management areas).

The applicant or licensee should describe the existing soil quality (including hazardous and radiological substance concentrations) for all study areas, as well as any additional soil quality parameters potentially relevant for modelling purposes (such as the transport and bioavailability of contaminants of potential concern).

The applicant or licensee should provide baseline a characterization of radionuclide and hazardous substance levels in vegetation and other non-human biota to support human and ecological risk assessments. The

characterization should also take into consideration the baseline conditions of other applicable environmental components (e.g., the atmospheric environment).

The applicant or licensee should undertake independent studies to gather the necessary information, as appropriate. The applicant or licensee should describe field studies in terms of representativeness of the target populations where possible. The applicant or licensee should fully describe the design of the study, including the allocation of samples in space and time, measurement methods and results.

The applicant or licensee should include an assessment of any limitations or gaps in the quality and extent of baseline data and methods, and the method(s) by which they were addressed.

8.7 Ambient radioactivity

Ambient radioactivity arises from sources, their activity levels and their origin, for all applicable environmental media (including air, soil, food, water, aquatic sediments and plant or animal tissue).

The applicant or licensee should describe the ambient radiological conditions at the site and in the local and regional study areas. The applicant or licensee should include information about the existing conditions, including an inventory of sources, their activity levels and their origin (natural or anthropogenic), for all applicable environmental media.

The applicant or licensee should fully describe the design of the study, including the allocation of samples in space and time, measurement methods and results.

The description should include an assessment of any limitations or gaps in the quality and extent of the baseline data and methods, as well as the method(s) by which they have been addressed.

8.8 Human health

The potential effects of the facility or activity on human health include both radiological sources and non-radiological contaminants.

The applicant or licensee should describe the current health profiles of the communities likely to be affected by the facility or activity, including information on the population health of the communities in the local and regional study areas.

The applicant or licensee should provide, to the extent available, information about the current consumption of locally grown harvests and country foods, and the quality by food type, amounts consumed and parts consumed (whole body or specific organs).

The applicant should characterize the socio-economic environment, including:

- the rural and urban settings likely to be affected by the project
- any federal lands and lands located outside the province or Canada that may be affected by the project
- the current use of land in the study area, with a description of hunting, recreational and commercial fishing, trapping, gathering, outdoor recreation, use of seasonal cabins, outfitters
- current use of all waterways and water bodies that will be directly affected by the project, including recreational uses, where available
- location of and proximity to any permanent, seasonal or temporary residences or camps
- health ¹ and socio-economic conditions, covering the functioning and health of the socio-economic environment and encompassing a broad range of matters that affect communities in the study area in a way that recognizes interrelationships, system functions and vulnerabilities

- physical and cultural heritage, including structures, sites or things of historical, archaeological, paleontological or architectural significance

8.9 Indigenous land and resource use

Indigenous land and resource use includes lands, waters and resources of specific value, traditional activities and lifestyle, and traditional dietary habits.

Traditional land use may include areas where traditional activities are being carried out, such as establishing seasonal camps, camping, travel on traditional routes, gathering of country foods and medicines (hunting, fishing, trapping, planting and harvesting). Traditional land use also includes spiritual sites of significance to Indigenous people.

The applicant or licensee should identify the lands, water and resources of specific social, economic, archaeological, cultural or spiritual value to Indigenous people, including established and asserted Indigenous or treaty rights, that may be affected by the facility or activity.

The applicant or licensee should describe Indigenous land and resource use at the site and in the local and regional study areas. The applicant or licensee should identify traditional activities, including activities for food, social, ceremonial and other cultural purposes, in relation to such lands, waters and resources with a focus on the current use of lands, waters and resources for traditional purposes.

The applicant or licensee should describe the traditional dietary habits and dependence on country foods and harvesting for other purposes, including harvesting of plants for medicinal purposes. The analysis should focus on identifying the potential adverse effects of the facility or activity that impact the ability of future generations of Indigenous people to pursue traditional activities or lifestyle.

9. Effects assessment

9.1 Predicted changes to the physical environment

The assessment will include a consideration of the predicted changes to the environment that result from the project being carried out or from of any powers, duties or functions to be exercised by the federal government in relation to the project. These predicted changes to the environment are to be considered in relation to each phase of the project (i.e., construction, operation, decommissioning) and are to be described in terms of magnitude, geographic extent, duration and frequency, and whether the environmental changes are reversible or irreversible.

As changes to various parts of the physical environment may be inter-related in an ecosystem, the EIS will explain and describe the connections between the changes described.

9.2 Predicted effects on valued components

Based on the predicted changes to the environment identified in section 9.1 (Part 2), the proponent is to assess the environmental effects of the project on the VCs identified as per section 5.2.1 (Part 2).

Based on the predicted changes to the environment identified in section 9.1 (Part 2), additional VCs are to be selected based on the following:

- If there is potential for the project to result in environmental changes on federal lands, in another province or in another country, VCs of importance not already identified are to be listed in this section.
- If federal decisions about the project will lead to environmental changes, these environmental changes are to be considered stand-

alone VCs.

All interconnections between VCs and between changes to multiple VCs will be described.

The proponent will use the information in appendix C of the CNSC's REGDOC-2.9.1, *Environmental Protection: Environmental Policy, Assessments and Protection Measures* and CEAA 2012 guidance documents listed on the Impact Assessment Agency's website for guidance on assessing the environmental effects of the project (refer to the bibliography for titles and web pages).

9.3 Mitigation measures

Every EA conducted under the CEAA 2012 will consider measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project. Measures that are technically and economically feasible include application of best industry practices, pollution prevention principles such as best available technology and techniques economically achievable, and radiation protection principles, such as keeping radiation exposure and doses as low as reasonably achievable (ALARA). Under the CEAA 2012, mitigation includes measures to eliminate, reduce or control the adverse environmental effects of a project, as well as restitution for damages to the environment through replacement, restoration, compensation or other means.

Each measure will be specific, achievable, measurable and verifiable, and described in a manner that avoids ambiguity in intent, interpretation and implementation. Mitigation measures may be considered for inclusion as conditions in the EA decision statement and/or in other compliance and enforcement mechanisms provided by other authorities' permitting or licensing processes.

As a first step, the proponent is encouraged to use an approach based on the avoidance and reduction of the effect(s) at the source. Such an approach may include the modification of the design of the project or relocation of project components.

The EIS will describe the standard mitigation practices, policies and commitments that constitute technically and economically feasible mitigation measures and that will be applied as part of standard practice regardless of location (including the measures directed at mitigating adverse socio-economic effects). The EIS will then describe the project's environmental protection plan and its environmental management system, through which the proponent will deliver this plan. The plan will provide an overall perspective on how potentially adverse effects would be minimized and managed over time. The EIS will further discuss the mechanisms the proponent would use to require its contractors and sub-contractors to comply with these commitments and policies and with auditing and enforcement programs.

The EIS will then describe mitigation measures that are specific to each environmental effect identified. Measures will be written as specific commitments that clearly describe how the proponent intends to implement them and the environmental outcome the mitigation is designed to address. The EIS will describe mitigation measures in relation to species and/or critical habitat listed under the SARA. These mitigation measures will be consistent with any SARA permit, applicable recovery strategy and/or action plan.

The EIS will specify the actions, works, minimal disturbance footprint techniques, best available technology, corrective measures or additions planned during the project's various phases to eliminate or reduce the significance of potential adverse effects. The impact statement will also present an assessment of the effectiveness of the proposed technically and

economically feasible mitigation measures. The basis used to determine whether the mitigation measure reduces the significance of a potential adverse effect will be made explicit. The proponent is also encouraged to identify mitigation measures for effects that are adverse although not significant.

The EIS will indicate what other technically and economically feasible mitigation measures were considered, and explain why they were rejected. Trade-offs between cost savings and effectiveness of the various forms of mitigation will be justified. The EIS will identify who is responsible for the implementation of these measures and the system of accountability.

For proposed mitigation measures for which there is little experience or that have questionable effectiveness, the potential environmental risks and effects – should those measures not be effective –will be clearly and concisely described. In addition, the EIS will identify the extent to which technological innovations will help mitigate environmental effects. Where possible, it will provide detailed information on the nature of these measures, their implementation and management, and how they are integrated into the follow-up program.

The EIS will document specific suggestions raised by Indigenous groups for mitigating the effects of changes to the environment on Indigenous peoples (section 5(1)(c) of CEAA 2012). For the mitigation measures intended to address the effects of changes to the environment for Indigenous peoples, the proponent must discuss the residual effects with the Indigenous groups prior to submitting the EIS.

Adaptive management is not considered a mitigation measure, but if the follow-up program indicates that corrective action is required, the proposed approach for managing the action should be identified.

9.4 Other effects to consider

9.4.1 Accidents and malfunctions

The applicant should provide an assessment of potential health and environmental effects resulting from postulated radiological and conventional malfunctions or accidents. The EIS should also include any mitigation measures, such as monitoring, contingency, clean-up or restoration work in the surrounding environment that would be required during or immediately following the postulated malfunction and accident scenarios.

The EIS should provide a description of postulated malfunction and accident sequences leading to a radiological or non-radiological release considering, as appropriate, internal events, external events and human-induced events, including their frequency, an explanation of how these events were identified and any modeling that was performed.

The applicant can use a bounding approach or use facility- or activity-specific information (e.g., design, operation, projected environmental releases) in the assessment of radiological accidents and malfunctions. If a bounding approach is used, the applicant should provide a detailed rationale for the selection of each bounding scenario.

The EIS should include the source, quantity, mechanism, pathway, rate, form and characteristics of contaminants and other materials (physical and chemical) likely to be released to the surrounding environment during the postulated malfunctions and accidents.

Note: Malfunctions and accidents are reviewed in depth under the NSCA for licensing purposes (for example, under REGDOC-2.4.1, *Deterministic Safety Analysis*; REGDOC-2.4.2, *Probabilistic Safety Assessments for Nuclear Power Plants* and REGDOC-1.1.1, *Site Evaluation and Site Preparation for New Reactor Facilities*). These scenarios should be taken into consideration by the applicant when designing environmental protection measures.

If applicable, the applicant should use operating experience (OPEX) to identify any past abnormal operations, accidents and spills to the extent that they are relevant to the current assessment for the purposes of identifying malfunction and accident scenarios to be assessed.

9.4.2 Effects of the environment on the project

The EIS shall take into account how the environment could adversely affect the project and how this in turn could result in effects on the project (e.g., extreme environmental conditions resulting in malfunctions and accidental events). These events will be considered in different probability patterns (e.g., 5-year flood vs. 100-year flood).

Examples include local conditions, natural hazards (e.g., severe and/or extreme weather conditions), external events (e.g., flooding, drought, ice jams, landslides, avalanches, erosion, subsidence, fire, outflow conditions, geotechnical hazards, seismic events) and biophysical hazards (e.g., algae).

The applicant shall also take into account any potential effects of climate change on the project, including an assessment of whether the project might be sensitive to changes in climate conditions during its lifecycle.

The EIS will provide details of planning, design and construction strategies intended to minimize the potential environmental effects of the environment on the project.

9.4.3 Cumulative effects

The applicant shall assess any residual adverse environmental effects of the project in combination with other past, present or reasonably foreseeable projects and/or activities within the study area.

The applicant should explain the approach and methods used to identify and assess cumulative effects. The approach and methods should be consistent with *Assessing Cumulative Environmental Effects under the*

10. Conclusion on significance of residual effects

The applicant shall assess the significance of any residual effects that persist, taking into consideration the proposed mitigation measures. These residual effects are identified during the ERA or a characterization of the environmental effects.

In the EIS, the applicant should include a detailed analysis of the significance of each residual effect. The applicant should clearly explain the method and definitions used to describe the level of the residual adverse effect (e.g., low, medium, high) for each of the criteria assessed. The applicant should also describe any cumulative environmental effects that are likely to result from the designated project in combination with other physical activities that have been or will be carried on. It should also describe how these levels were combined to reach an overall conclusion on the significance of the adverse effects for each VC.

Some specific criteria to be assessed are:

- magnitude of the effect
- spatial extent of the effect
- duration and frequency of the effect
- degree to which the effect can be reversed or mitigated
- ecological importance

The method used to describe the level of the adverse effect should be transparent and reproducible.

The EIS should identify additional criteria used to assign significance ratings to any predicted adverse effects. It should contain clear and sufficient information to enable the CNSC and the public to understand and review the applicant's judgment of the significance of effects. The applicant should define the terms used to describe the level of significance. In assessing significance against the criteria, the EIS should, where possible, employ relevant existing regulatory documents, environmental standards, guidelines or objectives such as prescribed maximum levels of emissions or discharges of specific hazardous substances into the environment or maximum acceptable levels of specific hazardous substances in the environment.

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11. Follow-up program

The EIS shall include a framework or preliminary program upon which EA follow-up actions will be managed throughout the life of the project.

The applicant should design the follow-up program to verify the accuracy of the EA predictions and to determine the effectiveness of the measures implemented to mitigate the potential adverse environmental effects of the project. The applicant should also design the follow-up program to incorporate pre-project information that would provide the baseline data; compliance data, such as established environmental quality criteria; regulatory documents, standards or guidelines; and real-time data consisting of observed data gathered in the field. The applicant should describe the compliance reporting methods to be used, including reporting frequency, methods and format.

Where applicable, the proponent will describe how the follow-up program relates to the project's environmental protection plan and environmental management system.

Environmental assessment effects predictions, assumptions and mitigation actions that are to be tested in the follow-up program must be converted into field-testable monitoring objectives. The monitoring design must include a statistical evaluation of the adequacy of existing baseline data to provide a benchmark for testing project effects, and the need for any additional pre-construction or pre-operational monitoring to establish a firmer project baseline.

The proponent will propose a schedule for the follow-up program. The schedule should indicate the timing, frequency and duration of effect monitoring. This schedule would be developed after the statistical evaluation of the length of time needed to detect effects given estimated baseline variability, probable environmental effect size and desired level of statistical confidence in the results (type 1 and type 2 errors).

The description of the follow-up program must include any contingency procedures or plans or other adaptive management provisions as a means of addressing unforeseen effects or correcting exceedances, as required, to comply with benchmarks, regulatory standards or guidelines.

The follow-up program will describe roles and responsibilities for the program and its review process, by both peers and the public.

The EIS should provide discussion on the follow-up program's requirements, and include:

- objectives and structure of the follow-up program and the VCs targeted by the program
- tabular summary and explanatory text of the main components of the program including:

- a description of each monitoring activity under that component
- which of the two generic program objectives the activity is relevant to (e.g., verify EA predictions, determine effectiveness of mitigation measures)
- the specific statement from the EA that goes along with that generic objective and will be the focus for that activity (e.g., program objective: verify predicted effects; environmental assessment effect: no potential adverse effects)
- the specific monitoring objective for that activity
- planned schedule
- roles and responsibilities to be played by the proponent, regulatory agencies, Indigenous people, local and regional organizations and others in the design, implementation and evaluation of the program results
- possible involvement of independent researchers
- program funding sources
- information management and reporting (reporting frequency, methods and format)
- possible opportunities for the proponent to include the participation of the public and Indigenous groups, during the development and implementation of the program

The follow-up program plan should be sufficiently described in the EIS to allow independent judgment as to the likelihood that it will deliver the type, quantity and quality of information required to reliably verify predicted effects (or absence of them) and confirm the effectiveness of mitigation measures.

Acronyms

| Acronym | Term |
|--------------|---|
| ALARA | As Low As Reasonably Achievable |
| BATEA | As best available technology and techniques economically achievable |
| CEAA 2012 | <i>Canadian Environmental Assessment Act, 2012</i> |
| CNSC | Canadian Nuclear Safety Commission |
| EA | environmental assessment |
| EIS | environmental impact statement |
| ERA | ERA environmental risk assessment |
| GHG | greenhouse gas |
| HHRA | human health risk assessment |
| OPEX | Operating Experience |
| SARA | <i>Species at Risk Act</i> |
| UTM | Universal Transverse Mercator |
| VC | valued component |

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Bibliography

Canadian Nuclear Safety Commission. REGDOC-2.9.1, *Environmental Protection: Environmental Policy, Assessments and Protection Measures*, December 2016, <http://nuclearsafety.gc.ca/eng/acts-and-regulations/regulatory-documents/published/html/regdoc2-9-1-new/index>

Canadian Nuclear Safety Commission. REGDOC-3.2.1, *Public Information and Disclosure*, May 2018, <http://www.nuclearsafety.gc.ca/eng/acts-and-regulations/regulatory-documents/published/html/regdoc3-2-1/index>

Canadian Nuclear Safety Commission. REGDOC-3.2.2, *Indigenous Engagement*, February 2016, /pubs_catalogue/uploads/REGDOC-3-2-2-Aboriginal-Engagement-version-1.1-eng.pdf

Canada Privy Council Office. *A Framework for the Application of Precaution in Science-based Decision Making about Risk*. ISBN 0-662-67486-3
Cat.no. CP22-70/2003.

Impact Assessment Agency of Canada (formerly Canadian Environmental Assessment Agency). Various guidance documents.

Operational policy statements:

- [Assessing cumulative environmental effects under CEAA 2012](#)
- [Addressing “purpose of” and “alternative means” under CEAA 2012](#)
- [Determining whether a designated project is Likely to cause significant adverse environmental effects under CEAA 2012](#)

Technical guidance:

- [Assessing cumulative environmental effects under CEAA 2012](#)
- [Determining whether a designated project is likely to cause significant adverse environmental effects under CEAA 2012](#)

- Guide to preparing a description of a designated project under CEEA 2012
- Technical guidance for assessing physical and cultural heritage or any structure, site or thing that is of historical, archeological, paleontological or architectural significance under CEEA 2012
- Technical guidance for assessing the current use of lands and resources for traditional purposes under CEEA 2012

Indigenous and Northern Affairs Canada. Aboriginal and Treaty Rights Information System, https://sidait-atris.aadnc-aandc.gc.ca/atris_online/home-accueil.aspx

-
- 1 The proponent should refer to Health Canada's guidance documents in order to include the appropriate baseline information relevant to human health.
-

Date modified:

2021-06-08



Government
of Canada

Gouvernement
du Canada

[Canada.ca](#) › [Impact Assessment Agency of Canada](#) › [Canadian Impact Assessment Registry](#)

› [Wheeler River Project](#) › For Public Participation

› Public Notice - Wheeler River Project - Comments Invited on Denison mines Corp.'s Projec...



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SEARCH

Wheeler River Project

Public Notice

 PDF Version (Portable Document Format) 12.6 MB (Megabyte)

Document reference number: 1

Wheeler River Project – Comments Invited on Denison Mines Corp.'s Project Description

The Canadian Nuclear Safety Commission (CNSC) is seeking comments from the public and Indigenous groups on the project description for the proposed Wheeler River Project. The project involves a new uranium

mining and processing operation located in the Athabasca Basin in northern Saskatchewan, approximately 600 km north of the city of Saskatoon, SK, 4 km west of Highway 914 and midway between Cameco Corporation's Key Lake Mill and McArthur River Mine.

The CNSC has reviewed the project description and determined that it was written in accordance with the *Prescribed Information for the Description of a Designated Project Regulations* (CEAA 2012). Detailed information about the project will be available in the Environmental Impact Statement which will be submitted by Denison Mines Corp. at a later stage of the EA process (refer to Next Steps below).

Comments on the project description should be based on local, regional or traditional knowledge of the site or surrounding environment, or should provide any other relevant information that may help with the conduct of the environmental assessment (EA). All comments received will be considered public.

Written comments must be submitted by **June 30, 2019** to:

Marcelle Phaneuf, Environmental Assessment Officer

Canadian Nuclear Safety Commission

P.O. Box 1046 Station B

280 Slater Street

Ottawa ON K1P 5S9

Telephone: 613-947-3209 or 1-800-668-5284

Fax: 613-995-5086

Email: cnscc.ea-ee.ccsn@canada.ca

Next Steps

Following receipt of comments on the project description, CNSC staff will consider all submissions received and make recommendations to inform the Commission's decision on the scope of the factors to be considered in the EA. In addition, CNSC staff will respond to all comments received from members of the public and Indigenous groups. The comments and responses will be populated in a table and publically posted to the Canadian Environmental Assessment Registry. Effort will be made to collate common issues together.

Following the Commission's decision on the scope of the EA, the proponent, Denison Mines Corp., will then be required to provide to the CNSC an Environmental Impact Statement (EIS) for review. An EIS is a report written by a proponent that presents the technical studies and findings of an EA. The CNSC's *Generic Guidelines for the Preparation of an Environmental Impact Statement pursuant to the Canadian Environmental Assessment Act, 2012* (PDF, 733Kb) provide general instructions on the preparation and information requirements that must be included in the EIS in order to comply with CEAA 2012 requirements.

Participation Opportunities

We'd also like to seek your views on the EA participation opportunities for this project.

As part of the EA process, Indigenous groups and members of the public will have the opportunity, through formal comment periods, to review and comment on the following documents:

- the project description
- the draft Environmental Impact Statement

Indigenous groups and members of the public will also be given the opportunity to submit comments to the Commission for an eventual EA/Licensing hearing as a Commission Member Document (written intervention and/or oral presentation).

In addition, throughout the EA process, CNSC staff will engage with members of the public through more informal engagement opportunities such as open houses, town halls, workshops, webinars, and providing status updates to our project distribution list. As part of standard practice, CNSC staff will focus its efforts in key communities within the regional project area that would provide the greatest opportunity for access by a large number of participants and where possible, capitalize on existing events/festivals in the communities to further extend our reach.

We would like to hear your views and suggestions on in-person engagement opportunities that would be meaningful for you. The feedback received will inform the planning of future activities.

Anyone interested in receiving regular project updates is invited to sign up for the project update e-mail list by sending a request to cnsceae.ccsn@canada.ca.

Date modified: 2019-08-14

March 19, 2020

Candida Cianci
Director, Environmental Assessment Division
Canadian Nuclear Safety Commission / Government of Canada
280 Slater Street
Ottawa, ON K1P 5S9

Subject: Wheeler River Uranium Project
Notification of temporary suspension of Environmental Assessment

Dear Ms. Cianci:

On March 20, 2020 Denison Mines Corp. (“Denison” or the “Company”) will be announcing the suspension of activities relating to the Environmental Assessment (“EA”) for the Wheeler River Uranium Project. An advanced copy of the Press Release is attached for your reference. The decision to suspend the EA is motivated by the significant social and economic disruption that has emerged as a result of the COVID-19 pandemic, and the Company’s commitment to ensure employee safety, support public health efforts to limit transmission of COVID-19, and exercise prudent financial discipline. The suspension includes a hold on all technical assessments and project focused engagement activities with Indigenous and non-Indigenous interested parties.

Accordingly, Denison hereby requests that the cost recovery fees associated with the Regulatory Activity Plan, payable to the Canadian Nuclear Safety Commission (“CNSC”), be put on hold until the CNSC receives further notice from Denison. Given the timing of this notification, Denison understands that the fee structure can be re-evaluated prior to the start of the upcoming fiscal year (April 2020) and that we can expect an updated fee estimate for the 2020-2021 fiscal year.

To the extent possible, Denison will provide the CNSC with advanced notice on the re-commencement of EA activities as well as an updated expected submission date for the draft Environmental Impact Statement, once established. It is important for the Company to maintain open lines of communication with the CNSC, as it is our intent to advance the EA process once global circumstances allow. In keeping with Denison’s effort to be transparent throughout the EA process, Denison will also be notifying certain Indigenous and non-Indigenous groups regarding our recent decisions.

If you have any questions, please do not hesitate to contact me by phone at 306-652-8201 ext. [REDACTED] or by email at [REDACTED]. Alternatively, you can contact Janna Switzer by phone at 306-652-8201 ext. [REDACTED] or by email at [REDACTED].

Regards,



David Bronkhorst
Vice President, Operations

Cc: Peter Fundarek : Director, Uranium Mines and Mills Division – CNSC
Marcelle Phaneuf, Environmental Assessment Officer – CNSC
David Cates, President and CEO - Denison Mines Corp.
Janna Switzer, Environmental Manager – Denison Mines Corp.
Carolanne Inglis-McQuay, Manager Corporate Social Responsibility - Denison Mines Corp.



Wheeler River Project

Provincial Technical Proposal and Federal Project
Description



Denison Mines Corp.

May 2019

Revised: December 2020

Wheeler River Project

Provincial Technical Proposal and
Federal Project Description

Project Summary

English – Page ii

French – Page ix

Dene – Page xviii

Cree – Page xxv

Summary

Wheeler River Project

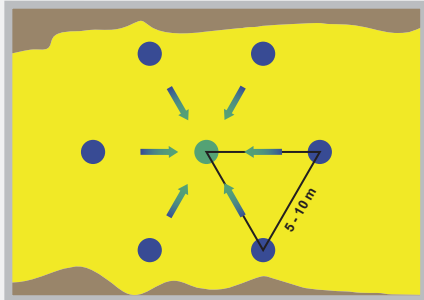
The Wheeler River Project (Wheeler or the Project) is a proposed uranium mine and processing plant in northern Saskatchewan, Canada. It is located in a relatively undisturbed area of the boreal forest about 4 km off of Highway 914 and approximately 35 km north-northeast of the Key Lake uranium operation.

Wheeler is a joint venture project owned by Denison Mines Corp. (Denison) and JCU (Canada) Exploration Company Ltd. (JCU). Denison owns 90% of Wheeler and is the operator, while JCU owns 10%. Denison is a uranium exploration and development company with interests focused in the Athabasca Basin region of northern Saskatchewan, Canada with a head office in Toronto, Ontario and technical office in Saskatoon, Saskatchewan. Historically Denison has had over 50 years of uranium mining experience in Saskatchewan, Elliot Lake, Ontario, and in the United States. Today, the company is part owner (22.5%) of the McClean Lake Joint Venture which includes the operating McClean Lake uranium mill in northern Saskatchewan.

To advance the Project, Denison is applying an innovative approach to uranium mining in Canada called in situ recovery (ISR). The use of ISR mining at Wheeler means that there will be no need for a large open pit mining operation or multiple shafts to access underground mine workings; no workers will be underground as the ISR process is conducted from surface facilities. While this mining method has been used extensively on an international basis and currently accounts for more than 50% of global uranium production, it has not previously been used in Canada for uranium mining. Denison has done significant research on international uranium ISR operations to understand best practices and incorporate lessons learned into the design of Wheeler. In order to implement ISR at Wheeler, Denison will apply existing technologies to eliminate the typical challenges experienced at some international uranium ISR operations.

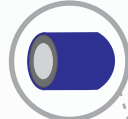
ISR mining at Wheeler will involve injecting a mining solution into the uranium deposit through a series of cased drill holes (about 4 to 8 inches in diameter) called injection wells (Figure A). The mining solution proposed for Wheeler is a low pH or acidic mining solution. As the mining solution passes from the injection wells through the uranium deposit it dissolves the uranium and leaves virtually all other minerals in the host rock in place. Once dissolved, the uranium rich mining solution is recovered and pumped back up to surface through another set of cased drill holes called recovery wells. The combination of injection and recovery wells is called a wellfield. Denison anticipates the wellfield will have the general arrangement of one recovery well in the centre surrounded by 6-8 injection wells with about 10 m spacing between wells. With these configuration options, the final wellfield may include approximately 310 wells over a 90 m x 900 m area.

TOP VIEW OF A SINGLE WELL FIELD

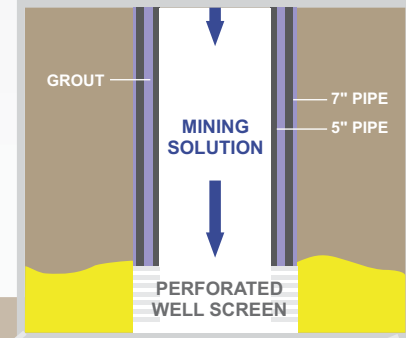


- INJECTION WELL WITH MINING SOLUTION
- RECOVERY WELL WITH URANIUM-RICH SOLUTION

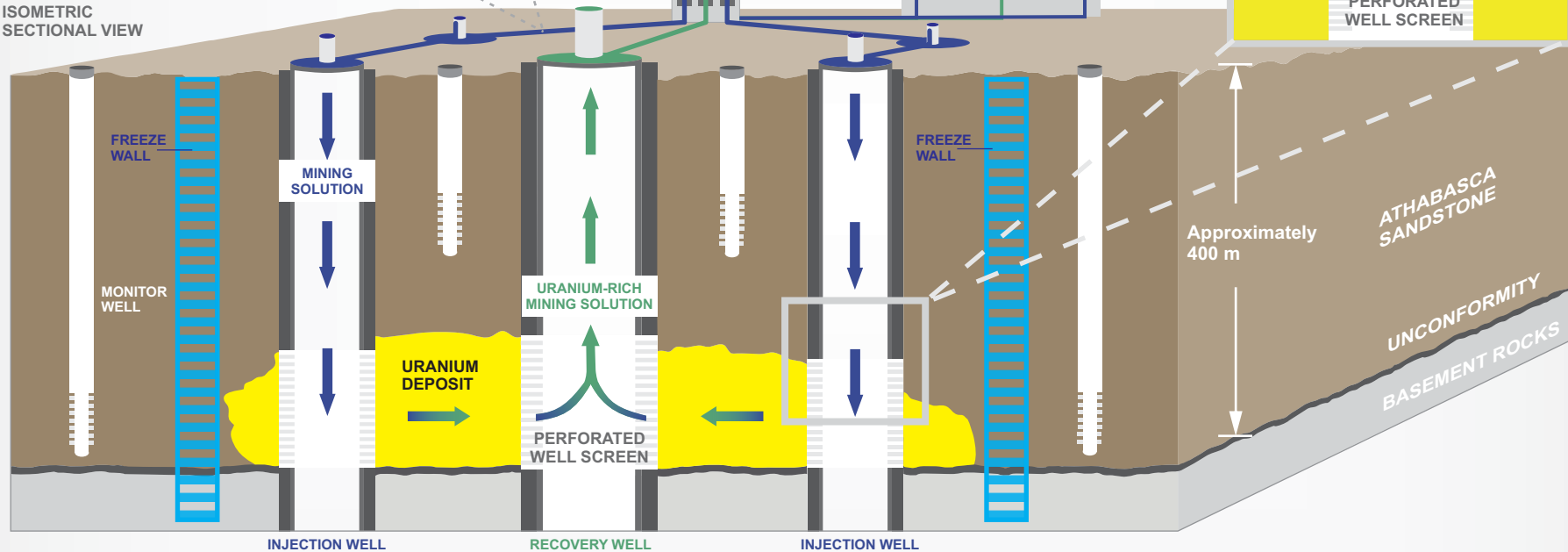
PIPE WITH
SECONDARY
CONTAINMENT



WELL CLOSE-UP
See well installation process



ISOMETRIC
SECTIONAL VIEW



Schematic does not represent detailed engineering of the ISR well field and its components. Schematic not drawn to scale.

Denison Mines

**Wheeler River Project
Technical Proposal and Project Description**

Figure A: Overview of the In-situ Recovery Process

Revised - December, 2020

Criticism of international ISR operations largely involves the containment of mining solution and the interaction of the mining solution with groundwater. At Wheeler, in order to contain the solution within the uranium deposit and maximize recovery as well as prevent interaction of the mining solution with surrounding groundwater, Denison will create an impermeable wall using conventional ground freezing technology. The freeze wall will encompass the deposit located at 400 m depth and the overlying sandstone from the basement rock to surface with the existing impermeable basement rock acting as a bottom barrier beneath the deposit. The approximate area of the freeze containment is 90 m wide x 900 m long.

Once on surface, the uranium rich mining solution recovered from the wellfield will be pumped to the on-site processing plant. Inside the processing plant a relatively simple precipitation process will be used to separate the uranium from the mining solution. Once the uranium is removed, the mining solution is reformed with reagents and returned to the wellfield for re-injection and further mining. The process is a closed loop system with potentially no need for treated effluent discharge to the environment. The uranium will be dried, packaged and trucked off site, destined for eventual use in a nuclear power plant.

Once sold and refined off-site, the uranium will be used as fuel for nuclear power plants. Denison estimates that the uranium produced from Wheeler can be used to power 1 million modern homes for approximately 160 years with minimal greenhouse gas emissions. This highlights the importance of the Project at a time when reducing global greenhouse gas emissions are of the utmost importance in the battle against climate change.

In addition to ISR mining and uranium processing, the Project will also require construction, operation, and decommissioning of a number of supporting components. This includes a short (7 km) access road from Highway 914 to the site, an accommodation complex, operations centre, airstrip, a 5 km long road from the site to the airstrip, site roads, a lined pad for storage of impurities from the processing plant and mineralized drill cuttings from wellfield development, water treatment ponds, potable, sewage, and waste water treatment plants. Power will be supplied to Wheeler by connecting into the existing provincial power line along Highway 914 with emergency generators available as a back-up power supply.

The main phases of the Project are construction, operation, decommissioning and post-decommissioning. The Project is subject to both a federal and provincial environmental impact assessment and various licences and permits will also be needed. Following receipt of regulatory approvals, construction would last for approximately two years and may start as early as 2022. Production activities commence following commissioning of the facilities and would last up to 20 years with a production rate of up to 12 M lbs U₃O₈ per year. Decommissioning is expected to last for five years. The five main decommissioning activities include: remediation, decontamination, asset removal, demolition and disposal, and reclamation. Closure of the entire Project will be completed in accordance with all provincial and federal regulations and guidance documents with the fundamental considerations being to ensure physical and chemical stability of the site in order to protect human health and the environment. A five-year post-decommissioning phase will serve to monitor Wheeler and confirm that it is acceptable for either direct release back to the Crown with no future use restrictions or acceptance into the provincial Institutional Control Program for decommissioned sites.

Existing Environment

The Project is located in the Wheeler River Upland Landscape Area of the Athabasca Plain Ecoregion. Exploration activity has occurred in the area over the past 40 years. There are recreational, industrial and traditional land use leases nearby; however, the nearest permanent residences are about 150 km away. The Slush Lake Reserve registered to the English River First Nation, which has no permanent residents, is located approximately 15 km west of Wheeler.

Denison initiated a comprehensive biophysical environmental data collection program in 2016 to characterize the existing or baseline conditions. A robust dataset of atmospheric, hydrogeological, aquatic, and terrestrial data has been collected for the Wheeler site, local and regional study areas and targeted data collection is ongoing. The biophysical environment data collection program to date has focused on defining existing conditions for: air quality (radon and dust), groundwater quality, groundwater levels, surface water quality, lake levels, lake bathymetry, stream flow, sediment quality, aquatic habitats, benthic invertebrates (communities and chemistry), plankton, fish (communities, spawning habitat, and tissue chemistry), amphibians, birds, small mammals, semi-aquatic furbearers, large mammals, ecosite mapping, vegetation (communities and chemistry), soil quality, and wildlife habitat.

Wheeler is located in the Treaty 10 area and the local and regional area surrounding the proposed Project has been claimed by four distinct Indigenous communities as partially or entirely falling within their traditional territories, where traditional land use activities have been historically or are currently practiced. These groups consist of the English River First Nation and the Kineepik, Sipishik and A La Baie Métis locals of the communities of Pinehouse, Beauval and Ile a la Crosse, respectively. Traditional land use activities practiced within the local and regional area of the Project consist of subsistence hunting and fishing, seasonal harvesting of native plants for food and medicinal purposes. During the open water season the rivers and lakes in the area serve as transportation routes to and from areas for harvest of plants and game as well as preferred campsites and cabins. During the winter months the frozen lakes, river banks and muskegs are used as transportation routes to cabins, trap lines and preferred hunting areas. Heritage resource surveys completed at Wheeler to date identified one artifact and the Project has been redesigned to avoid the location of the artifact find.

Overall, Denison believes the baseline biophysical and human environments in the Project areas have been adequately characterized to support the completion of an environmental impact assessment and support future environmental monitoring programs.

Potential Effects

ISR mining, as proposed for the Project, results in a uranium mining and uranium processing Project with no tailings, a relatively small surface disturbance footprint, minimal volumes of clean waste rock (all in the form of drill cuttings), minimal volumes of waste rock (mineralized drill cuttings from wellfield development), minimal generation of other contaminated wastes, near zero carbon emissions and limited (if any) water treatment and discharge. Wheeler will be designed to contain all hazardous materials and careful consideration will be taken to ensure contaminated areas are kept separate from non-contaminated areas. Through Project design, implementation of best management practices, and application of other mitigation measures, Denison will strive to minimize interactions of the Project with the biophysical and human environments throughout all phases of the Project.

The main potential Project effects on the biophysical environment are expected to be: changes in air quality from various emission sources including the processing plant; changes in air quality if radon and radon progeny degas from the uranium rich mining solution; potential changes in groundwater quality from mining solution excursions or the potential discharge of treated effluent to groundwater; changes in water quality, sediment quality, and possibly other aquatic components from the potential discharge of treated effluent to a surface water body; direct loss of wildlife habitat; and indirect effects on wildlife through sensory disturbance. However, Denison anticipates that none of these potential effects will be significant and overall the Project does not pose any long-term risks to the biophysical environment.

The Project's potential effect on the socio-economic component of the human environment is expected to be positive. Wheeler will employ approximately 300 people during two years of construction and about 100 to 150 people during operations. Business opportunities will be available for supplies and services. Any potential effects on traditional land use activities will be limited to the site and local study areas and these effects will be short term and limited to the construction and operating phase of the Project. After decommissioning is completed, access to the site and the ability to practice traditional activities such as fishing and hunting will be fully restored. No effects on traditional land use are expected to occur in the regional study area. Potential effects on workers from a conventional health and safety standpoint will be similar to other mining and industrial sites and Denison expects these effects can be mitigated through management and development of a strong safety culture. Potential effects on workers from radiological exposures will be minimized through Project design measures and closely monitored and managed through implementation of a Radiation Safety Management Program.

In the EIA, Denison will demonstrate that the Project can be constructed, operated, and decommissioned with no significant adverse effects on the biophysical and human environments. Potential effects of the Project will be rigorously and transparently assessed and presented in the EIA. This includes the completion of a human health and ecological risk assessment to demonstrate

the overall low impacts of the Project. The EIA will also outline details of an effective monitoring program. Monitoring will be required to provide proof that the Project is operating legally and within the bounds of its licence obligations.

Engagement

Denison recognizes the importance of engaging with local and Indigenous communities, residents, businesses, organizations, land users and the various regulatory authorities, collectively referred to as 'Stakeholders.' Since 2016 Denison had been engaging with Stakeholders in an ongoing effort to build positive relationships with all parties. Broadly speaking, Denison has categorized the stakeholders into three categories:

- Indigenous communities
- Regulatory authorities
- The general public

Denison has engaged with Stakeholders to provide Project updates and collect input that has been incorporated into the Project's design. This approach is expected to continue. Further, Indigenous Knowledge has been integrated into the baseline data collection programs to ensure appropriate scientific data is collected in key areas to allow for a robust assessment of potential Project interactions as part of the environmental impact assessment.

Denison and several local Indigenous and non-Indigenous communities have executed mutual Memorandums of Understanding (MOU) regarding the Project. These non-binding MOUs formalize the signing parties' intent to work together in a spirit of mutual respect and cooperation to collectively identify practical means by which to avoid, mitigate, or otherwise address potential impacts of the Project upon the exercise of Indigenous rights, Treaty rights, and interests. In addition, the MOUs outline the signing parties' intent to work together to ensure that benefits will flow from the Wheeler River project, provide a process for continued Project engagement and information-sharing about the project, and establish a relationship to identify business, employment and training opportunities for the parties with respect to the Project.

Denison is proud of the relationships it has established with all Stakeholders, and looks forward to continuing to build upon those relationships through an ongoing engagement program as Wheeler advances.

Sommaire

Projet Wheeler River

Le projet Wheeler River (Wheeler ou, le Projet) comprend une mine d'uranium et une usine de traitement proposées dans le nord de la Saskatchewan, au Canada. Il se situe dans une zone relativement peu perturbée de la forêt boréale, à environ 4km de l'autoroute 914 et à environ 35km au nord-nord-est du site d'exploitation d'uranium de Key Lake.

Wheeler est un projet de coentreprise appartenant à Denison Mines Corp. (Denison) et à JCU (Canada) Exploration Company Ltd. (JCU). Denison détient 90% de Wheeler et en est opérateur, tandis que JCU en détient 10%. Denison est une compagnie d'exploration et de développement d'uranium dont les intérêts sont concentrés dans la région du Bassin Athabasca dans le nord de la Saskatchewan au Canada, avec son bureau primaire à Toronto, Ontario et un bureau technique à Saskatoon, Saskatchewan. Denison a plus de 50 ans d'expérience historique dans l'extraction d'uranium en Saskatchewan, à Elliot Lake en Ontario, et aux États-Unis. Présentement, la compagnie est propriétaire (22.5%) de la coentreprise McClean Lake qui comprend l'usine de traitement d'uranium au nord de la Saskatchewan.

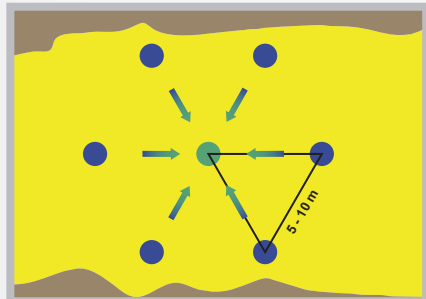
Pour faire avancer le projet, Denison applique une nouvelle méthode à l'extraction de l'uranium au Canada qui appelée récupération in situ (RIS). L'utilisation de l'exploitation minière de RIS à Wheeler signifie qu'il ne sera plus nécessaire de recourir à une grande exploitation à ciel ouvert ou aux infrastructures pour accéder les travaux d'une mine souterraine; il n'aura aucun ouvrier sous terre puisque le processus de RIS est mené à partir d'installations de surface. Bien que cette méthode d'exploitation minière soit largement utilisée à l'échelle internationale et représente présentement plus de 50% de la production mondiale d'uranium, elle n'était auparavant pas utilisée au Canada pour l'extraction d'uranium. Denison a effectué d'importantes recherches sur les opérations internationales de RIS pour l'uranium afin de bien comprendre les meilleures pratiques et d'intégrer les leçons apprises à la conception de Wheeler. Afin de mettre en œuvre la RIS à Wheeler, Denison utilisera les technologies existantes pour éliminer les défis typiques rencontrés à quelques opérations internationales de RIS d'uranium.

L'exploitation par RIS à Wheeler impliquera l'injection d'une solution d'exploitation minière dans le gisement d'uranium à travers une série de trous de forage tubés (d'un diamètre de 4 à 8 pouces) appelés puits d'injection. La solution minière proposée pour Wheeler est une solution à pH bas ou acide. Lorsque la solution minière passe des puits d'injection à travers le gisement d'uranium, elle dissout l'uranium et laisse pratiquement tous les autres minéraux dans la roche hôte.

Une fois dissoute, la solution minière, riche en uranium, est récupérée et remontée à la surface par un autre ensemble de trous de forage tubés appelés puits de récupération. La combinaison des puits d'injection et de récupération s'appelle un champ de captage. Denison prévoit que le champ de captage aura la configuration générale d'un puits de récupération au centre entouré de 6 à 8

puits d'injection espacés d'environ 10 m. Avec ces options de configuration, le champ de captage final pourra inclure environ 310 puits sur une aire de 90m x 900m.

VUE DU HAUT D'UN SEUL CHAMP DE CAPTAGE



- PUIITS D'INJECTION AVEC SOLUTION EXPLOITATION MINIÈRE
- PUIT DE RÉCUPÉRATION AVEC SOLUTION RICHE EN URANIUM

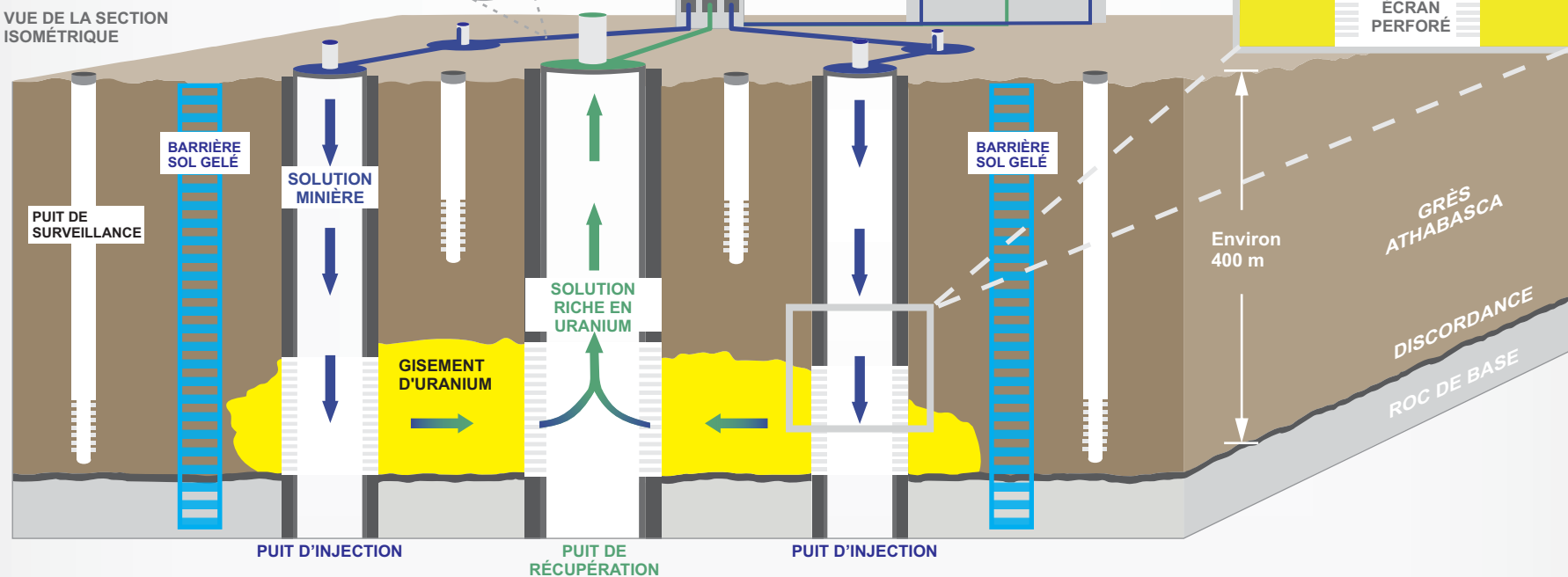
TUYAU AVEC CONFINEMENT SECONDAIRE



STATION DE POMPAGE

USINE DE TRAITEMENT D'URANIUM

VUE DE LA SECTION ISOMÉTRIQUE



Le schéma ne représente pas une ingénierie détaillée du champ de puits RIS et de ses composantes.
Schéma pas dessiné à l'échelle.

Enison Mines

Project Wheeler River
Proposition Technique et Description de Project

Figure A: Aperçu du Processus de Récupération In-Situ (RIS)

Révisé - Décembre, 2020

Les critiques des opérations internationales de RIS concernent largement le confinement de la solution minière et l'interaction entre la solution minière avec les eaux souterraines. À Wheeler, afin de contenir la solution dans le gisement d'uranium, et d'optimiser la récupération ainsi que d'empêcher l'interaction de la solution minière avec les eaux souterraines environnantes, Denison créera une barrière imperméable utilisant la technologie conventionnelle de congélation du sol. La barrière de gel imperméable entourera le gisement situé à 400 m sous terre; ainsi que le grès situé au dessus du gisement et s'étendra depuis le roc de base jusqu'à la surface. Le roc de base imperméable servira de barrière en dessous du gisement. La surface approximative du confinement par le gel sera de 90 m de large par 900 m de long.

Une fois à la surface, la solution minière riche en uranium récupérée du champ de captage sera pompée vers l'usine de traitement sur site. À l'intérieur de l'usine, un processus de précipitation relativement simple sera utilisé pour séparer l'uranium de la solution minière. Une fois que l'uranium est extrait, la solution minière est reconditionnée avec des réactifs et renvoyée au champ de captage pour être réinjectée et extraite. Le processus suit un système en boucle fermée qui ne nécessite, potentiellement, aucun rejet d'effluent traité dans l'environnement. L'uranium sera séché, emballé et acheminé par camion hors site, destiné à être utilisé dans une centrale nucléaire.

Une fois vendu et raffiné hors site, l'uranium sera utilisé comme combustible pour les centrales nucléaires. Denison estime que l'uranium produit par Wheeler peut servir à alimenter 1 million de foyers modernes pendant environ 160 ans avec des émissions minimales de gaz à effet de serre. Cela souligne l'importance du projet à un moment où la réduction des émissions mondiales de gaz à effet de serre revêt une importance capitale dans la lutte contre le changement climatique.

En plus des activités d'extraction (RIS) et de traitement d'uranium, le projet nécessitera également la construction, l'exploitation, et le déclasséement d'un certain nombre de composantes de support. Cela comprend un court chemin d'accès (7 km) allant de l'autoroute 914 jusqu'au site, un complexe d'hébergement, un centre d'opérations, une piste d'atterrissage, une route de 5 km allant du site à la piste d'atterrissage, des routes de chantier, une plateforme couverte de doublure pour le stockage de résidus de l'usine de traitement et des déblais de forage minéralisés provenant de la mise en valeur des champs de captage, des bassins de traitement d'eau, et des usines de traitement (eau potable et eaux usées). L'électricité sera fournie à Wheeler par une connexion à la ligne électrique provinciale existante le long de l'autoroute 914 avec des génératrices de secours disponibles comme source d'alimentation secondaire.

Les phases principales du projet sont la construction, l'exploitation, le déclasséement, et le post-déclasséement. Le projet est assujéti à une évaluation des impacts sur l'environnement au niveau fédéral ainsi que provincial, et divers permis et licences seront également nécessaires. Après avoir reçu les approbations réglementaires, la construction durerait environ deux ans et pourrait commencer dès 2022. Les activités de production débutent suivant la mise en service des installations et dureraient jusqu'à 20 ans, avec un taux de production pouvant atteindre 12M lb U_3O_8 par an. Le déclasséement devrait durer cinq ans. Les cinq principales activités de déclasséement sont les suivantes: décontamination, élimination des actifs, démolition et élimination, et réhabilitation. La clôture de l'ensemble du projet sera effectuée conformément à tous les règlements et directives provinciaux et fédéraux, les considérations fondamentales étant d'assurer la stabilité physique et chimique du site afin de protéger la santé humaine ainsi que l'environnement. Suivant le déclasséement, une phase de cinq ans servira à surveiller Wheeler et à confirmer qu'il est acceptable de le restituer soit directement à la Couronne sans restrictions d'utilisation futures, ou au programme provincial de contrôle des établissements pour les sites déclassés.

Environnement Existant

Le projet est situé dans la région paysagère des hautes terres de la rivière Wheeler de l'écorégion de la plaine Athabasca. Des activités d'exploration ont eu lieu dans la région au cours des 40 dernières années. Il y a des utilisations récréatives, industrielles et traditionnelles des terres à proximité; cependant, les résidences permanentes les plus proches sont à environ 150 km du site. La réserve de Slush Lake, appartenant aux Premières Nations d'English River, qui n'a pas de résidents permanents, est située à environ 15 km à l'ouest de Wheeler.

Denison a lancé un programme complet de collecte de données biophysiques sur l'environnement en 2016 afin de caractériser les conditions existantes ou de base. Un ensemble de données robustes de données atmosphériques, hydrogéologiques, aquatiques, et terrestre a été collecté pour le site Wheeler; les zones d'étude locales et régionales et une collecte de données plus spécifiques est toujours en cours. À ce jour, le programme de collecte de données sur l'environnement biophysique s'est concentré sur la définition des conditions existantes pour : la qualité de l'air (radon et particules), la qualité des eaux souterraines, le niveau des eaux souterraines, la qualité des eaux de surface, les niveaux des lacs, la bathymétrie des lacs, le débit des cours d'eau, la qualité des sédiments, les habitats aquatiques, les invertébrés benthiques (communautés et chimie), plancton, poissons (communautés, habitat de frai, chimie des tissus), amphibiens, oiseaux, petits mammifères, animaux à fourrure semi-aquatiques, grands mammifères, cartographie d'éco-sites, végétation (communautés et chimie), qualité du sol, et habitat faunique.

Wheeler est situé dans la zone du Traité 10 et quatre communautés d'autochtones distincts ont prétendu que la zone locale et régionale entourant le projet proposé appartenait en tout ou en partie à leurs territoires traditionnels, ou des activités traditionnelles d'utilisation des terres ont anciennement été ou sont présentement pratiquées. Ces groupes comprennent la Première Nation English River et les habitants de Kineepik, Sipishik, et À La Baie Métis des communautés de Pinehouse, Beauval, et Île à la Crosse respectivement. Les activités traditionnelles d'utilisation des terres pratiquées dans la zone locale et régionale du projet comprennent la chasse et la pêche de subsistance, et la récolte saisonnière de plantes indigènes à des fins alimentaire et médicinales. Pendant la saison des eaux libres, les rivières et les lacs de la région servent de voies de transport pour la récolte de plantes et de gibier, ainsi que pour les sites de campings et chalets préférés. Pendant les mois d'hiver, les lacs gelés, berges des rivières, et muskegs sont utilisés comme voies de transport vers les cabanes, les lignes de piégeage, et les zones de chasse préférés. Les enquêtes sur les ressources patrimoniales réalisées à Wheeler à ce jour ont permis d'identifier un artefact et le projet a été repensé afin d'éviter l'emplacement de la découverte de l'artefact.

En tout, Denison estime que les facteurs biophysiques et humains de l'environnement dans la zone du projet ont été correctement caractérisés pour appuyer la réalisation d'une évaluation de l'impact sur l'environnement ainsi que les programmes de suivi environnemental à venir.

Effets Potentiels

L'exploitation minière RIS, telle que proposée pour le projet, aboutit à un projet d'extraction et de traitement d'uranium sans résidus, avec une empreinte de perturbation de surface relativement petite, des volumes minimaux de stériles propres (tous sous la forme de déblais de forage), des volumes minimaux de stériles (déblais de forage minéralisés provenant du développement du champ de captage), volumes minimaux d'autres déchets contaminés, près de zéro émissions de gaz à effet de serre, et un traitement et rejet minimal d'eau (le cas échéant). Wheeler sera conçu pour contenir toutes les matières dangereuses et un soin particulier sera pris pour s'assurer que les zones contaminées soient séparées des zones non contaminées. Par la conception du projet, la mise en œuvre des meilleures pratiques de gestion et l'application d'autres mesures d'atténuation, Denison s'efforcera de minimiser les interactions du projet avec les environnements biophysiques et humains au cours de toutes les phases du projet.

Les principaux effets potentiels du projet sur l'environnement biophysique devraient être les suivants : modifications de la qualité de l'air provenant de diverses sources d'émission, y compris l'usine de traitement; des changements dans la qualité de l'air si le radon et les descendants du radon proviennent de la solution minière riche en uranium; les changements potentiels dans la qualité des eaux souterraines résultants d'excursions de solutions minières ou le rejet potentiel d'effluent traités dans les eaux souterraines; les changements dans la qualité de l'eau, la qualité des sédiments et éventuellement d'autres composantes aquatiques dus au rejet potentiel d'effluents traités dans un plan d'eau de surface; perte directe d'habitat faunique; et, effets indirects sur la faune par des perturbations sensorielles. Cependant, Denison prévoit qu'aucun de ces effets potentiels seront significatifs et que en tout, le projet ne pose aucun risque à long terme pour l'environnement biophysique.

L'effet potentiel du projet sur la composante socio-économique de l'environnement humain est prévu d'être positif. Wheeler emploiera environ 300 personnes pendant deux ans de construction et entre 100-150 personnes durant les opérations. Des opportunités seront disponibles pour les fournisseurs de services et de matériaux. Tous les effets potentiels sur les activités d'utilisation traditionnelle des terres seront limités au site et aux zones d'étude locales. Ils seront de courte durée et limités à la phase de construction et d'exploitation du projet. Une fois que le déclassement est terminé, l'accès au site et la possibilité de pratiquer des activités traditionnelles telles que la pêche et la chasse seront entièrement rétablis. Aucun effet sur l'utilisation traditionnelle des terres ne devrait se produire dans la zone d'étude régionale. Les effets potentiels sur les travailleurs du point de vue santé et sécurité seront similaires à ceux d'autres sites miniers et industriels, et Denison s'attend à ce que ces effets puissent être atténués grâce à la gestion et au développement d'une forte culture de sécurité. Les effets potentiels des expositions radiologiques sur les travailleurs seront minimisés grâce aux mesures de conception du projet, suivis de près et gérés par la mise en œuvre d'un Programme de Gestion de la Protection contre la Radiation.

Dans le cadre de l'évaluation des impacts environnementaux (EIE), Denison démontrera que le projet peut être construit, exploiter, et déclasser sans aucun effet négatif important sur les environnements biophysique et humain. Les effets potentiels du projet seront évalués et présentés de manière rigoureuse et transparente dans l'EIE. Cela comprend la réalisation d'une Évaluation des Risques pour la Santé Humaine et l'Environnement afin de démontrer les faibles impacts du projet au complet. L'EIE indiquera également les détails d'un programme de suivi efficace. La surveillance sera nécessaire pour fournir la preuve que le projet fonctionne légalement et dans les limites de ses obligations en matière de licence.

Engagement

Denison reconnaît l'importance de s'impliquer avec les communautés locales et autochtones, les résidents, les entreprises, les organisations, les utilisateurs des terres, et les diverses autorités de réglementation, ci-après dénommés « Parties Prenantes ». Depuis 2016, Denison engageait les parties prenantes dans leur effort continu d'établir des relations positives avec toutes les parties. De manière générale, Denison a classé les parties prenantes en trois catégories :

- Communautés autochtones
- Autorités réglementaires
- Public général

Denison s'est engagé auprès des parties prenantes pour fournir des mises à jour du projet et collecter des informations qui ont été intégrés à la conception du projet. Cette approche est prévue de se poursuivre. De plus, le savoir autochtone a été intégré dans les programmes de collecte de données de base afin de garantir la collecte de données scientifiques appropriées dans des domaines clés, afin de permettre une évaluation robuste des interactions potentielles du projet dans le cadre de l'évaluation de l'impact sur l'environnement. Denison est fière des relations établies avec les communautés et réjouit de pouvoir continuer à améliorer ces relations et ces avantages pour les communautés par moyen du programme en cours de participation des parties prenantes à mesure que Wheeler avance.

Denison et plusieurs communautés locales autochtones et non-autochtone ont conclu des accords de principe ou des protocoles d'entente mutuels. Ces protocoles d'entente non-contraignant formalisent l'intention des signataires de travailler ensemble dans un esprit de respect mutuel et de coopération pour identifier collectivement des moyens pratiques permettant d'éviter, d'atténuer, ou adresser des impacts potentiels du projet sur l'exercice des droits autochtones, droits issus de traités, et domaines d'intérêt mutuels. De plus, les accords de principe et protocoles d'entente décrivent l'intention des signataires de travailler ensemble pour assurer que les avantages découleront du projet Wheeler River, fourniront un processus permettant de poursuivre l'engagement du projet et le partage d'informations sur celui-ci, et établiront une relation en vue de définir des opportunités d'affaires d'emploi et de formation pour les parties liées au projet.

Denison est fier de la relation établie avec toutes les parties prenantes, et se réjouit de continuer à développer ces relations par moyen d'un programme d'engagement en cours à mesure que le projet Wheeler avance.

Yati nedué holj

Wheeler desé t'a Lak'e hoté ghonj

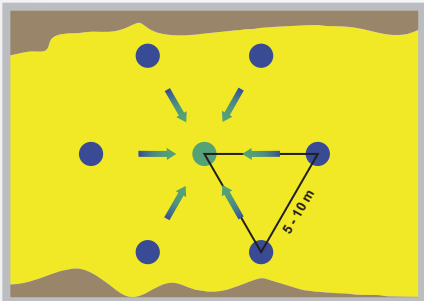
Ku zeja Wheeler des nare tsamba k'e gha yati k'i (Wheeler huto Lak'e k'esi hudzi si) yunadhe tsamba k'e chu t'a begodher betué hujj k'onj ha yati hoté si zediri Saskatchewan, Canada hots'j yutthj ts'en. Za t'ok'é hoté hadé dechën yaghé 4 km hulta tulu 914 ga chu nasi ts'en 35 km Key Lake tsamba k'e uranium operation hots'j.

Wheeler tsamba k'é k'i Denison Mines Corp. hots'j tsamba k'é hoza zelts'enj k'é si. (Denison) chu JCU (Canada) tthe kadanetá dene Exploration Company Ltd hulyé k'i. (JCU). Za Denison k'i 90% bets'j hultá si zediri Wheeler lak'e hadé bets'en zasi het'el si, ku JCU 10% bets'j si. Denison wjdna kqn tthe kanetá dene si uranium exploration chu tsamba k'e nupa ha zedisi yutthën nene Athabasca Basin k'eyaghe nadanetá Saskatchewan, Canada yutthën hots'en Toronto ts'en bets'j zeriht'is ku nedhe hoza, Ontario ts'en hu Saskatoon, Saskatchewan tth'i wjaghe bets'j zeriht'is ku hozasí. Ku yunj zediri Denison k'i 50 nene hudher k'adané wjdna kqn tthe kadanjta si zeja Saskatchewan chu Elliot Lake, Ontario ts'en, United States Beschogh nene tth'i nare. Ku dhyj dzjne k'e (22.5%) hulta McClean Lake Joint Venture hel hozasí tsamba k'e hujj chu t'ok'e tthenadzis ku McClean Lake hozasí yutthën Saskatchewan be hekoth sí.

Ku zediri tsamba k'e nup'a ha nainá hadé, Denison zediri yati thetsj si horegodhe wjdna kqné hichú ha Canada nask'athé ha zediri t'atthé hoté ha tthot'jne za in situ recovery hulyé nyaghe ts'jdhué za hadzi ha (ISR) hulyé si. Ku zediri ISR beghaladá k'i Wheeler tsamba k'e bek'enats'edé hadé noka njh ghalada hailé ha zeyi chu nyaghe ts'en tth'i zeghalada hailé há; dene tth'i nyaghe ts'en la k'é nadé hailé ha zediri ISR zasi zahot'j dé noka hut'a zasi za hut'a ha. Ku zediri zasi t'oreza k'i njbane dene t'arát'j si dhyj k'asjnen 50% haneft'é wjdna kqn tthe naftsí si dhyj, k'anj hujj t'atthé bet'oreza ha Canada nask'athé hadé. Denison hotié zediri basé nadanetá si t'at'u zediri zasje bet'oreza ISR bebasí tsamba k'e nup'a zeja Wheeler tsamba k'e nup'a ha. Ku zediri ISR Wheeler lak'e nup'a hadé, Denison hotié zediri k'esi zasi k'enats'edí t'at'ú yet'odoreza si k'esi yek'enadé ha t'ok'e ISR tsamba k'e daholá si basí.

Ku zediri ISR t'a tthe ghaladá k'i Wheeler tsamba k'e k'i dot'ú hasj naidisunj nyaghe ts'en hedzelí ha ts'jdhué yé t'ok'é wjdna kqn tthe hujj ts'en (ku zeyi ts'jdhué nyjka k'i 4 hots'j 8 lacheth hots'en harelaya ha) ku zeyi beyedzi injection wells hulyé (A hultá k'é). Ku zeja tthe ghalada ha k'i beye k'estes tué pH natserhilé t'oreza ha zediri k'estes tué bet'a tthe natxj há. Ku t'ohó zediri k'estes tué tthe njj háj dé wjdna kqn tthe natxj há zeyer t'aghe dé zeduné ts'jdhué yé yudaghe ts'en hedze há. Ku zeyi nats'en njh ghaladá k'i nyaghe ts'en ts'jdhué well fields hulyé si. Denison hadanjdhën hujj zediri ts'jdhué hujj k'é benaré 6-8 hutó nyaghe ts'en k'estes tué hedzelí k'é injection wells hujj begá k'asjnen 10 m begesé hoza há t'ok'é ts'jdhué naré. Ku zeyi kot'ú hoza dé horelyj njh k'é, k'asjnen 310 nyaghe ts'en ts'jdhué hujj ha 90 m x 900 m haghelya njh k'é.

Yudaghé hots'ı t'ok'é ts'ıdhulé nıyırá t'ahot'ı



● T'ok'é nıyaghé ts'ın naidislıne beyet'ır

● Nıyaghé hots'ı t'ok'e ııdına kın tthé tué nats-er hadzıl ts'ıdhul chogh yé

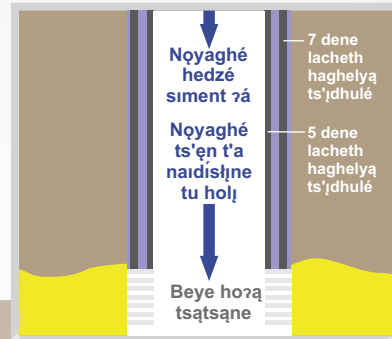
Ts'ıdhulé beye nah hultá ıasie heı



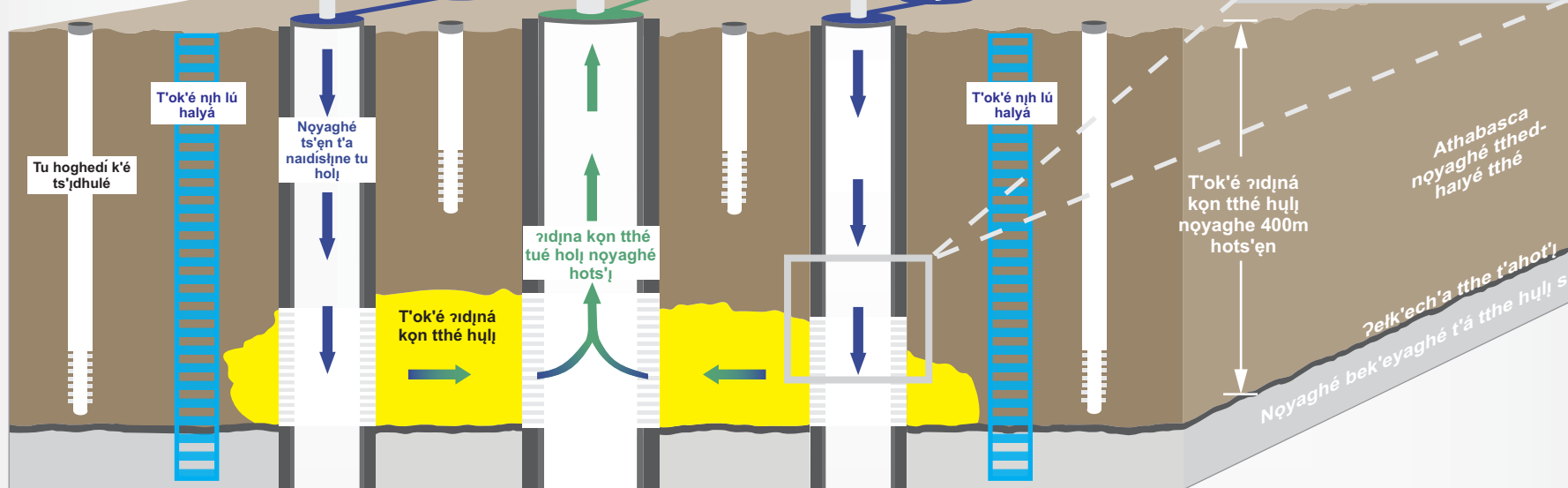
Tu hedzel kuę

ııdına kın tthé t'ok'é nadaret'ır

Nıyaghé ts'ıdhulé t'ahot'ı bets'ıdhulé



Benare hots'ı t'ahot'ı



1 hulta: nıyaghé t'at'u hedzel t'ahot'ı

ıedırı det'ıs hut'á sı ISR t'ahot'ı hots'ı kılı kohot'ı ghonııı ıedırı ıası hedzelı hobası ghı Hobenaré begıı det'ıs hut'á koghelyá hılı sı

Denison Mines

Wheeler River Project T'OK'E TSAMBA K'E HOıÁ LAK'E NARE T'AHOT'ı GHADET'ıS Sı ıJEıAK'ı

Nıyaghé t'at'u beghaladá In Situ Recovery hıııé t'ahot'ı há

2020

Ku nıh banı ıası hoghedı huk'e ıedırı ISR bebası ghetł'el k'ı t'at'u tthé hıchu daızı dayattı hade t'a beghalada k'ı nıh ye hots'ı tthezase tué chu t'a naidıstıne nótué hel hané ghonı ghay yatı holı sı. Ku ıejä Wheeler, ıeyı naidıstıne tue uranium ııdına kó naré chu ıeyı t'a hılchú sı bek'etł'a hııı hılchu hozelıh hel nótue hel hané ch'a ha hoghedı ha, Denison ıedırı tthé hılchu naré seyilé ha ıası betä hutł'ır ch'a nıh hetén t'a. Ku ıeyı nıh hetén de t'ok'e tsamba tthe hııı sı naré ha 400 meters nótıaghe ts'én t'a yeda tthe hııı yaghé ts'én, ıedırı tsamba tthe k'ı ıeyı tıne hııı hası. Ku ıeyı horelyı t'a nıh hetén hadé 90 m hots'ı 900 meters haghıtneth ha.

u nqdaghé ts'én hedzel dé, t'a beyé ɔɔɔɔɔ kɔn tué hɔɔɔ sɔ beyé natser sɔ kú ɔeyer hots'ɔ t'ok'é selyé kué hɔɔɔ sɔ nɔt'ír ha. Ku ɔeyer yɔɔɔ t'á tu chɔ ɔɔɔɔɔ kɔn hɔɔɔ sɔ ɔelch'así halyé há ɔasí horɔchahilé sɔ ɔeyí k'í. Ku ɔɔɔɔɔ kɔn hɔɔɔ dé, t'á tu bēghódhé sɔ beyé naɔɔɔɔɔ hanalyé hú nqyaghé ts'én hedzel ha bet'oreɔá naɔɔ há. Ku ɔeyí k'ésí bet'oreɔá ɔá nqdaghé ts'én tu ch'lele naɔɔɔ haile ha hoket'á bet'oreɔá há. Ku t'á ɔɔɔɔ kɔn bets'ɔ hɔɔɔ ha.

ɔa ɔɔɔɔ ɔɔɔɔɔ kɔn tthé naní t'ághé dé, t'á ɔɔɔɔ kɔn tthé hɔɔɔ sɔ nɔh bəɔɔ ɔɔɔɔɔ kɔn t'ulé ye kɔn heɔtsí ha bet'oreɔá haɔɔ yunadhé dé. Denison hots'ɔ dene hadaɔɔɔɔ hu t'á ɔɔɔɔ kɔn tthé hɔɔɔ sɔ k'asɔɔɔ 1 ɔɔɔɔɔ dene kué ye kɔn heɔtsí há yunadhé 160 nɔɔɔ hots'én bets'ɔ horetth'agh tth'í ɔhɔɔ heɔ. ɔeyí ɔa t'at'é ɔa bet'oreɔá ha korɔjala dɔhɔ bet'á horetth'agh boreɔɔɔ ɔa hɔɔ ha ɔa yunadhé dé nɔh k'é honídhɔ ch'á.

Ku ɔɔɔɔ ISR tthé k'enats'éde hel t'at'ú beghaladá chu hoɔé basí hadé, ɔɔɔɔ tsamba k'é hoɔé chu beghaladá hu t'ohó belághé nɔɔɔɔɔ dé nɔh senalyé tth'í hoɔɔɔ yunadhé dé. T'a ɔasí hadé tulú nedué (7 km) hoɔé t'ok'é 914 tulú hulta hots'ɔ t'ok'é tsamba k'e ts'én, dene naradé ha yoh hoɔé hu t'ok'é ɔasí het'el hots'ɔ hu, dziret'ái k'é hu, tulú 5 km lak'e hots'ɔ dziret'ái k'é ts'én, tsamba k'e naré tulú hú, tu k'é hoɔé ɔejedheth bebəɔ hu t'ok'é tu ch'ele bek'oní chu tthe heldeth bezasé k'onɔ t'oho ttheheldeth hots'ɔ, tu soreldhɔn k'e hu, tu ts'edə k'é hu, tu ch'ele k'onɔ k'é hu, tu soreldhɔn kué hu. Ku dɔhɔ ɔɔɔɔ kɔn t'ulé hɔɔɔ 914 hulta ts'ɔɔɔɔ ku t'axə netthath dé tsətsəne het'el ha hɔɔ kɔn heɔtsí ha.

Ku ɔejə lak'e bonɔɔɔ dé ɔelk'ɔɔ donódhí ha, lak'e honaré ɔasí hoɔé tthé hu, la k'e beghalada, belághé nɔɔɔɔɔ dé ɔasí nanelyé ha, ku ɔeyí nodher dé nɔh sehenɔt'á ha. Ku nɔɔts'én k'oldé nahts'én hots'ɔ bet'ésí ɔasí boghedí hoɔə province chu Canada hots'ɔ k'oldé nɔh t'at'u bet'ahot'ɔ ha bel sehúlyé hoɔə hotthé ɔasí bonídhí ts'én tth'ú. ɔa horelyɔ ɔasí senɔɔɔɔɔ dé, tsamba k'e naré ɔasí hoɔé naké nɔɔɔ hots'én 2022 nɔɔɔ honɔɔɔ k'é. Ku t'oho la honɔɔɔ t'ághé dé tthé tsamba 20 nɔɔɔ hots'én hoɔə ha ɔɔɔ nɔɔɔ k'e 12 M ɔɔɔɔɔ haɔɔɔ U₃O₈ ɔɔɔɔ kɔn tthé ɔes delttthogh hoɔé ha. Ku belághé t'ághé dé ɔɔɔ nɔɔɔ ts'én nɔh sehenɔt'á ha. Ku ɔeyer nɔɔɔɔɔ dé ɔɔɔɔ ɔɔɔɔɔ ɔasí tthere bek'enats'éde ha: t'ok'é tthé tsamba hɔɔɔ sɔ nqyaghé senahúlyé ha, ɔasí borneɔɔɔ dɔɔɔ hu, la yué tth'í dɔɔɔ ha hú, ɔasí nanélyé chu senɔɔɔ, ɔeyí chu nɔh sehenɔt'á ha. Ku ɔeyer nɔɔɔɔ dé t'at'ú nɔh sehenɔt'á hoɔə k'í hotié degharé t'a ɔasí hoghedí k'e hoɔə province chu Federal nɔɔts'én k'oldé bet'ésí yunadhé dene ɔeyer honaré hoɔə ɔesorané ch'á nɔh tth'í hotié besúdí hoɔə ɔa. Ku ɔeyí nodher t'ághé de ɔɔɔ nɔɔɔ hots'én nɔh boghedí ha Wheeler des honare t'ok'é la k'é ghɔɔ naré t'at'u ɔasí senalyá walí sɔ ha net'ɔ ha ku nezɔ dé nɔɔts'én k'oldé bets'én benaredí ha yunadhé bek'e yatí theɔɔɔ dé nɔh benaredí ha kɔt'ú boghedí ha province hots'ɔ k'oldé bets'én.

Ku dɔhɔ nɔh k'é t'áhúɔə

Ku ?ediri tsamba k'e nųt'á Wheeler des nare yudaghe ts'ęn nih k'e ?ası k'enats'edé ha Athabasca Plain Ecoregion t'ąt'ú nih hudzi honaré. Hotthe yuné 40 nęę ?ązi tthe kadanáhotą sı ?eyer honaré. ?eyer honaré kęn k'é chu jeth kuę dahóla sı ?eyı chu tsamba k'é tth'I dahóla sı bets'ıdhilé ts'ęn chu nąnı dene nih k'é nakoreldé sı ku dene naradé hadé ?eją hots'ı 150 km hanjłthá naradé sı. Ku ?ediri Slush Lake Reserve Beghąnch'ere bets'ı nih hudzai hıłı English River First Nation hulyé k'ı bek'é dene narade hilé 15 km the?ą Wheeler ts'ıdhilé.

Denison yunı 2016 nęę k'é hotié degharé nih k'e t'a ?ası hıłı sı nadanetá ha yek'ıdét nih horelyų hąt'ere nadanetá ha dųhų t'a yatı hıłı sı ?eła nıylı ha. Degharé hok'enats'ıdé sı nıłts'ı hu, tu ye hu, té. Hu chu nęk'é t'a ?ası hıłı horelyų ?eją Wheeler honaré bek'enats'ıdé sı, ku ?eyer honaré chu bets'ıdhilé hel halyá sı dųhų ts'ęn bek'enats'edé. Ku horelyų nih hu yedá hu te. Yaghé ts'ęn hu horelyų ha net'ı ho?ą: nıłts'ı beyé (radon naidisłıne chu ts'er), nętué beyé t'ahųt'é hu, nętué narjłthá neląą hı, nędaghé t'a tu hıłı sı t'ąt'é hu, tu dathela t'a hıłı sı tarjłthá hu, tu tarjłtha sı bası hu, t'a ts'ęn tu dajłı, tet'łaghé t'a ?ası hıłı sı net'ı hu, te t'a ?ası daghená, te tarjłthá ts'ęn t'a ?ası daghéna (t'aneł'é chu t'ąt'é hıłı sı), te hots'ı gu chu łué (t'a łué hıłı hu t'ok'é hedel chu betthęn t'ąt'é), ts'alıı chu gu hu, ?ıyesé, tech'adie?asé, nęk'é tsadheth t'a ?ełk'ech'a hıłı, tech'adié nedhe, nih k'e t'ahu?ą beghą t'a yatı hıłı t'ąchaj ?ełk'ech'a (t'ok'é hıłı chu t'anełł'é hıłı sı), nıh t'ąt'é hu tech'adié t'a hıłı sı t'ok'é naradé.

Wheeler tsamba k'e t'a nıh k'é hıłı sı Treaty sęlaghe tsamba nalyá 10 hulta k'eyaghé sı ku t'a dene yets'ıdhilé naradé sı dğhı ?ełk'ech'a dene xaiyorłla hots'ı sı t'a nıh ?eyer honaré nih t'odorełá sı, yunıı chu dųhų ?ełk'esi yek'e naradaı sı. Ku ?ediri nąnı dene k'ı Beghąnch'ere hot'ıne English River First Nation chu ?ena hots'ı deně Kineepik, Sipishik chu begharék'ą dene A La Baie dene chu Pinehouse hots'ı ?ena chu Beauval chu kuę Ile a la Crosse, hel sı. Ku t'ą dene ?eyer honaré t'a nıh t'odorełá sı horelyų ?ełk'ech'a ?asıé ha naralyé chu łue kadanjdhen hu jıé chu nęts'ı naidié horelyų t'a hıłı sı kodorełıh sı nıh dąnéłł'ú. Sıne dé t'a des hu tú hıłı sı dene ts'ıyé yek'e dzırédıł sı ?ası kodorełıh ha naidié chu tech'adié chu dorełk'ą huto nęnısé bekoę dahóla naradé nı dąłł'ú. Ku xaiyé nųnıdhher dé t'a des hu tu daıtą sı, dene yek'e dzıredıł nadłı sı nakoreldé ha, nęnıı bekoę dahóla ts'ęn chu ąıdzúsé dathetá chu naralzé há t'ok'é horelyų ts'ęn. Ku yunıı denenızasé t'a ąıłaghé huląası Wheeler nare t'ok'é hıłı sı ts'ıdhilé ?ası hołé hailé bet'á hulá ch'á.

?a horelyų ?ası net'ı, Denison hots'ı dene hadánjdhen hu t'a yatı hołı sı k'enełł'é sı dųhų bet'a nıh ?ahót'ı ha ?erıłł'is nedhe hołé t'ąt'ú nıh t'oredhı ha ?eją tsamba k'e hołé honaré hotie t'ąt'ú hołé ha k'enełł'é yatı hołı sı la ts'ıranı ha.

Ku nıh k'é ?edłahúné ghonı há

ISR gharé nęyaghé ts'ıdhıłé t'ore?á k'ı ?ediri tsamba k'e hołé k'ı bet'á tthé tsamba hılchú chu ıdıná kęn łes delłthogh hołé tthénadzıs kuę hedı, nıh tth'ı necha ?ahot'ı hailé tthé tth'ı łą hıłı hailé (t'a hıłı sı tthenaldeth zasé hut'á hası), tthé tth'ı łą nılyé hailé (t'ok'é nęyaghé ts'ıdhıłé nılyé sı bezasé hut'a hıłı hası), ku horelyų t'a ?ası borełnı ha łą hailé ha (ku hıłı dé) tu soreldhen chu t'a nıdıł hut'á. Wheeler la k'é t'a hołé hadé horelyų t'a ?ası borełnı sı hotié bek'ónı ha nılyé ha ?eyer honaré t'a nıh

bet'ahót'jlé ts'jdhilé ʔasi nilyé ch'á. T'at'u tsamba k'e hoté hadé, hotié ʔasi hoghédi ʔasi k'enadé sughuá tth'í ʔasi hoté hu, Denison degharé nɪ ghadalaná ha ʔasí nodhí ch'á bek'e horelyu sughuá halyé dé dué hané hailé yunadhé de, Denison hotié nɪ hoghéni ha dene yets'jdhilé tth'í hoʔɪ hailé la bonjdher t'aghé dé.

Ku t'a ʔasie boghedí hadé ʔediri tsamba k'é ʔa nɪ hobasí t'a ʔasí ʔedɪ hané ʔediri net'ɪ hoʔɪ: nɪts'í t'a ʔeyer naré hɪlɪ sɪ yasí ʔedɪ hané ghónɪ t'ok'é nɔyaghé hots'ɪ tu hut'ir bet'á; bet'á ʔedɪ hané ghonɪ beye naidsɪné radon chu naidsɪné radon progeny degas hulyé beyé hɪlɪ de t'a nɔyaghé ɔɪɪná kɔn tthé tué natser dé; nɔtué t'a hɪlɪ sɪ ʔeyer honaré ʔedɪ hané ghonɪ t'a nɔyaghé tu yudá t'axá tu soreldhen kué tu hut'ir nɪt'ir de ʔeyer gá; t'ok'é tech'adié daghéna dɪʔas ghonɪ tsamba k'e nɪt'á ʔá; ʔeyɪ chu tech'adié ʔeyer naré naradé ʔejá ʔasi k'enats'edé ʔa dɪʔas ghonɪ. Kulí, Denison hots'ɪ dene hadanjdhen hu ʔediri ʔasie behayaɪtɪ bet'a doʔɔnzɪ ʔedɪ hailé t'ok'é nɪ ʔahot'ɪ ha.

Ku ʔediri la k'e hoté hobasí dene ha la hoté chu ʔasí k'enats'edé hadé nezɪ ha bet'oreʔa ha. Wheeler lak'e k'asjɛnɛ 300 dene lak'e nadaréɪá t'oho hoté de nak'e nɛnɛ huk'é ku ʔeyɪ belághé nɪɪjdher dé k'asjɛnɛ 100-150 hots'ɛn dene ʔejá ʔeghadalaná ha. Ku nɪɪ dene ʔediri lak'e naré ʔeghadalana hodorelɪɪ dé dene ha hoʔɪ ha. ʔa ʔediri la nɪt'a k'í bet'a dene ɪá yet'oreɪá ha tsamba chogh hoté ha ʔá bet'á la chu dene yenaré ʔeghadalaná ha yutthɛn Saskatchewan hots'ɪ dene xa t'á dene ʔeyer honaré naradé dɪhɪ ba horená hoʔɪ dé. Ku t'á dene ʔeyer honaré nɪ ʔarat'ɪ sí doʔɔsí horɪchá hailé nɪ necha bet'oreʔa hailé ʔa tsamba k'é nɪt'á ha. Yunadhé t'oho la k'é ʔenahút'é t'aghe nɪ senɪt'á dé nɪ hotthé bet'ahot'ɪ nɪ k'esí hoʔɪ nadɪ ha dene yek'e nakoreldé ha. Ku dɪhɪ t'a yatɪ holɪ k'í dene t'á nɪ ʔarat'ɪ sɪ ba dué hailé ha. Ku t'á dene lak'e nadaréɪá k'í hotié boghedí ha t'ok'é Dennison bet'sɪ tsamba k'e dene hoghedí k'esí hɪ ha hotie dene la k'e hoghedí yatɪ gharé. Ku ʔediri ɔɪɪná kɔn tthé behodhele dene yets'jdhilé hoʔɪ hoʔɪhílé t'at'u ʔasi holɪ begharé dene hoghedí ha ʔediri Radiation Safety Management Program ʔerɪht'is nedhé hogharé t'á boghedí ha tsamba k'e naré dene xa.

ʔa ʔediri nɪ ghaladáɪht'is EIA k'e, Denison degharé yatɪ thetsɪ sɪ t'at'u sughuá ʔasi k'enadé ʔediri lak'e heftsɪ ha k'í chu yeghalaná hu t'oho belághé dé nɪ t'at'u senaɪílé ha bet'a nɪ chu dene ha dué hailé. Ku t'a ʔasi bet'a t'ahuʔá hotié ʔediri nɪ basí EIA ʔerɪht'is holɪ sɪ hotié holɪ dene nalé tth'í thelá ha. Ku ʔeyɪ t'a yatɪ holɪ sɪ dene hel t'ahuʔá basɪ yatɪ kodorelɪɪ sɪ (HHERA hulyé) bet'á dene ha t'ahuʔá ha betth'ɪ hu beɪ t'anodhɪ ghonɪ basí. Ku ʔediri EIA ʔerɪht'is nedhe k'e t'at'u nɪ ghaladá boghedí dɪlɪ ghá holɪ sɪ. Ku nɪ hoghedí dé t'at'u ʔeghalada sɪ hotié nɪ k'é ʔasi heftsɪ hoʔɪ sɪ beghare nɪt'á sɪ k'esí hoʔɪ ɪá kulɪ bedɪ ha dué sɪ, ʔeyɪ ha hotié boghedí sɪ.

Denedédɪne chu nɪnɪ dene ʔeyer honaré t'at'u beɪ yatɪ nɪt'a ha

Denison hotie ʔediri k'olyá sɪ dene t'á ʔeyer honaré naradé sɪ beɪ yatɪ hoket'á ts'ɛn, t'á ʔasi k'e naradé hu, dene t'á ʔasi beɪ hoté basɪ chu t'á nɪ ʔarat'ɪ sɪ ʔeyer honaré hots'ɪ. Yuní 2016 nɛnɛ hots'ɪ Denison hots'ɪ dene ʔeyer honaré denedédɪne chu honésí dene hel nadayaɪtɪ nɪ sughua nɪʔá k'enadé ha. Horelyu honet'ɪ hadé, Denison ʔediri taghe ʔasi yatɪ thets'ɪ sɪ ʔeyɪ basɪ:

- T'ok'e denedédŶne naradé
- T'at'u k'oldé bet'esí nŶ ts'ęn k'oldé
- Honezi ęeyer honaré dene naradé

Denison hotié dene heŶ ęası k'enadé sĪ ęeyer honaré nŶ ęarat'Ŷ sĪ basĪ t'oho La k'e Project basĪ yatĪ godhé holĪ dé kudęne dene ts'ęn yatĪ nŶt'a t'ahot'Ŷ basĪ. Ku ęeyĪ k'esĪ ęası hoté dé dene beyatié tth'Ī beghoręt'a ha t'a nŶ basĪ yatĪ hoté huk'e dé ęeyĪ hogharé yunaghé nŶ k'e t'at'u ęedŶ ghonĪ kat'u hotié boghedĪ ha honĪdhęn ęá.

Denison chu nęnĪ haiyórŶla dahóla sĪ ęęla limarshĪęasé datheŶtsŶ nĪ Memorandum of Understanding hulyé t'at'ú ęęla sughuá hoŶę ha (MOU). Ku ęedĪrĪ yatĪ nedhe MOU holĪ k'Ī dŶhŶ ęęneredĪ ha holĪ yunadhé bet'a limarshĪ nedhe hoté ha ęeyer dé Denison hots'Ŷ dene hotié dene sughuá senuęá k'enadé ęęę Wheeler tsamba k'e nŶt'a ts'ęn tth'ú. Denison hots'Ŷ dene ęeyer honaré dene heŶ k'adęne holę nadaŶŶtĪ sĪ dŶhŶ hots'ęn begharé t'at'u tsamba k'e hoté dęŶ ha begharé yatĪ holĪ sĪ tsamba naŶya yatĪe tth'Ī narayĪs hĪlé hu t'at'u dene heŶ sughua hoŶęsĪ sĪ k'e hoŶę ha.. Dene t'ę nŶ ęarat'Ŷ behonié gharé ęası holĪ sĪ nŶ basĪ ęerĪht'Īs nedhe MOU holĪ nĪ yé bet'orĪdher sĪ hotié horelyŶ yatĪ ęęla nŶlyá ęa ęŶęaghé yatĪ nedhe holĪ sĪ dene horelyŶ ęęŶts'edarŶnĪ ęá. Denison hots'Ŷ hotié danĪdhęn sĪ dŶhŶ ts'ęn t'at'ú dene heŶ ęęghadalajna ghę sughuá dene heŶ hoŶę danĪdhęn sĪ yunadhe dene heŶ hotié ęasĪe k'enadé hodorelęŶ tsamba k'e nŶt'á hots'ęn ęęę Wheeler tsamba k'e nŶt'a hots'ęn.

Denison benĶ'esĪ chu ęedĪrĪ ghę sughua nĪdhęn sĪ t'at'u dene heŶ ęası k'enaradé yunadhé tsamba k'e nŶt'a ts'ęn tth'ú ęęę Wheeler naré t'at'u sughua ęası k'enadé sĪ k'e hoŶę ha yunadhé ęedĪrĪ la k'e nŶt'a ts'ęn tth'ú

MAMOY ITWIWIN

WHEELER SEPIY ISICIKIWIN

Ikote ooko kakesi othethihtuhkwaw ewi – paskihtenuhkwaw moonuhisooneyawan ooko moonuhisooneyawewi kimanuhk ohci ooko Denison Mines ka – itihchik. Ikote isi kewetinohk, tepukohp tipuhuskan puskeskunuhk, nisto – mitunuw – neyanunosap kachimasiki tipuhuskanu, puhki kewetinohk isi menu nuwuch poko machi – kesikunohk, Apihtukuhikuni – Sakuhikunihk, (Key Lake) ohchi.

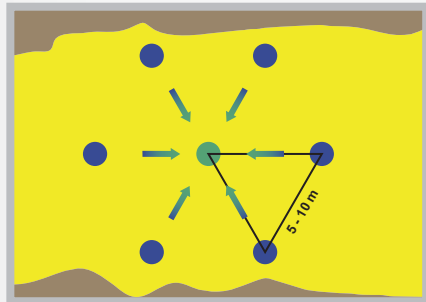
Oma Wheeler Sepiy Sakamocikiwin masiniykan oci Uranium Monahahk soniyowan ikwa kisinihkiw waskiykan oti kewitinok om a tihpahaskan Saskatchewan, Canada. Ita oma kawi isicikik ita eka ipiskicikatik uski, nantow niyo tipahaskan oci kici miskank 914 ikwa nantow nistomintanow-niyanosap cipahskans kewitinohk- macikisikani ita Key Lake mikwa atoskaniwik.

Wheeler oho i wihci cesikimacik ikwa Denison Mines Corp. ikwa JCU(Canada) Exploration Company. Denison mamowe kikac-mitatomintano 90% tipiytamok Wheeler ikwa kotakwak mitatat 10% poko. Denison oho kapi itonako Uranium ikwa kotaka otosikwina i opinaki oti kewitinok Athabasca. Mikwac Toronto, Ontario ikw ota Saskatoon kayacik. Elliot sakiykan, Ontario ikwa mina Kicimohkiman uski ayowak. Mikwac wiya paki tipiytamok McClean Lake Uranium nantow nistanow-nisisap 22% oti kewiytinok.

Oti nikan titastikicik, Denison oho iwi pitos wepinikic to monahoht awa usini ikwa itamok situ recovery(ISR). Yakoma kawi iyki moya ta misi monatikewak akwaci atamik tisi monatikicik, maka waskitc titakamikan. Sasiy iki kita patamok kotaka iskiya akamaski isi atosikicik. Osam poko niyano-mitanow-50% iko sawa isotinit awa Uranium. Ikosi kwa Wheeler oma kawiyask soki waskawistamok ikosoma ka wi iswipitcikik.

ISR monahikiwin, Wheeler ta kotwi paham nipi ita oci kaki poskwahiykicik, nantow niyo isko iynaniw mihcicin poskawa ita monahopana ikwa nipi potsikinamok ikwa i tikawpawit awa asini ikwa kitwam nipi otinamok waskiykanisi wipahoyt. Mamawi nistow mintatomitanow mina mitat pohskwa tositawak mina 90m X 900m tawatikan tositawak (figure A) tapasiniykan.

Tuhkohch ohchi ikosi e-isinakwuhk



Puhki tuhkohch ikwu menu puhki pimich ohchi ka-isinakwuhk oomu moonuhi-sooneyawan

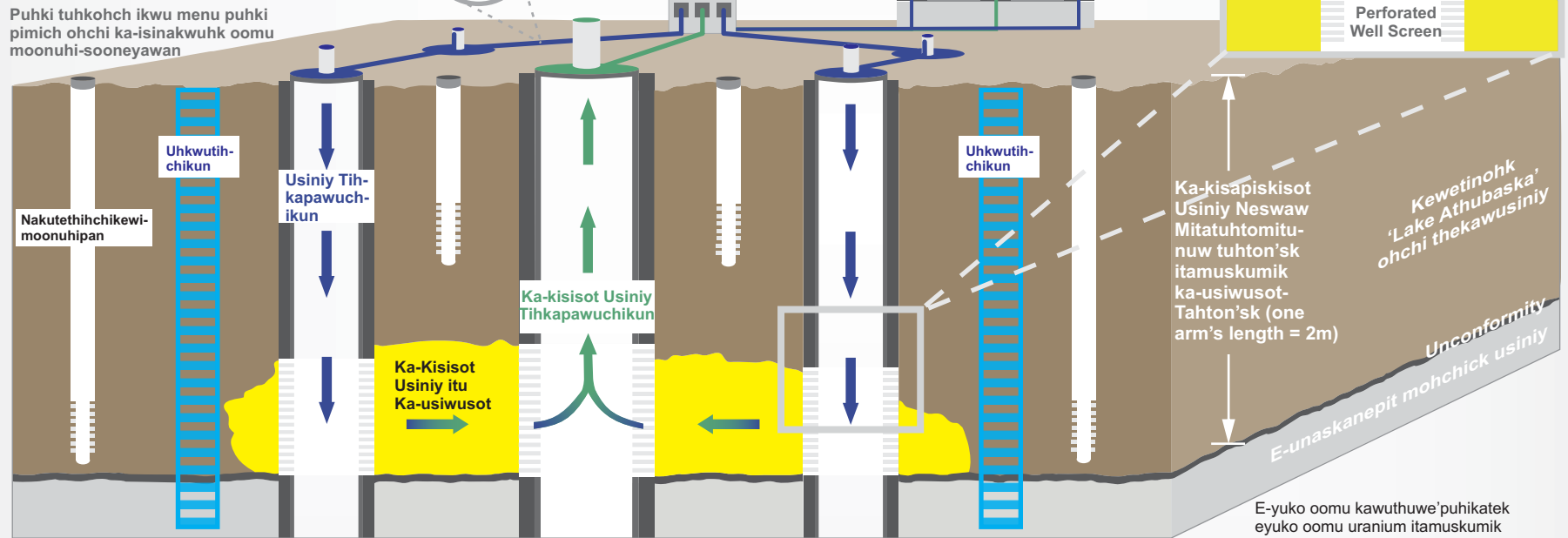
- Ikotu oomu kakotawe'puhikatek tihkapawuchikun itamuskumik isi itah itu ka-uyat unu uranium
- Ikotu ka-uti mawusukwuskinék eyuko oomu ka-wuthuwe'puhikatek usiskewapoy itu ka-kikih pimihkeyuyat uwu isiniy (Uranium)

O-kohtuskwuyepiy e-uh-kohtuwisihtaniwík eka kitu pastiputhik pimowepuhikateki tihkapawuchikun



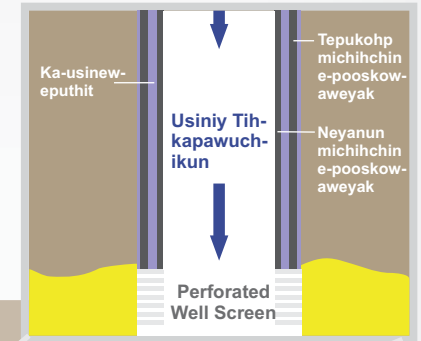
Isi-wepuhikewikumik

Itu kananupachihiht ikwu ka-uti kesihit kakisapis-kisot usiniy



Tapusinuhikewin kawi-isinakwuhk itamuskumik ikwu wuskitus-kumik ohchi Ka-ispichi-kuhkuhkeyak

Kisiwak ohchi e-isinakwuhk itu ka-usiwutek tihkapawuchikun ikwu usiskewapoy ka-kesi wuthuwe'pukatek



E-yuko oomu kawuthuwe'puhikatek eyuko oomu uranium itamuskumik ohchi otukiseyapeyu ekotawapekumoki itamuskumik isi ikwu ikotu ohchi kakospoowepuhikatek eyuko oomu uranium

Denison Mines

WHEELER RIVER SEPIY

Figure A: Yakoma tapasiniykan tansi kawi isi atoskimaka

Pawahcakanasis 2020

kwecihkeyimowin osci akāmaskihk ISR atoskewina eyikoni kā-kipahamihk wātihkewin āpoy ekwa atāmaskīhk nīpiy At Wheeler, ta-kipahamihk āpoy ekota kaskatewi asiniy ekwa ta-sohki-ocipitamihk mīna ta-nakinamihk kāya ta-pihcipoyik atāmaskīhk nīpiy, Denison ta-osihāwak e-sohkahk asicihtahk ta-apacihācīk ahkwatin askiy apacihcikana. ka-ahkwatik asicihtak ta-sīpatāskwan esi (400m) newo kihci mitātahtomintaw tipahaskānis ekwa mīna askiy askiniy osci nihcāyihk asiniy eskohk tahkohc isi nihcāyihk asiniy ta-nakinikeyit nihcāyihk atāmihk kā-otinamihk. Nānitaw ispihcāw ahkwatinihk kā-asteyik 90 m 900 m kinwāw.

Mamowi Aski Kitakwa

Mikwac oma ita kawi opina atoskiwin kiciwak Wheeler Sepiy ispaski itawin ciki mina Athabasca itowin kiyapic nitonom kotak asiniya aspihin oci neyo mintanow aski. Ata wiya kiyapic maciwak , mitawiwak moya awiyak kisiwak ayow topiykit. Mitatomintow mina niyomitanow tihpahaskan mowic kisiwak awiyak , yako ma Slush Lake iskonikan, English River ka akisocik ota, apo mina pakisomo tiki moya awiya ayow.

Ikosi Denison iki itotom ikwa masinanam, kisiwak ikitapata uski, nipi, pisiyskowa ikwa mina nanatok ta kitapimiko kakiyow kiwi, kinosiw ita amiyit, piysis ita ka pimacihot ita mina nipi oci ikwa astik.

Ikosi kwa Wheeler nistowinom, neyow piskic itoninowak ikota iyakiso Treaty 10 ochi. Wiya iyapicta iyaco isiwak uskikan. Iyako English River Itinowak, Kinepik-Pinehoue, Sepesiy-Beauval ikwa Sahkitawa-Ile La Crosse Apitowkosanak. Ikosiy kwayask apatan oma aski ka nipi ikwa kapihpo.

Ikosi Denison tapwi itam kwayask kayow aski oci ikwa itowin iktapata ikwa masinahum mina tisi nakatoki uski.

Tansi taki isiki

ISR atosikwin ka masina oma oci Uranium atoskiwin ikwa Uranium Kisitawin, ika kikwi iskonikiwin, ta wanata uski, ika ta siwanata nipi, tapikinai, asini ka poskwaha, ta pikina, ikosiy kwayask Wheeler ta nakotokih oma isicikiwin.

Ikosi mina kapi ta nakato nipi, kistikana kakiya kikwi papamik ka pimata. Ikosi Denison itiyi tum , ika nanatow tisi siwanata uski, anowc ikwa mwestus.

Wheeler itwew mamowi nesto- mitatomitanow topina oma atoskiwin , nistom nesso askiwin mina takoc mitatomitanow mins mitatomitanow niyanmitanow itnowuk tatoski. Kapi ta kitapimi iyawis ka tosksi ikota.

Ikosi Denison ta nokotow kakiyow kikwi soki tati ispiyik, Iya mina soki tatoski ta masinaha tisi kacitina oma masiniykan tisi opinana ikwa tatoskimaka.

Mamowi Isicikiwin

Aspin oci 2016 Denison nistowinawiw i yawis ka kiso oma opinikiwin. I yakoni ohoh kanitowinawat:

- iyawis itawina
- Oyasowi nowak okimakani
- Iyawis kiciwak ka kiso

Denison kiyapic natkato kakiyow ka ti nakiska ikwa wica atoskiw kakiyow itiniwa mina kakitom apowak ta yamicik ka tispiyik. Sasiy mina masiniykan masinamo isi napo nistota. Ika miwstas iwyak ta pwakatam kitusowi.

Denison nahnaskomo ikwa mamtiso iyawis ka miyo wicito ikwa katiski. Kiyapic mina oti nikan.

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| Appendix A: Table of Concordance with Prescribed Information for the Description of a Designated Project Regulations | |
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Abbreviations

| | |
|-----------|--|
| ALARA | As Low As Reasonably Achievable |
| CEAA 2012 | <i>Canadian Environmental Assessment Act 2012</i> |
| CNSC | Canadian Nuclear Safety Commission |
| CWQG | Canadian Water Quality Guidelines |
| COSEWIC | Committee on the Status of Endangered Wildlife in Canada |
| Denison | Denison Mines Corp. |
| EIA | Environmental Impact Assessment |
| EIS | Environmental Impact Statement |
| ERFN | English River First Nation |
| ha | hectare |
| HCB | Heritage Conservation Branch |
| HHERA | Human Health and Ecological Risk Assessment |
| IK | Indigenous Knowledge |
| ISR | In Situ Recovery |
| JCU | JCU (Canada) Exploration Company Ltd. |
| km | kilometre |
| masl | metres above sea level |
| mg/L | milligram per liter |
| M lbs/yr | million pounds per year |
| NAD | Northern Administration District |
| PFS | prefeasibility study |
| Project | Wheeler River Project |
| SARA | <i>Species at Risk Act</i> |
| SKCDC | Saskatchewan Conservation Data Centre |
| SEQG | Saskatchewan Environmental Quality Guideline |
| SK MOE | Saskatchewan Ministry of the Environment |
| SSWQO | Saskatchewan Surface Water Quality Objectives |
| VC | Valued Component |
| WTP | Water Treatment Plant |
| Wheeler | Wheeler River Project |

1 Introduction

The Wheeler River Project (Wheeler or the Project) is a proposed uranium mine and processing plant in northern Saskatchewan, Canada (Figure 1.1).

Wheeler is a joint venture project owned by Denison Mines Corp. (Denison) and JCU (Canada) Exploration Company Ltd. (JCU). Denison owns 90% of Wheeler and is the operator, while JCU owns 10%. The Wheeler property contains a number of areas of mineralization, including but not limited to the Phoenix and Gryphon deposits.



Athabasca Basin, Canada
Date: Dec. 2018

Figure 1.1: Wheeler River Location in Canada

Wheeler is located in Saskatchewan's Athabasca Basin about 4 km west of Highway 914. It is located mid-way between Cameco Corporation's Key Lake Mill and McArthur River Mine (Figure 1.2) and is 600 km north of Saskatoon.

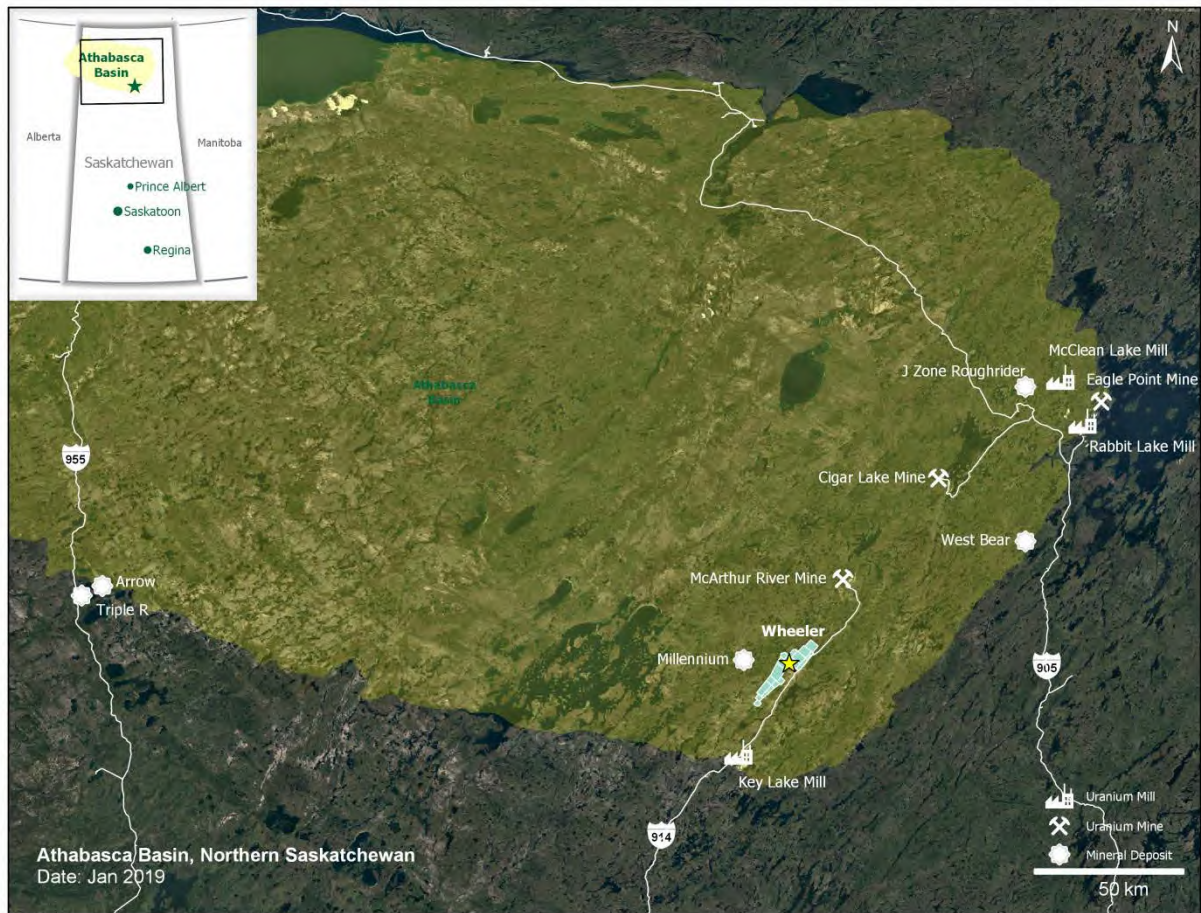


Figure 1.2: Wheeler River Location in the Athabasca Basin

1.1 Project Proponent

Denison is a publicly traded uranium exploration and development company with interests focused in the Athabasca Basin region of northern Saskatchewan, Canada. The company trades on the Toronto Stock Exchange and New York Stock Exchange, and headquartered in Toronto, Ontario with offices in Saskatoon, Saskatchewan and Vancouver, British Columbia.

Historically, Denison (and its predecessor companies) has had over 50 years of uranium mining experience in Elliot Lake, Ontario, Saskatchewan, and in the United States. Today, the company is part owner (22.5%) of the McClean Lake Joint Venture which includes the operating McClean Lake uranium mill in northern Saskatchewan. In addition, Denison provides expert mine decommissioning and environmental services through its Denison Environmental Services division and serves as the manager of Uranium Participation Corporation, a publicly traded company that invests in uranium oxide and uranium hexafluoride.

The company's history of uranium mining, unique expertise in the specialized sectors of uranium mine decommissioning and exploration, as well as its active involvement in the uranium sales and marketing business through its management of Uranium Participation Corporation, have uniquely prepared Denison to be a qualified proponent to develop and operate Wheeler.

As exemplified under our current licences with the Canadian Nuclear Safety Commission (CNSC) at our Elliot Lake and McClean Lake uranium facilities, Denison is committed to the operation of its facilities in a manner that prioritizes safety, environmental protection, and sustainable development.

The proponent is Denison Mines Corp.

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Email: jswitzer@denisonmines.com

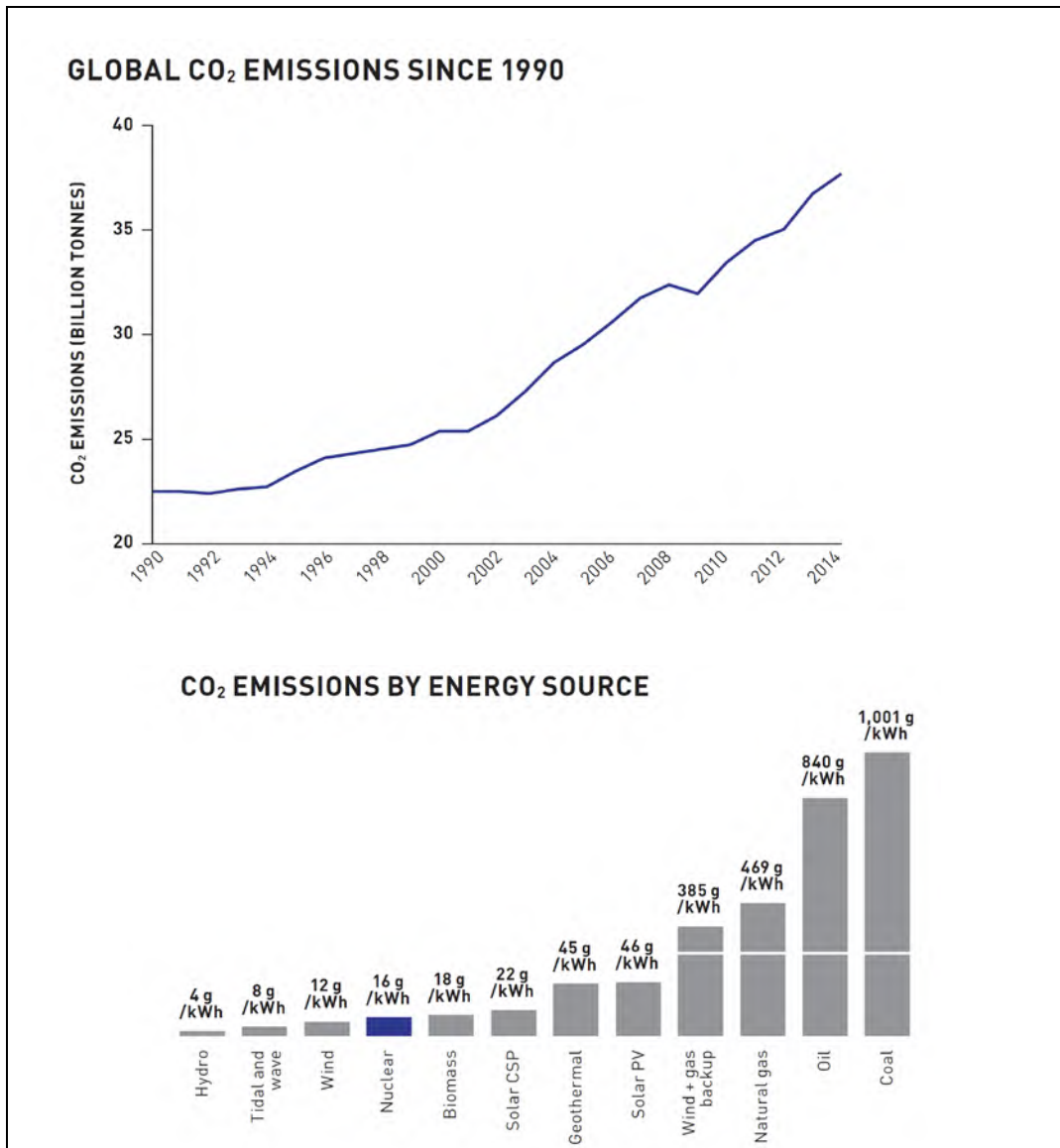
1.2 Project Needs and Benefit

Mining of uranium is the first step in the nuclear fuel cycle, which ultimately concludes with the furnishing of nuclear fuel assemblies to nuclear power plants around the world for the generation of low carbon and low-cost electricity. Accordingly, uranium mining is an essential component in the global battle against climate change and the shift towards the generation of low carbon electricity.

The United Nations estimates that the world's population will grow from approximately 7.5 billion in 2017 to over 9.7 billion in 2050 (United Nations 2017) which is expected to substantially increase global electricity demand. Economic development in non-OECD countries is rapidly shifting global electricity demand and generating more interest in new nuclear plant investments (Massachusetts Institute of Technology 2018). According to the International Atomic Energy Agency (IAEA 2018), high-case projections for nuclear generating capacity suggest that current global capacity could increase from 392 GWe in 2017 to 748 GWe in 2050. At present, there are approximately 450 operable reactors worldwide with an additional 50 to 60 under construction (Canadian Nuclear Association 2017). In addition, momentum is building in regards to the future potential associated

with the development of small modular nuclear reactors, which could bring reliable and low-cost energy to remote communities around the world, and ultimately create significant additional demand for nuclear fuel.

Hand-in-hand with the rising demand for reliable and low-cost energy is the discussion surrounding greenhouse gas emissions and climate change. Despite numerous environmental initiatives and on-going research, global climate change continues at an alarming rate. In 2017, global atmospheric concentration of carbon dioxide (CO₂) rose by 1.4% which is the largest annual rise ever recorded (World Nuclear Association 2018). One of the most influential energy sources available to combat the rise of CO₂ emissions is nuclear power (Figure 1.3). If all the world's coal and natural gas plants were replaced with low carbon nuclear, CO₂ emissions would be reduced by over 22% (Canadian Nuclear Association 2017).



Source: The Canadian Nuclear Association 2017

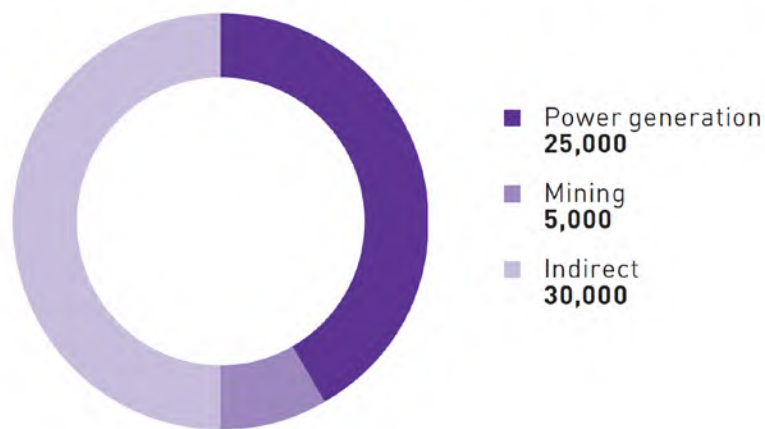
Figure 1.3: Global CO₂ Emissions since 1990 and CO₂ Emissions by Energy Source

A recent report by the United Nations Intergovernmental Panel on Climate Change that examined 89 climate change mitigation scenarios concluded that achieving the 1.5°C target from the Paris Agreement will require global greenhouse gas emissions to start being reduced immediately, and an increase in nuclear power generation of approximately 2.5 times by 2050 (World Nuclear Association 2018). Without a significant contribution from nuclear energy, as the global power mix shifts to respond to climate change initiatives, the cost to achieve meaningful decarbonisation targets will steadily rise or targets will simply go unmet. Nuclear is critical to global climate change objectives because of its unique combination of low carbon emissions, large scale, and reliability.

In terms of scale, the uranium expected to be produced from Wheeler would be sufficient to power 1 million homes for approximately 160 years (assuming 200 tonnes U_3O_8 fuels a 1,000 MWe plant for one year). Alternatively, the uranium produced from Wheeler could provide fuel to meet all of the projected Canadian nuclear utilities' base requirements from 2019 to 2035 including New Brunswick Power, Ontario Power Generation and Bruce Power.

Canada is uniquely positioned to support global climate change initiatives. Canada is the second largest producer and exporter of uranium in the world, with approximately 88% of the uranium produced in Canada destined for export to support global nuclear power use (Natural Resources Canada 2018). At present, Canada's current uranium production comes from uranium mines operated in northern Saskatchewan. Canada has a rich history of involvement with nuclear power and the technological advances that have been made within the industry since the early 1940s. According to Natural Resources Canada, 15% of the country's electricity was provided by nuclear power in 2016 (Natural Resources Canada 2018). Given the integral role it plays in our economy, the nuclear power industry has been and will continue to be a growth vehicle for economic and employment opportunity, an aid to the rapidly increasing electricity demand, and a key contributor in the battle against the environmental impacts associated with greenhouse gas emissions. The mining and processing of uranium as part of the Project will support the projected future growth in nuclear power both domestically and internationally.

Nuclear in Canada is a \$6 billion industry that directly and indirectly supports a total of 60,000 jobs throughout the country (Canadian Nuclear Association 2017) (Figure 1.4).



Source: The Canadian Nuclear Association Factbook 2017

Figure 1.4: Jobs Supported by the Nuclear Industry in Canada

With refurbishment plans in place for 10 of the 19 nuclear reactors in Canada (primarily located at the Ontario Power Generation and Bruce Power nuclear facilities in Ontario) there is a distinct opportunity to add further employment opportunities within the industry and throughout the nuclear fuel cycle. Government research and studies suggest that the economic benefits of refurbishing only 4 of the 10 reactors (located at the Ontario Power Generation facility in Darlington, Ontario) would be almost \$90 billion (Canadian Nuclear Association 2017). At its peak, the refurbishment of Bruce Power’s nuclear facility will create 22,000 direct and indirect jobs annually and will secure the organization’s future for decades creating demand for reliable and safe uranium production for many years to come (Bruce Power and Ontario Power Generation 2018).

While Canada’s nuclear facilities are mainly concentrated in Ontario, the majority of uranium production in Canada comes from northern Saskatchewan, which is home to the world’s largest and highest-grade uranium deposits – some with concentrations more than 100 times the global average (Natural Resources Canada 2018). Wheeler is located in the Athabasca Basin in northern Saskatchewan where established uranium mining and milling operations are a major employer of the province’s northern and Indigenous peoples. The advancement of Wheeler will not only contribute economically to Canada’s nuclear energy industry, but is also expected to provide additional employment and business opportunities to Indigenous and northern communities in Saskatchewan.

The world and Canada need uranium and Wheeler can provide this critical component in the nuclear fuel cycle while making a meaningful contribution to the Canadian economy and Saskatchewan’s northern and Indigenous communities.

1.3 Regulatory Context

This document was written to meet the requirements and guidance for both a federal Project Description under the *Canadian Environmental Assessment Act 2012* (CEAA 2012; *Prescribed Information for the Description of a Designated Project Regulations* and Canadian Environmental Assessment Agency 2015a) and a provincial Technical Proposal (Government of Saskatchewan 2014a) under Saskatchewan's *Environmental Assessment Act*.

Denison anticipates that the provincial and federal environmental assessment processes for Wheeler will be conducted in parallel; the Saskatchewan Environmental Assessment & Stewardship Branch and the CNSC will cooperate in conducting a coordinated provincial-federal EA that will follow the spirit of the Canada-Saskatchewan Agreement on Environmental Assessment Cooperation (2005) to the extent possible. The agreement allows for cooperation in the assessment of projects that require regulation by both levels of government. The cooperation agreement allows for the production of a single environmental impact assessment (EIA) that meets the requirements of both levels of government, so that each level of government can make an independent decision.

Please see Appendix A for the table of concordance with the *Prescribed Information for the Description of a Designated Project Regulations*.

1.3.1 Environmental Assessment Requirements

1.3.1.1 Federal

The proposed Project will include the construction, operation and decommissioning of a uranium mine, processing plant and supporting facilities on a site that is not within the boundaries of an existing licensed uranium mine or mill. As such, Wheeler is a designated project as set out in section 31 of the *Regulations Designating Physical Activities* and is therefore subject to a federal environmental assessment.

The CNSC will be the federal responsible authority for Wheeler's environmental assessment.

Applicable federal Acts and regulations applicable to Wheeler include but are not limited to:

- *Fisheries Act*
 - *Metal and Diamond Mining Effluent Regulations*
- *Canadian Environmental Assessment Act*
 - *Regulations Designating Physical Activities*
 - *Prescribed Information for the Description of a Designated Project Regulations*
- *Species at Risk Act*
- *Nuclear Safety and Control Act*
 - *General Nuclear Safety and Control Regulations*

- *Uranium Mines and Mills Regulations*
- *Packaging and Transport of Nuclear Substances Regulations*
- *Radiation Protection Regulations*
- *Migratory Birds Convention Act*
- *Transportation of Dangerous Goods Act*
 - *Transportation of Dangerous Goods Regulations*
- *Canadian Environmental Protection Act*
 - *Environmental Emergency Regulations*
- *Canadian Wildlife Act*
- *Navigation Protection Act*

Denison acknowledges Bill C-69 that proposes a number of changes to the current environmental assessment process. Section 182 of the bill outlines that EIAs for CNSC designated projects started under *CEAA (2012)* will continue under *CEAA (2012)*.

Accordingly, this project description has been prepared to comply with the requirements of *CEAA (2012)*.

1.3.1.2 Provincial

Environmental Assessment in Saskatchewan is regulated by the *Environmental Assessment Act* and its application hinges on whether a project is a development, or not, based upon the criteria in Section 2(d):

2(d) “development” means any project, operation or activity or any alteration or expansion of any project, operation or activity which is likely to:

- (i) have an effect on any unique, rare or endangered feature of the environment;
- (ii) substantially utilize any provincial resource and in so doing pre-empt the use, or potential use, of that resource for any other purpose;
- (iii) cause the emission of any pollutants or create by-products, residual or waste products which require handling and disposal in a manner that is not regulated by any other Act or regulation;
- (iv) cause widespread public concern because of potential environmental changes;
- (v) involve a new technology that is concerned with resource utilization and that may induce significant environmental change; or
- (vi) have a significant impact on the environment or necessitate a further development which is likely to have a significant impact on the environment.

The likely applicable Section 2(d) triggers are Sections 2(d) (iv) and (v); a potential for public concern, and a new technology application in Saskatchewan (in situ recovery for uranium), respectively.

Accordingly, Denison is self-declaring that Wheeler is a development under the *Environmental Assessment Act*; Denison is not seeking a ministerial determination on whether the Project is a development.

Denison will be submitting the Project's draft Terms of Reference to the province under a separate cover.

Denison will conduct, prepare and submit an environmental impact statement (EIS) to Saskatchewan Ministry of Environment's Environmental Assessment and Stewardship branch that meets the requirements outlined in the Saskatchewan Environmental Assessment Act. Ultimately the Project will require issuance of a ministerial approval under section 15 of the Saskatchewan *Environmental Assessment Act* before proceeding to licensing and permitting.

Relevant provincial Acts and associated regulations applicable to Wheeler include but are not limited to:

- *Environmental Assessment Act*
- *Environmental Management and Protection Act*
 - *Mineral Industry Environmental Protection Regulations*
 - *Hazardous Substances and Waste Dangerous Goods Regulations*
 - *The Waterworks and Sewage Works Regulations*
 - *Environmental Management and Protection (Saskatchewan Environmental Code Adoption) Regulations*
- *Wildlife Act*
 - *Wildlife Regulations*
- *Wildlife Habitat Protection Act*
 - *Wildlife Habitat Lands Disposition and Alteration Regulations*
- *Fisheries Act (Saskatchewan)*
 - *Fisheries Regulations*
- *Forest Resource Management Act*
 - *Forest Resources Management (Saskatchewan Environmental Code Adoption) Regulations*
 - *Forest Resources Management Regulations*
- *Natural Resources Act*
- *Prairie and Forest Fire Act*
- *Heritage Property Act*

- *Provincial Lands Act*
 - *Provincial Lands Regulations*
- *Saskatchewan Employment Act*
 - *Mines Regulations*
 - *Occupational Health and Safety Regulations*
- *Radiation Health and Safety Act*
 - *Radiation Health and Safety Regulations*
- *Reclaimed Industrial Site Act*
 - *Reclaimed Industrial Sites Regulations*
- *Water Security Agency Act*
- *Dangerous Goods Transportation Act*
 - *Dangerous Goods Transportation Regulations*
- *Mineral Resources Act*
- *Crown Minerals Act*
- *Public Health Act*
 - *Plumbing Regulations*
- *Boiler and Pressure Vessel Act*
 - *Regulations Respecting the Design, Construction, Installation and Use of Boilers and Pressure Vessels*
- *Electrical Inspection Act*
 - *Electrical Inspection Regulations*
- *Gas Inspection Act*
 - *Gas Inspection Regulations*
 - *Gas Licensing Regulations*

1.3.2 Guidelines, Policies, Standards

In addition to regulatory requirements from federal and provincial Acts and regulations, Denison will apply a number of other guidelines, policies and standards to the Project. The following list provides examples of guides, policies and standards Denison will use in completing the Wheeler EIA and is not exhaustive:

- Canadian Environmental Assessment Agency:
 - Technical Guidance for Assessing Physical and Cultural Heritage or any Structure, Site, or Thing that is of Historical, Archaeological, Paleontological, or Architectural Significance under CEAA (2012)

- Addressing “Purpose of” and “Alternative Means” under the CEAA (2012)
- Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under the CEAA (2012)
- Considering Aboriginal traditional knowledge in environmental assessments conducted under CEAA (2012) (CEAA 2015b)
- Federal Policy on Wetland Conservation
- Various CNSC regulatory documents (REGDOCS), for example:
 - 2.9.1 Environmental Principles, Assessments and Protection Measures (CNSC 2017)
 - 3.1.2 Reporting Requirements, Volume I: Non-power reactor class I facilities and uranium mines and mills
 - 3.2.2 Aboriginal Engagement (CNSC 2016a)
- CNSC’s generic guidelines for the preparation of an environmental impact statement (CNSC 2016b)
- Various CSA Standards, for example:
 - N288.4-10 Environmental monitoring programs at Class I nuclear facilities and uranium mines and mills
 - N288.7-15 Groundwater protection programs at Class I nuclear facilities and uranium mines and mills
 - N286-12 Management System Requirements for Nuclear Facilities
 - N288.5-11 Effluent Monitoring Programs at Class I nuclear facilities and uranium mines and mills
 - N288.6-12 Environmental risk assessments at class I nuclear facilities and uranium mines and mills
 - N294-09 Decommissioning of facilities containing nuclear substances
- Guidelines for Northern Mine Decommissioning and Reclamation, November 2008, Version 6, Saskatchewan Ministry of Environment
- The Saskatchewan Environmental Code and attendant standards

1.3.3 Licensing and Permitting

The following permits, approvals, and licences are anticipated at different stages of the Project:

- Provincial environmental assessment approval
- Federal environmental assessment approval
- CNSC licences to:
 - Prepare site and construct

- Operate
 - Decommission
 - Abandon (release from licensing)
- Surface lease agreement
- Heritage Conservation Branch approval
- Forest Product Permit
- Aquatic Habitat Protection Permit
- Approval to Construct Highways Approach
- Approval to Construct and Operate Pollutant Control Facilities
- Environmental Protection Plan for Industrial Sources
- Approval to Construct Hazardous Substances and Waste Dangerous Goods Facility and Store Hazardous Substances and Waste Dangerous Goods
- Permit to Operate Waterworks
- Permit to Operate Sewage Works
- Approval to Decommission Pollutant Control Facilities
- Release from Decommissioning and Reclamation
- Provincial Acceptance of Decommissioned and Reclaimed Site into Institutional Control Program

1.4 Regional Studies

EIAs have been completed or are underway for nearby projects related to uranium mining and milling as well as a provincial highway extension. This includes Cameco Corporation's original EIAs and any subsequent expansion EIAs for mining and milling of uranium at Key Lake Operation and mining of uranium at McArthur River Operation. An EIA was initiated and subsequently halted by Cameco for the proposed Millennium Project, a proposed uranium mine located between Key Lake and Wheeler. Saskatchewan Ministry of Highways has initiated the provincial environmental assessment process for extending Highway 914 from McArthur River Operation to Cigar Lake mine and constructing a by-pass at the Key Lake Operation.

Other regional studies include:

- Eastern Athabasca Regional Environmental Monitoring Program;
- Canadian Nuclear Safety Commission's Independent Environmental Monitoring Programs; and
- Saskatchewan Boreal Watershed Initiative (Government of Saskatchewan 2017a) which includes a summary of available air quality, aquatic ecosystems, terrestrial ecosystems and Indigenous Knowledge.

1.5 Engagement

Denison recognizes the importance of engaging with local and Indigenous communities, residents, businesses, organizations, land users and the various regulatory authorities, collectively referred to as ‘Stakeholders.’ Since 2016 Denison had been engaging with Stakeholders in ongoing efforts to build positive relationships with all parties.

Denison has engaged with the following Stakeholders in regards to Wheeler:

- English River First Nation
- Hamlet of Patuanak
- Kineepik Métis Local Inc.
- Pinehouse village
- Sipisishik Métis Local 37
- Beauval village
- A La Baie Métis Local 21 Inc.
- Ile a la Crosse village
- Recreational lease holders
- Northern Saskatchewan Environmental Quality Committee
- Canadian Nuclear Safety Commission staff in the Environmental Assessment division and the Uranium Mines and Mills division
- Saskatchewan Ministry of Environment staff with the Environmental Assessment and Stewardship branch and the Uranium and Northern Operations branch.

Details of Denison’s engagement with Stakeholders, including engagement results to date, influence of engagement on the Project design, and the plan for ongoing engagement activities are provided in sections 7 and 8 below.

Engagement initiated by Denison in 2016 is part of an ongoing commitment by Denison to actively engage all Stakeholders throughout the Project development phases.

Denison’s early engagement initiatives with local Indigenous communities have allowed for the integration of Indigenous Knowledge with the Project development process, environmental baseline studies completed, and socio-economic initiatives directly related to the Project. Some of the key activities demonstrating this integration are presented in the Project timeline shown in Figure 1.5.

Denison’s ongoing Stakeholder engagement program reflects the results of feedback received to date from previous engagement sessions and is intended to be flexible and adaptive.

Denison will visit local Stakeholders, as appropriate, and will provide Project updates as Wheeler is advanced. It is currently envisioned that community meetings will be held at least once per year in a number of local communities, and more frequently if desired by any of these communities.

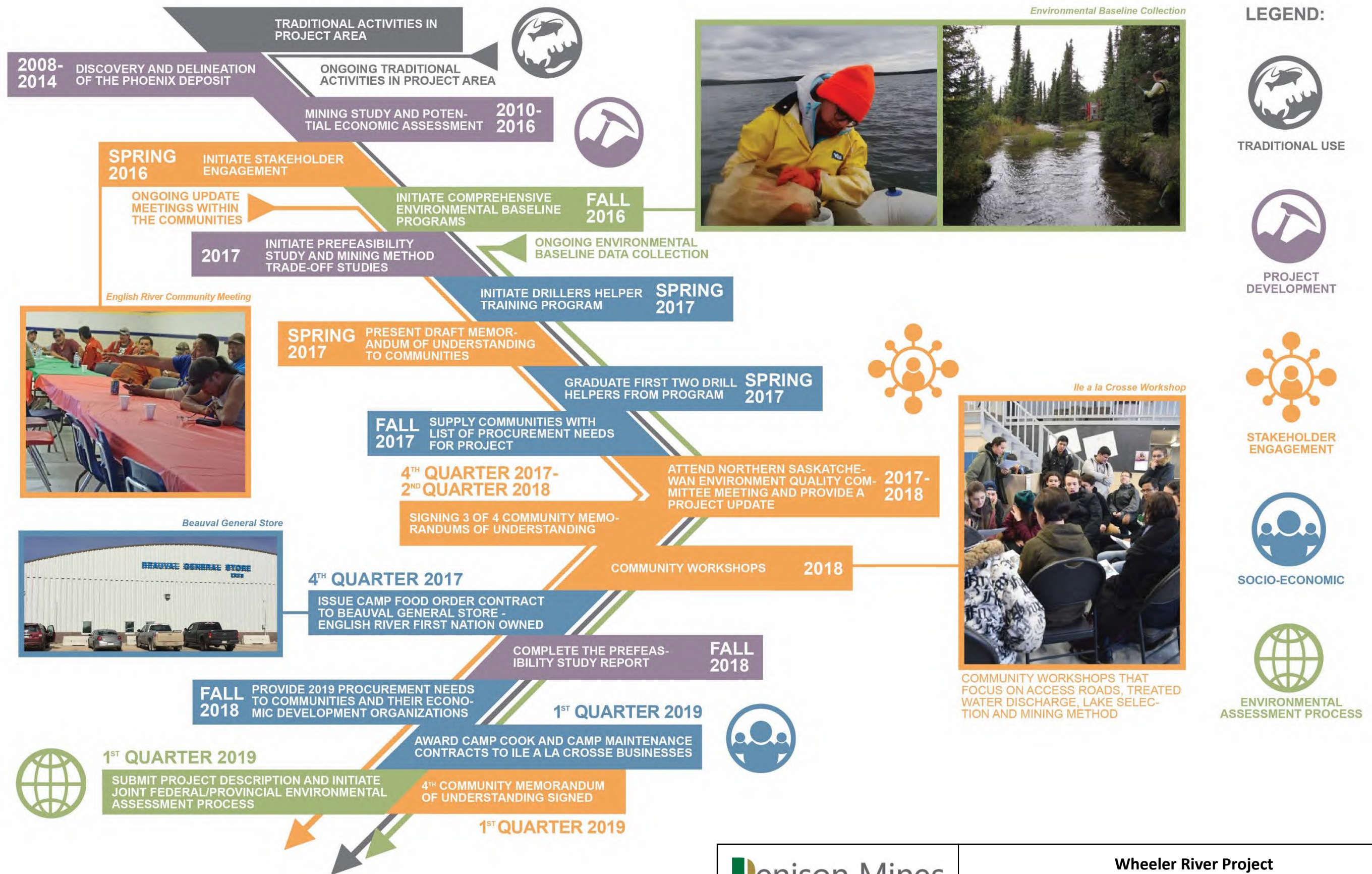
Denison is also committed to meeting with the leadership of these communities, in addition to other stakeholder organizations, as and when requested as part of the Company's standing commitment to respond to any enquires regarding the Project.

As the Project advances Denison is committed to continue to utilize local community radio stations, social media, and print media that may reach northern audiences.

In order to formalize Denison's commitment to its local Indigenous communities (and their associated non-Indigenous communities), Memorandums of Understanding (MOU) have been signed between Denison and:

- English River First Nation;
- Kineepik Métis Local and the community of Pinehouse;
- A La Baie Métis Local 21 and the community of Ile a la Crosse; and
- Sipisishik Métis Local 37 and the community of Beauval.

These non-binding MOUs formalize the signing parties' intent to work together in a spirit of mutual respect and cooperation to collectively identify practical means by which to avoid, mitigate, or otherwise address potential impacts of the Project upon the exercise of the indigenous rights, treaty rights, and interests. In addition, the MOUs outline the signing parties' intent to work together to ensure benefits will flow from the Project, provide a process for continued Project engagement and information-sharing about the project, and establish a relationship to identify business, employment and training opportunities for the parties with respect to the Project.



lenison Mines

Wheeler River Project
Provincial Technical Proposal and Federal Project Description

Figure 1.5: Project Timeline

May 2019

2 Project Information

2.1 Project Overview

2.1.1 Deposit & Geology

Several areas of uranium mineralization amenable to in situ recovery (ISR) have been defined at Wheeler with the most prominent area being the Phoenix deposit. Phoenix is the highest-grade undeveloped uranium deposit in the world. It is geologically situated at or immediately above the unconformity between the Athabasca Basin sandstone and older basement rocks, approximately 400 metres below surface. To date, these zones have been estimated to contain a total of 70.2 million pounds U_3O_8 of indicated mineral resources based on 166,400 tonnes of ore at an average grade of 19.14% U_3O_8 . There are additional zones of mineralization at Wheeler that have not been fully defined from exploration activities.

2.1.2 Selection of In Situ Recovery Mining Method

After completion of the 2016 Wheeler Preliminary Economic Assessment (Denison 2016) Denison initiated a detailed review of the development plan for the Phoenix deposit, which had originally been designed as an underground mine using a jet boring system as the extraction technology.

The 2016 Preliminary Economic Assessment identified disadvantages associated with the jet boring system mining method – including technical risks, comparatively high operating and capital costs, and long pre-production construction timelines. Accordingly, Denison initiated an extensive review process, seeking suitable alternative mining methods for the Phoenix deposit. A total of 32 different mining methods were initially identified and screened. The final two preferred technologies were advanced into a more rigorous evaluation process at the prefeasibility (PFS) level of assessment. Ultimately, In Situ Recovery (ISR) mining was selected as the preferred mining method due to its significant economic, environmental, and technical advantages.

ISR mining is also known as solution mining or in situ leaching – as the mining method uses an engineered fluid or solution to dissolve uranium from the host rock without physically removing the host rock for processing on surface. There are no underground or open pit workings required in an ISR operation; no heavy equipment is needed and people do not work underground. The process utilizes a series of injection wells to inject mining solution into the uranium deposit and another series of wells (recovery wells) to return the uranium rich solution back to surface for processing. There is minimal surface disturbance, minimal waste rock generated and no tailings are produced.

2.1.3 Experience and Lessons Learned from International In Situ Recovery Operations

Globally, ISR mining is considered to be the lowest-cost and industry leading method for uranium extraction. The method was first used in the 1960's and now accounts for over 50% of the world's annual uranium production, with use in Kazakhstan (the world's largest and lowest cost producer of

uranium), the United States, China, Russia, and Australia, among others. ISR mining is amenable to uranium deposits in certain sedimentary formations and is well known in the industry for having comparatively minimal surface impact, high production flexibility, and low operating and capital costs relative to open pit or conventional underground mining methods. There has been continuous development and improvement of ISR mining techniques in recent years, particularly in the two decades since the International Atomic Energy Agency published the *Manual of Acid In-Situ Leach Uranium Mining Technology* (IAEA 2001).

The general benefits of ISR include:

- *No tailings* – as the dissolution of the uranium contained in the host rock occurs “in-situ”, there is no processing of the host rock on surface and thus there is no waste / tailings generated by the ISR mining method;
- *Minimal surface disturbance* – In addition to having relatively modest needs for buildings and structures on site, ISR mining does not involve the sinking of shafts or the development of a large open pit. The surface impact associated with an ISR wellfield is limited to a series of cased injection, recovery and monitoring wells with a diameter of approximately 4-8 inches;
- *Established safety practices and procedures* – with over 50% of global uranium production coming from ISR mining in multiple countries, the mining method has become well known within the uranium mining industry and has allowed for the establishment of a wealth of safety practices and procedures to ensure health and safety of workers;
- *Minimal environmental impacts* - Amongst other additional comparative benefits, ISR mining operations are known for low noise levels, minimal dust and air emissions, low water consumption levels, minimal treated effluent discharge volumes, and minimal waste rock generation; and
- *Economic advantages* – ISR mining operations often have comparatively low capital and operating costs, as well as shorter timelines to first production and greater flexibility to allow production to be scaled to meet market demands.

In evaluating the application of ISR technology to the Athabasca Basin, Denison initiated a detailed review of the experience from international ISR operations over the last 50 years. Information is publicly available from ISR activities in the following countries:

- Australia (5 sites)
- USA (49 sites)
- Kazakhstan (17 sites)
- Bulgaria (19 sites)
- China (3 sites)
- Czech Republic (2 sites)
- Hungary (1 sites)

- Mongolia (3 site)
- Niger (1 site)
- Pakistan (1 site)
- Russia (2 sites)
- Ukraine (3 sites)
- Uzbekistan (3 sites)

Other countries such as Germany also have experience with ISR operations but have less extensive publicly available records to date.

While each operation is unique based on site-specific characteristics, the two general challenges to international ISR operations are: 1) potential groundwater impacts during operations and 2) remediation of the mining zones after mining is complete.

2.1.3.1 Potential Impacts to Groundwater

Traditional ISR operations rely on natural barriers (aquitards) or artificial pumping to create a drawdown of the regional groundwater to help contain the mining solution and minimize loss of the mining solutions to the regional groundwater. Containment of the mining solution in this way may create downstream problems including:

1. Loss of the mining solutions to the environment (known as excursions) may occur. Depending on the site-specific characteristics, these excursions will have varying levels of impact on the groundwater. In some instances, the excursions are allowed to continue while in other cases operations are required to implement mitigation strategies such as drilling additional pumping wells, reversal of wellfield flows and increase in draw down rates of the regional groundwater to capture the excursion.
2. Artificial drawdown of the aquifer brings excess water into the ISR process plant known as a bleed. Depending on site specific characteristics the bleed is either treated and discharged or directly discharged. In either case, it results with handling additional volumes of groundwater, an increased demand on energy and stress on the regional groundwater system.

In order to eliminate potential excursion to the regional groundwater Denison will engineer and create an artificial freeze wall to encompass the uranium deposit and isolate the mining horizon from the basement rock to surface (details in Section 2.3.1.3). The freeze wall will prevent the mining solution from travelling into the regional groundwater system and at the same time prevent the regional groundwater from entering the mining horizon and diluting the mining solution.

2.1.3.2 Remediation After Operations

The second major challenge to international ISR operations is the remediation of the site after mining is complete. Remediation efforts in international operations vary significantly depending on

site specific characteristics as well as the time period in which the operation occurred. In general, more recent operations have increased efforts towards remediation. Similar to many legacy mining sites, some historical ISR operations were operated with limited environmental considerations and as a result have led to contamination of the regional groundwater system.

In some operations, conditions surrounding the wellfield support a natural attenuation approach to remediation. In this context as groundwater travels outside the mining area it naturally improves. No active treatment outside the wellfield area is completed. Natural attenuation is typically completed in areas where the pre-mining environment showed poor background groundwater quality, limited or no use of groundwater for agriculture or human consumption, and/or areas with geochemical characteristics capable of naturally neutralizing the groundwater.

In some operations active treatment of the wellfield is completed. This can be completed by injecting reagents into the mined-out wellfield to neutralize the impacted groundwater, flushing the wellfield with clean water (in the same manner as mining was completed) with treatment and discharge of the collected groundwater or a variety of other options.

Denison's inclusion of a freeze wall (details Section 2.3.1.3) will mitigate many of the remediation challenges encountered at international operations. The freeze wall will allow for a controlled remediation process to occur unaffected by the regional groundwater. The depth to the deposit (400 metres below surface), the existing poor quality pre-mining groundwater chemistry, and limited volume of groundwater disturbance due to the isolation of the mining horizon will eliminate any impacts on regional groundwater use. Remediation of the contained mining horizon will be completed using active treatment and containment will continue until conditions inside the wall demonstrate acceptable geochemical conditions.

Denison has extensively researched best practices and challenges experienced in international operations. The design of the Wheeler ISR project has specifically targeted the elimination of the major challenges seen at international operations which is expected to result with the Wheeler being one of the most environmentally friendly mining projects in the world.

2.1.4 Objective and Overview of Wheeler In Situ Recovery

The objective of the Project is to construct, operate, and decommission an ISR uranium mine and processing plant.

The mining solution proposed at Wheeler will be similar to the leaching solution currently used in conventional Saskatchewan uranium mills and will consist of water and reagents such as sulphuric acid mixed to a consistent and relatively dilute concentration. The low pH or acidic mining solution oxidizes and dissolves the uranium as it travels through the uranium deposit. The process involves injecting the mining solution into the uranium deposit through a series of cased (contained) drill holes called injection wells. Following sufficient contact between the mining solution and the uranium deposit, the uranium is dissolved into the mining solution. The uranium rich mining

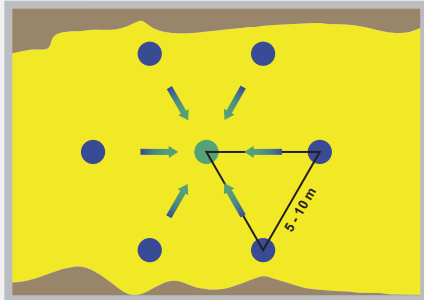
solution is then pumped back to surface via a similar series of cased recovery wells. This process is shown graphically in Figure 2.1 and details are provided in Section 2.3.1. Once on surface, the uranium rich mining solution will be piped to the processing plant for chemical separation of the uranium from the mining solution.

At Wheeler the uranium deposit is confined to a relatively small area (approximately 900 m x 90 m) and has proved readily leachable in laboratory testing. As a result, infrastructure disturbance (e.g., number of wells, extent of surface piping systems) are expected to be significantly reduced when compared to conventional low-grade ISR operations or conventional open pit operations.

In conventional ISR operations, containment of the mining solution is typically achieved by naturally impermeable bounding layers in the geological strata (i.e., aquitards) and/or by creating an artificial drawdown (via pumping) of the water table towards the uranium deposit. At Wheeler, there is a natural impermeable layer below the deposit, in the form of competent basement rock, but the deposit is otherwise hydraulically connected to the regional groundwater system in the overlying sandstone formation that is consistent throughout the Athabasca Basin. Given the depth and small spatial extents of the uranium deposit, the natural vertical hydraulic gradient can act as an upper layer of containment to contain the mining solution during the active mining process.

In order to simplify these controls and associated costs as well as to maintain proper concentrations of the mining solution and constant contact of the mining solution with the uranium deposit, an artificial freeze wall will be created to serve as an impermeable layer around the uranium deposit (details are provided in Section 2.3.1.3). When combined with the low permeability basement rock underneath the uranium deposit, the freeze wall will isolate the uranium deposit (Figure 2.1). Within the mining horizon the mining solution can move from the injection wells through the deposit to the recovery wells without interacting with the surrounding regional groundwater. The freeze wall will also facilitate controlled restoration of the mining horizon during the decommissioning phase.

TOP VIEW OF A SINGLE WELL FIELD

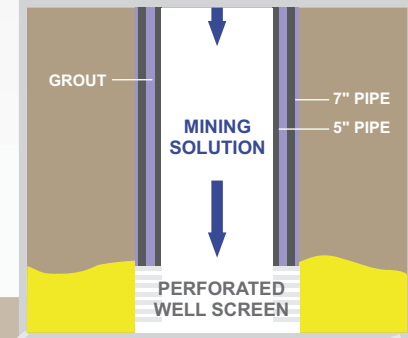


- INJECTION WELL WITH MINING SOLUTION
- RECOVERY WELL WITH URANIUM-RICH SOLUTION

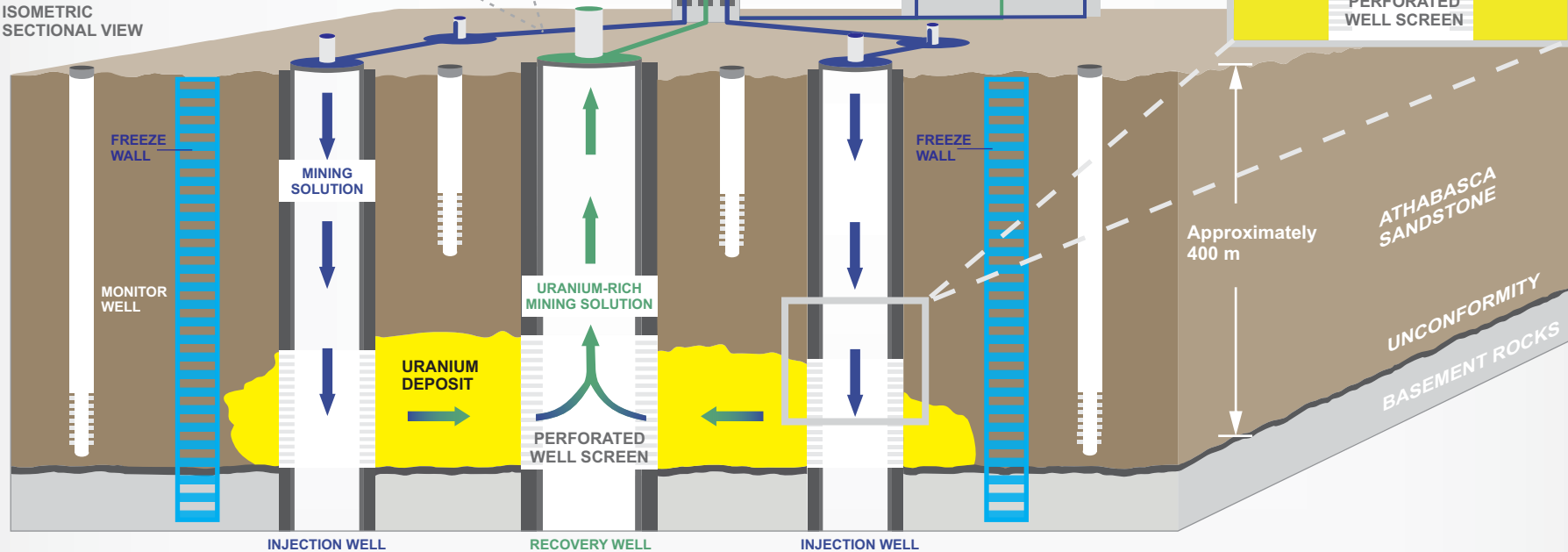
PIPE WITH
SECONDARY
CONTAINMENT



WELL CLOSE-UP
See well installation process



ISOMETRIC
SECTIONAL VIEW



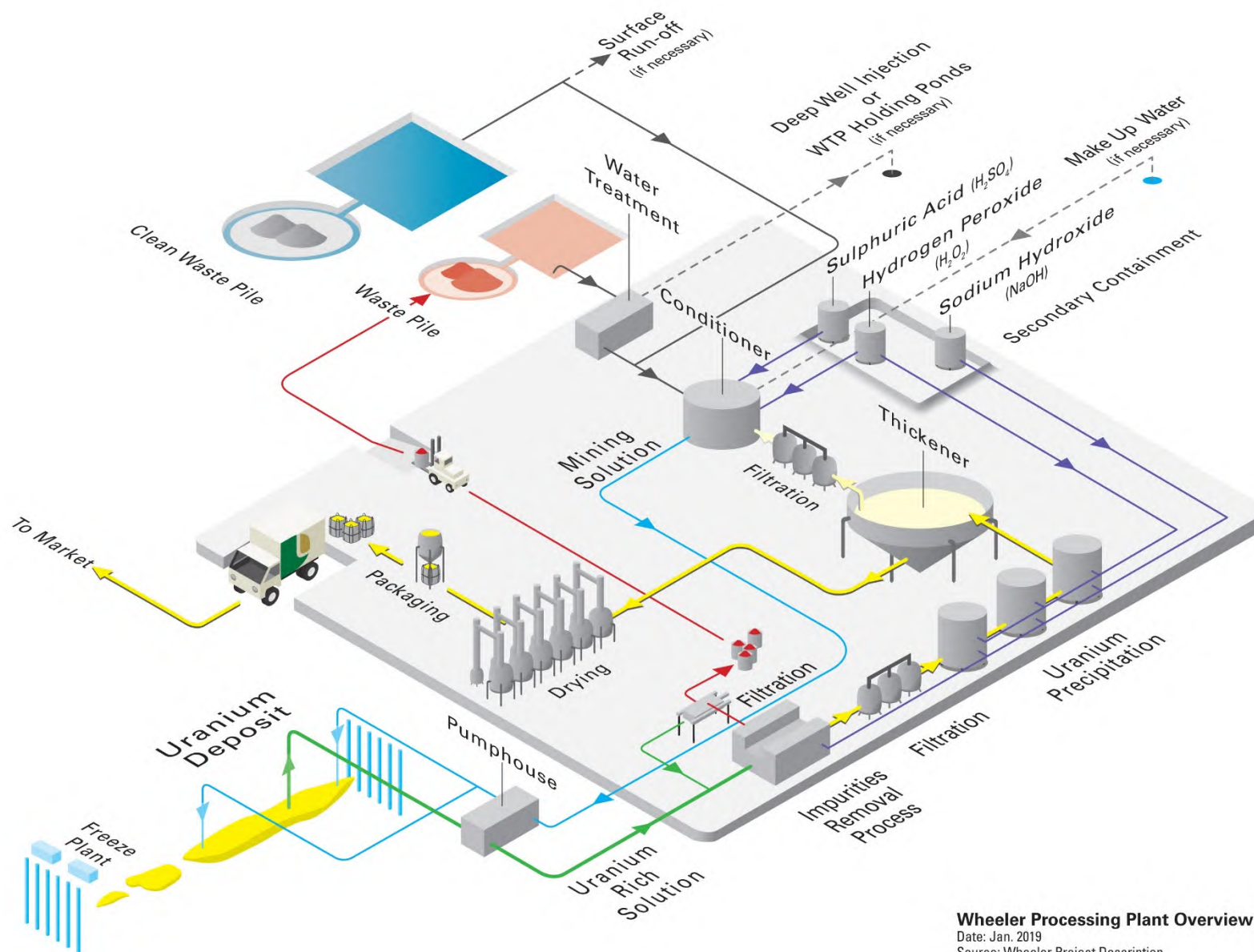
Schematic does not represent detailed engineering of the ISR well field and its components. Schematic not drawn to scale.

| | | |
|---|---|--------------------------------|
| | Wheeler River Project Technical Proposal and Project Description | |
| Figure 2.1: Overview of the In-situ Recovery Process | | Revised - December 2020 |

As part of the Project evaluation process, Denison completed numerous metallurgical test programs to simulate the ISR mining process, in accordance with industry standards – including leach tests, agitation leach tests, column tests, and post-mining restoration tests. The test results have been used to inform the design of the processing plant.

The processing plant design will be relatively simple for a variety of reasons. The first is that the ISR mining method eliminates the need for treatment of ore through conventional milling circuits like crushing, grinding and leaching. Secondly, as a result of the high uranium concentration and low levels of impurities in the uranium deposit and the uranium rich mining solution, Denison has demonstrated through test work that direct precipitation of the uranium is viable and may eliminate the need for ion exchange or solvent extraction circuits. However, to be conservative and allow for operational flexibility, future design work may evaluate use of additional processing circuits to improve performance. Finally, since the ISR process produces no tailings there is no need for tailings preparation circuits and a tailings management facility.

The processing of the uranium rich mining solution will consist of an impurities (mainly iron) precipitation circuit followed by the uranium precipitation, drying and packaging circuits (**Figure 2.2**). Details are provided in Section 2.3.2. The processing plant will be designed as a closed loop system, meaning that once the uranium is precipitated, the mining solution is refortified with reagents and returned to the wellfield for re-injection and further mining.



Wheeler Processing Plant Overview

Date: Jan. 2019

Source: Wheeler Project Description

2.2 Site History

2.2.1 Property Description

The Wheeler River exploration property is host to the Phoenix uranium deposit discovered in 2008 and Gryphon deposit discovered in 2014 (Figure 2.3) plus additional zones of mineralization and other prospective exploration targets.

Access to the property and deposits is by road, helicopter, or fixed wing aircraft from Saskatoon. Vehicle access to the property is by Highway 914. Access to Highway 914 north of Key Lake Operation is controlled by a gatehouse operated by Cameco. An older access road, the Fox Lake Road, between Key Lake Operation and McArthur River Operation provides access to most of the northwestern side of the property. The Fox Lake Road was decommissioned in 1999 and has been unmaintained since with the removal of all bridges and culverts in 2017. Gravel and sand roads and drill trails provide access by either four-wheel-drive or all-terrain vehicles to the rest of the property.



Lenison Mines

Wheeler River Project
Provincial Technical Proposal and Federal Project Description

Figure 2.3: Location of Wheeler River Property and Phoenix Deposit

May 2019

2.2.2 Land Tenure

The property consists of 19 mineral claims totalling 11,720 ha with an aggregate annual requirement of \$293,000 in either work or cash to maintain title to the mineral claims. In Saskatchewan, a mineral claim does not grant the holder the right to mine minerals. A mineral claim (Crown disposition) grants the right or privilege to explore or prospect for any Crown mineral or any other right to or interest in any Crown mineral or any Crown mineral lands. Based on previous work submitted and approved by the province of Saskatchewan, Denison has secured the title of the Wheeler River property until 2035. Denison continues to explore on the Wheeler River property and the right to explore on the property are reviewed on a project basis annually by the Saskatchewan Ministry of Environment.

A Saskatchewan mineral claim (Crown disposition) in good standing can be converted to a lease (Crown Lease) upon application. Leases have a term of 10 years and are renewable. A lease gives the holder the exclusive right to explore for, mine, work, recover, procure, remove, carry away, and dispose of any Crown minerals within the lease lands which are nonetheless owned by the province. Denison current has not converted any mineral claims to mineral leases. A surface lease agreement will be developed with the province following the successful completion of the environmental impact assessment process. It is anticipated that a small portion of the 11,720 ha mineral lease area will be converted to a surface lease.

Any uranium produced from the Wheeler River property is subject to uranium mining royalties in Saskatchewan, in accordance with Part III of the *Crown Mineral Royalty Regulations*. There is a 10% Net Profits Interest associated with the property held by the Wheeler River Joint Venture in approximate proportion to the ownership interests of each participant. There are no other back-in rights or third-party royalties applicable to this property.

There are no known environmental liabilities associated with the property, and there are no other known significant factors and risks that may affect access, title, or the right or ability to perform work on the property. All necessary permits for surface exploration on the property are in place and current. There are no known authorizations relating to a water lot in the Project area.

2.2.3 Exploration History

The Wheeler River property was staked on July 6, 1977. Excluding the years 1990 to 1994, exploration activities (such as airborne and ground geophysical surveys, geochemical surveys, prospecting, and diamond drilling) have been carried out on the property from 1978 to present. In November 2004, Denison became operator of the property and in 2005 carried out property-wide airborne geophysical surveys. The Phoenix deposit was discovered by diamond drilling in 2008, with subsequent delineation completed over the next six years from 2008 to 2014.

2.2.3.1 Current Site Conditions

Exploration field operations are currently conducted from Denison's on-site camp facilities, which are located approximately 3 km southwest of the Phoenix deposit (Figure 2.3). The camp provides accommodations for up to 40 field staff using ATCO trailer units and tent facilities (Figure 2.4). Fuel and miscellaneous supplies are stored in existing warehouse and tank facilities at the camp. Drill core from exploration activities is also stored on site. The exploration site currently generates its own power by diesel generator.

Denison maintains portions of the site roads necessary to gain access to the camp facilities (Figure 1.1) and complete field activities. This maintenance includes installation of temporary water crossings (bridges) and general road maintenance to ensure safe travel by either four-wheel drive vehicle or ATV. In addition, several gravel and sand roads as well as drill trails provide access by either four-wheel-drive or all-terrain vehicles to the rest of the property. These roads are maintained only as necessary.



Figure 2.4: Denison's Wheeler River Project Exploration Camp

Outside of the Phoenix drilling area (Figure 2.5) and Wheeler exploration camp facility, various surface disturbances have occurred since commencement of exploration activity in 1978. Several ground geophysical survey grid lines transect the property uniformly with an approximate additional 750 exploration pads that were cleared to accommodate diamond drill hole exploration programs. As a result of exploration drilling activities, several portions of the property have been previously disturbed with the removal of vegetation to allow for access trails and drilling areas.



Figure 2.5: Phoenix Deposit Aerial View

2.3 Project Components

The following section describes the anticipated Project components.

An overview of all proposed Project components is provided in Figure 2.6 and the proposed site layout is available in Figure 2.7.

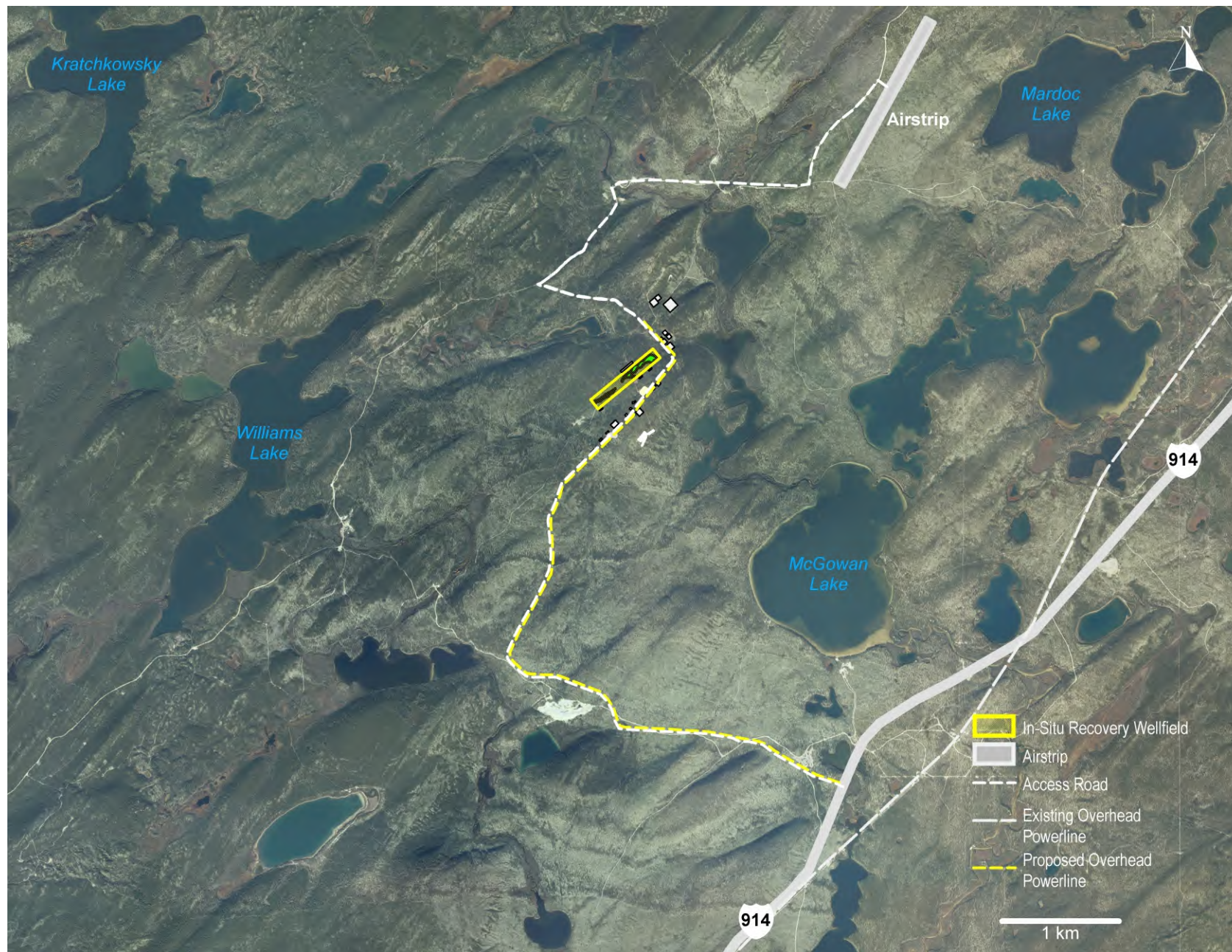
2.3.1 In Situ Recovery of Uranium

2.3.1.1 Mining Solution

Test work completed to date indicates that the uranium at Wheeler is amenable to the same type of leach solution that is used to leach other Athabasca Basin uranium ores in mills: an acidic or low pH solution.

The Wheeler ISR mining solution will initially be created by adding certain reagents (e.g., sulphuric acid (H_2SO_4) and sodium chlorate (NaClO_3)) to fresh water. The fresh water will be sourced from either a shallow groundwater well or a nearby lake. The liquids will be mixed to achieve the optimal pH of the mining solution which is a pH between 1.0 to 2.0.

The mining solution will be pumped underground to the uranium deposit via an injection well and recovered as uranium rich mining solution through a series of recovery wells (Figure 2.1). Once uranium rich mining solution is recovered, it will be pumped from the pumphouses into the processing plant where uranium will be removed from the uranium rich solution. The mining solution will be refortified (Section 2.3.2) with reagents as required and pumped back into the mining horizon via an injection well (**Error! Reference source not found.**). In this way, it is expected that the mining solution will be reused over and over again throughout the mining process. A small volume of make-up water will be added to the mining solution during operations to replace moisture removed during the yellowcake precipitation and drying processes. This make-up water will be preferentially sourced from site runoff where possible; although the EIA will include options for obtaining make-up water from either a shallow groundwater well or a nearby lake.



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Figure 2.6: Overview of Proposed Project Components

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**Figure 2.7: Details of Proposed Project Components
 Around the Wellfield, Camp, and Processing Plant**

Revised: December 2020

2.3.1.2 Wellfield

The ISR wellfield is a group of wells, installed and completed in an area of uranium mineralized. The Wheeler wellfield will consist of a combination of injection and recovery wells, potentially in the general arrangement of one recovery well in the centre surrounded by 6-8 injection wells. At surface, the spacing between the recovery well and each injection well is anticipated to be roughly 10 metres apart (Figure 2.1), with certain areas requiring closer spacing (approximately 5 meters) or further spacing (approximately 15 metres).

With these configuration options, the final wellfield for Phoenix is expected to include approximately 310 wells over a 90 m x 900 m area.

A variety of alternative arrangements or patterns of injection and recovery wells may be used; however, and may include other vertical or horizontal arrangements. The final details of the wellfield design (e.g., pattern on surface, distance between wells, orientation of wells, number of pumphouses, etc.) will be developed as Project engineering advances.

Well Design and Installation

There is no material difference in the design of an injection and a recovery well – both can be used to move mining solution in either direction depending on how pumps direct flow in or out of the ground. Pumping pressures between injection and recovery wells are expected to vary considerably depending on distance and stage of mining.

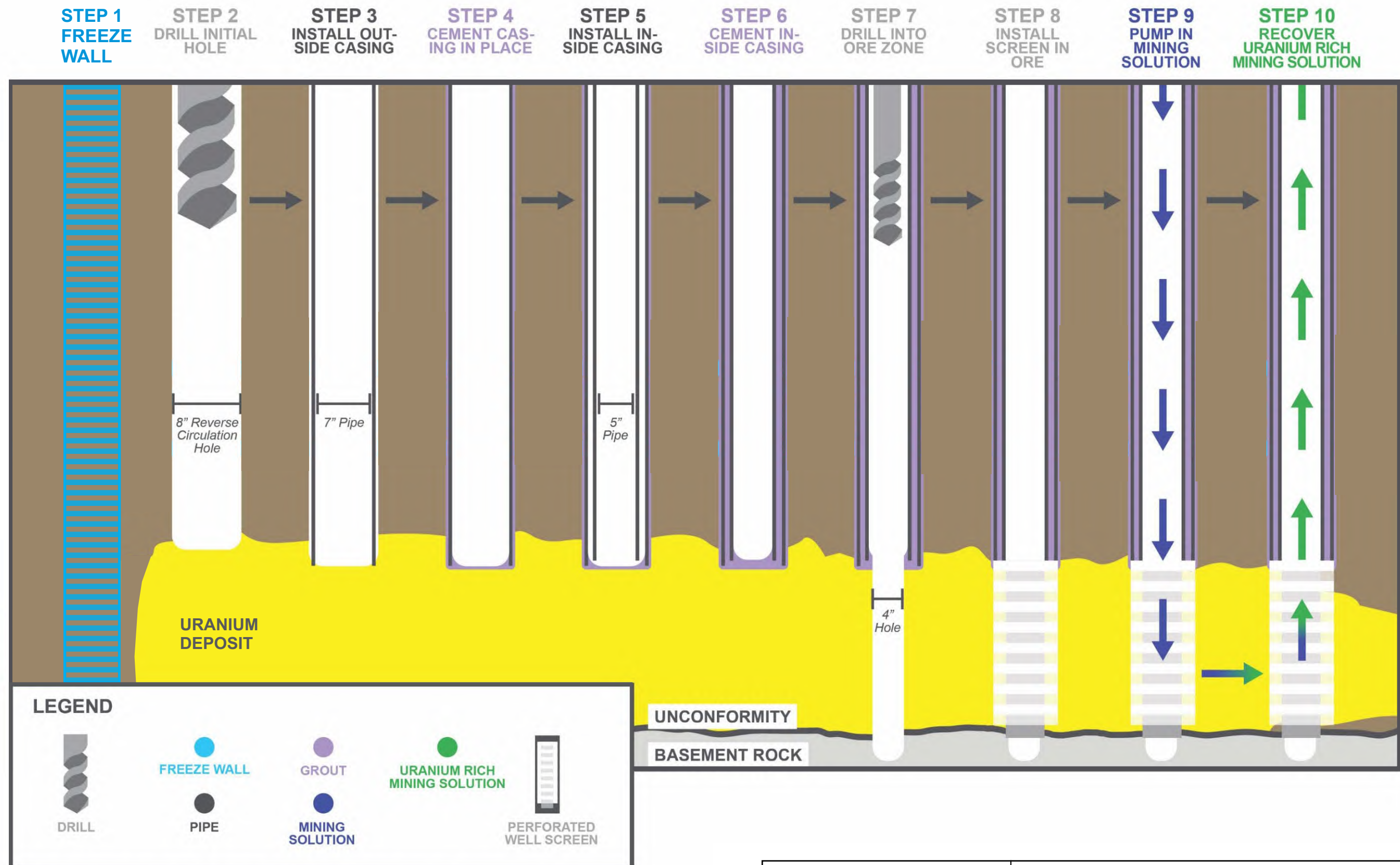
Injection and recovery wells at Wheeler may be about 4 to 8 inches in diameter at surface, however, other diameters may be used in some instances. Figure 2.8 shows photographs of a typical ISR well at surface and a standard type of well cover.

Figure 2.9 provides an overview of Denison's current conceptual well installation sequence based on prefeasibility level engineering. Specific details may change as the Project advances into feasibility and detailed engineering design stages.



Figure 2.8: Typical In Situ Recovery Well at Surface

Source: Confidential uranium in situ recovery operation in the USA



Schematic represents injection and recovery well installation concept at the prefeasibility stage. Details of well design, installation, and dimensions may be refined. Schematic not drawn to scale.

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Figure 2.9: Proposed Well Installation Sequence

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Pumphouses

Based on the current designs for the Project, approximately three pumphouses will be needed. A pumphouse is a small building or container on surface where pipes from injection and recovery wells are operated and flows of mining solution are monitored. See photos in Figure 2.10 for examples of components inside an operating ISR pumphouse in the USA.



Figure 2.10: Inside a Typical In Situ Recovery Pumphouse

Source: Confidential uranium in situ recovery operation in the USA

Pumphouses will distribute the mining solution to the injection wells, as well as collect the uranium rich mining solution from the recovery wells. Each pumphouse will be connected to two production trunk lines. One of the trunk lines will be used for receiving mining solution from the processing plant, and the other will be used for returning uranium rich mining solution back to the processing plant (Figure 2.1 and Figure 2.7). Each pumphouse will include a manifold, valves, flow meters, pressure meters, and instrumentation, as required, to fully operate, monitor and control

the process. Pumphouse control monitoring systems enable operators to individually adjust each recovery or injection well as well as allow for sampling. Operators can also use the master control system in the processing plant to remotely control pumphouse production lines.

Ventilation in the pumphouses will be designed with the ALARA principle (as low as reasonably achievable) in mind to provide sufficient worker protection from potential radon and radon progeny exposure. Monitoring systems will be in place to ensure these mitigation measures are meeting design specifications.

Wellfield Piping System

Pipelines will transport the mining solution to and from the processing plant. The flow rates and pressures of the individual well lines will be monitored in the pumphouses. This data will be transmitted to the processing plant for remote monitoring through a master control system. Through the master control system, operators will be capable of controlling pumphouse production lines remotely.

Double-walled high-density polyethylene (HDPE), or equivalent, piping will be used in the wellfields and will be designed and selected to meet design operating and environmental conditions.

The lines from the processing plant, pumphouses, and individual well lines will be freeze protected and secured to minimize pipe movement.

Monitoring Wells

Groundwater monitoring wells will be installed at various depths and locations in and around the wellfield. The monitoring wells will allow for both groundwater sample collection and measurement of groundwater level.

Mechanical Integrity Testing

After an injection, recovery, or monitoring well has been completed, and before it is made operational, a mechanical integrity testing of the well casing will be completed to ensure the installation has been successful and the well is functioning as designed. Well casings that fail integrity tests will be repaired before the well is placed into service.

2.3.1.3 Freeze Wall

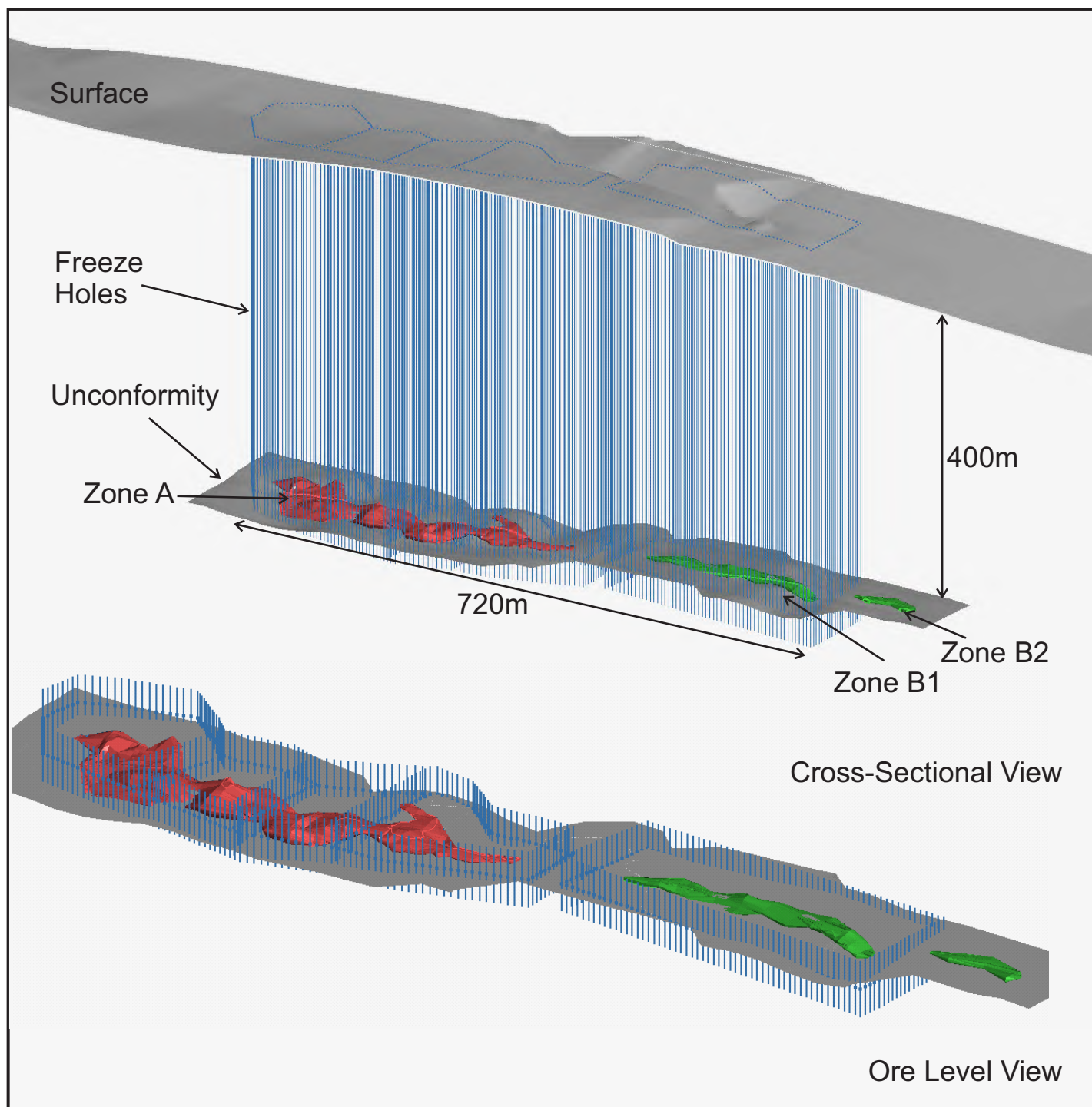
In typical ISR operations, containment is normally achieved through naturally impermeable geological layers (aquitards) or by artificially creating a drawdown of the water table by pumping.

At Wheeler, the very low permeability basement rock below the uranium deposit serves as a natural aquitard; however, the sandstone hosting the uranium deposit is permeable and groundwater can flow horizontally through the deposit. To achieve containment at Wheeler, the uranium deposit will be surrounded by an engineered freeze wall from the basement rock to surface, isolating the uranium from regional groundwater movement.

Ground freezing technology is well established throughout the world. Its use in a mining environment was pioneered in Saskatchewan's potash mining industry and later adapted for use in Saskatchewan's uranium industry. Ground freezing to control and eliminate groundwater from entering the mining areas is a fundamental component of two existing Athabasca Basin underground uranium mines.

The freeze wall will be established by drilling parallel cased holes from surface, anchoring into the impermeable basement rock. The freeze wall will be constructed to surround the entire mining horizon. This process is illustrated in Figure 2.11 and is expected to be achievable using existing commonly used drilling techniques. Once the drill holes have been installed, a low temperature brine solution will be circulated through the cased holes to remove heat from the ground, ultimately freezing the natural groundwater and establishing an impermeable, frozen wall to encompass the uranium deposit. While the freeze wall is expected to be several metres thick, it will be developed around the uranium deposit, to ensure the uranium deposit itself does not freeze.

The area within the freeze wall will allow for full containment of mining fluids and protect the regional groundwater.



Freeze Plant

A freeze plant will be required on surface; near the deposit where the freeze holes are collared (Figure 2.7). The freeze plant will be constructed on surface based on a modular design for easy installation and operation. The design for the freeze plant includes:

- Several modular freeze plant skids;
- Electrical/control skids;
- Evaporative condenser skids; and
- One insulated brine tank.

Freeze Wall Timeline

Modelling predicts the freeze wall will require 14 months to be established. The freeze wall will be in place throughout the operations phase. The freeze wall will be designed to allow for phased mining of the deposit and facilitate discovery and implementation of continuous improvement initiatives.

After decommissioning once the freeze wall is no longer needed and refrigeration is turned off, it will take a minimum of 1 year for the freeze wall to thaw depending on how long the freeze wall was active and actual ground conditions encountered.

2.3.2 Processing Plant

Refer to **Figure 2.2.** for an overview of the conceptual design of the processing plant.

The processing plant will house the tanks and equipment to fully process uranium rich mining solution recovered from the ISR wellfield into yellowcake and refortify the mining solution for continued use in the ISR wellfield. The processing plant will also contain filtration systems, bulk chemical storage, process solution storage tanks, and a control room.

The processing plant will be designed with expert consideration of potential environmental and health and safety effects to mitigate interactions to the extent possible. For instance, the floor will be graded as required and sumps will be installed to collect any spills. Ventilation in the processing plant will be designed with the ALARA principle in mind to provide sufficient worker protection and monitoring systems will be in place to ensure worker health and safety. Dust control and good housekeeping practices throughout the processing plant will also form a critical component of the Radiation Protection Management Plan developed for the Project. The processing plant exhaust, mainly from drying and packaging areas, will be directed through a stack and released outside of the building. The stack height will be designed based on results of air dispersion modelling to be an appropriate height for optimal dispersion. Bulk storage tanks for the processing chemicals, such as sulfuric and/or hydrochloric acid, sodium hydroxide, and hydrogen peroxide, will be located outside the processing plant. The storage tanks will sit inside appropriately designed and sized concrete

secondary containment basins. The secondary containment basin for each applicable chemical system will be physically separated from the containment basins for other chemical systems.

The plant is anticipated to be approximately 50,000 ft² (4,600 m²) in size, which is about half the size of a CFL football field. The building will be constructed adjacent to the wellfield to minimize piping distances (Figure 2.7).

The uranium bearing solution will be pumped from the wellfield pumphouse(s) to the processing plant and pumped through the following circuits:

- *pH adjustment (not shown in Figure 2.2)* – The pH of the incoming uranium rich mining solution will be monitored and adjusted as required to ensure the uranium is fully dissolved.
- *Impurities Removal Process* – Uranium rich mining solution will be pumped to an impurities removal circuit where the pH of the solution will be adjusted to allow the precipitation of iron hydroxides and other metals. Once the impurities have precipitated out of the uranium rich mining solution, the solution is routed to the yellowcake precipitation circuit. Precipitated impurities removed at this step will be placed into totes and stored on the lined waste pad (Figure 2.7) until final disposal.
- *Uranium Precipitation* – Uranium is recovered from the uranium rich mining solution following the impurities removal process. Reagents are added to the uranium rich mining solution in a series of agitation tanks to precipitate dissolved uranium. If required, there is additional pH adjustment. The solution moves to a thickener that provides time for growth of the uranium oxide crystals. The precipitated uranium will accumulate at the bottom of the thickener and the mining solution, now depleted of uranium, will rise to the top. The mining solution is cleaned through a series of sand filters prior to refortification and re-injection into the wellfield. The precipitated uranium product accumulated at the bottom of the thickener is withdrawn at the underflow of the thickener and pumped through a filter press (*not shown in Figure 2.2.*), where excess liquid is removed and circulated back to the thickener.
- *Yellowcake Dewatering/Drying and Packaging* – Entrained solids particles exiting the filter press will be collected for drying and packaged. Fresh water is sprayed on the surface of the cake to reduce the entrainment of contaminants in the dryer. Any remaining moisture is evaporated in the dryer. Any water collected from the drying process will be condensed and reused in the plant for reagents preparation. Once the moisture is removed from the yellowcake product, the yellowcake is packaged into 400 L steel drums via gravity. Denison will evaluate the use of either low temperature dryers or calciners for drying in the processing plant.
- *Mining solution refortification* – The ISR process circulates the mining solution through the uranium deposit over and over, and it is expected that contaminants may accumulate in the continuously recycled solution. Accordingly, it may be required to remove (or ‘bleed’) a portion of the mining solution to prevent accumulation of contaminants. The bleed solution will be routed to the water treatment plant where the contaminants will be removed from the system

and any produced cleaned water will be re-used as process make-up water when possible. This bleed volume in addition to moisture losses in the drying process must be replaced. Reagents will be added to any makeup water (sourced from either surface runoff or fresh water from groundwater or a lake) and will then be mixed with the recycled mining solution and re-injected into the mining horizon.

The ISR wellfield and processing plant will be designed to efficiently recover uranium and to reduce operating costs by recycling and re-using most of the solutions inside each circuit. Any excess treated water from the WTP will be released to a surface water body or injected into groundwater via deep well injection once acceptable water quality is achieved.

2.3.2.1 Production Capacity

The anticipated production capacity of Wheeler is up to 12 Mlbs/year with a mine life of up to 20 years. This is above the current known reserves at Wheeler and is intended to provide a conservative basis for assessing Project effects in the EIA and operational flexibility.

2.3.3 Roads

Mainland access to the site will be from Highway 914. A seven-kilometer (7 km) section of road will be constructed from the highway to the Wheeler site and a five kilometer (5 km) long road will also be constructed from the Wheeler site to the airstrip (Figure 2.6); the total road length is twelve kilometers (12 km). Additional site roads will include a service loop to the camp and a short service road to the runoff pond and the potential treated effluent discharge point.

Many of the proposed roads will be developed along previously disturbed areas, including roads currently used for exploration activities, thereby minimizing terrestrial habitat disturbance.

Denison anticipates the need for installation of two water crossings along the road from the Wheeler site to the airstrip. The crossings will be designed, constructed and maintained to avoid causing harm to fish and fish habitat.

During the PFS process (Denison 2018), an assessment was completed to evaluate access road alignment options from the highway into the Wheeler site. Several routes were analyzed for key factors including: length, cut and fill quantities, distance from cabins, distance from waterbodies and distance from any water crossings. As outlined in Section 8.2.1.2, a workshop was completed with communities to obtain input from local Indigenous and non-Indigenous communities into the access road routing options. After the engagement process and using community input, the preferred route was selected and incorporated into the current Project design.

2.3.4 Supporting Infrastructure

2.3.4.1 Air Strip and Terminal

As a proposed fly in-fly out operation, Wheeler will require an airstrip to bring personnel to and from the site.

A 1,600 m long airstrip is proposed to be positioned in a natural and relatively flat valley to the NE of the Wheeler site (Figure 2.6). The magnetic headings are 03/21, which is similar to both the Collins Bay airport and Key Lake airstrip. The runway has been designed to accommodate the aircraft presently used by existing mining operations in northern Saskatchewan to transport personnel into and out of site. An airstrip terminal building and two double-walled Jet A fuel tanks, to provide site service to aircraft as required, will be constructed near the airstrip. The approach line to the airstrip from the SW clears the Wheeler surface facilities by 500 m.

2.3.4.2 Accommodations Facility

Located to the southeast of the wellfield, the proposed accommodations facility is anticipated to be a turnkey building manufactured offsite and assembled and commissioned on-site. The building's design will be sized to accommodate a peak load of about 100-150 individuals during operations; however, due to its modularized design, additional modules can be easily installed should additional beds be required in the future.

The facility will include a central services complex with:

- Kitchen with food preparation area and serving area;
- Dining room;
- Camp office;
- Commissary;
- Recreation area; and
- Exercise facilities.

2.3.4.3 Operations Centre

The operations complex is planned to be a standalone, multi-functional building that will serve the administrative, technical, and maintenance needs of the site.

At the PFS stage, the building is proposed to be a two-story pre-engineered structure with total usable space of 38,000 ft²: 27,000 ft² on the first floor and 11,000 ft² on the second floor.

The first floor will house the two-story shops, dry space, and warehouses. The shops will include three full-sized maintenance bays, with one being equipped as a welding bay. Areas of the operations centre will be designed to have containment and sumps as required. Men's and women's change areas (dries) will be provided, with contamination control and suitable wash spaces for each, including laundry facilities. The warehouse has two receiving doors adjacent to the shops. Office spaces will also be provided in these areas for warehouse and procurement staff as well as maintenance supervisors.

The second floor will have administrative space with offices, a boardroom, meeting rooms, lunchroom, and washrooms.

Additional facilities include:

- Medical or nursing station with waiting area;
- Parking space for emergency response vehicles;
- Space for storage of mine rescue/emergency response gear and supplies;
- Laboratory facilities;
- Training room; and
- Mechanical and electrical services rooms.

2.3.4.4 Security Houses and Truck Scales

Access to the property will be controlled by both a north and south security gate (Figure 2.7).

The main, south gate security house will be staffed as required and be equipped with an 80-tonne weigh scale that is hard-wired into the shack. The security and truck scale buildings are planned to be modular, pre-fabricated units that will be manufactured off-site and shipped to site for installation and commissioning. The south gate facilities will have appropriate power and communications capability.

The north gate will be a simple locked gate.

2.3.4.5 Wash Bay and Scanning Facility

A wash bay will be available to clean items, equipment and vehicles that may have been in contact with potential contaminants. Contaminated water from wash bay will be collected in a sump tank and routed to the water treatment plant for treatment and discharge.

Radiological clearance scanning required for any items, equipment and vehicles leaving the site will be conducted in the same building.

2.3.5 Power Needs and Power Supply

Operation of an ISR uranium mine does not require substantial inputs of energy compared to traditional mining methods.

In an effort to further improve Wheeler's energy efficiency, Denison will assess using state of art technology for battery-powered light vehicles and mobile equipment. Similarly, Denison will evaluate the viability of using an AC powered dual rotary drill for ISR wellfield development rather than a traditional diesel-powered unit. Site infrastructure anticipated to draw power from the provincial power grid, includes the camp buildings, operations buildings, the ISR precipitation plant, and the freeze plants.

Primary Power Supply

Electrical service to Wheeler will be provided via an approximate 5 km extension tap from the existing 138 kV overhead transmission line that runs along Highway 914. Optimization of the precise line route will be completed as the Project advances and will likely follow the access road alignment.

Power transmission to the site (e.g., assessment, obtaining necessary permits, and construction) will be led by SaskPower and is not considered as part of this Project (refer to Section 2.6).

Back-up Power Supply

Based on historical data provided by SaskPower, the outage rate of the existing line is approximately six outages per year. To provide electrical service during times of utility outages, emergency diesel generator will be installed in strategic locations to service the site and maintain essential functions.

The generators will be used to maintain power to the processing plant and the accommodations facility, as well as to maintain other essential services as required.

2.3.6 Water Management and Treatment

As part of Denison's approach to sustainable mining at Wheeler, Denison intends to recycle process water to the greatest extent possible, thereby reducing the demand for a fresh water supply. The proposed recycling process design incorporates a closed-loop system within which only limited make-up water is estimated to be required to supplement ISR mining and on-site processing. As a result of the focus on water recycle, the volume of treated effluent requiring discharge is expected to be low.

2.3.6.1 Site Runoff

Water will be collected from the waste pond (which collected runoff from the waste pad) and the processing plant terrace and then directed to the water treatment plant. Runoff for the small clean waste rock pile may be collected into a settling pond to remove total suspended solids if necessary. Other site runoff collection needs will be examined and identified as part of the EIA.

2.3.6.2 Fresh Water Supply and Distribution

A fresh water distribution system will be designed to provide fresh water to the fire water system (fresh water tank, two electric fire water pumps, and a back-up diesel fire water pump for on-site fire suppression needs), the potable WTP, the processing plant, wash bay and temporary batch plant (required during construction phase). Fresh water will be sourced from either a shallow groundwater well or an intake from a nearby surface water body. Estimated fresh water consumption rates are provided in Table 2.1 below.

Table 2.1: Estimated Fresh Water Consumption Rates

| Consumer | Flow Rate (L/day) |
|--|-------------------|
| Processing Plant | 2,000 |
| Wash Bay | 6,000 |
| Potable WTP | 30,000 |
| Temporary Batch Plant (during construction only) | 5,000 |

2.3.6.3 Potable Water Treatment Plant and Distribution

Raw water for the potable WTP will be sourced from either groundwater or a nearby surface water body.

Potable water will be generated on site by a pre-fabricated modularized (40 ft shipping container) potable WTP comprised of a treatment plant, a 2,000 L storage tank, and a bottle filling station. Potable water will be piped to the camp, the operations centre, and the processing plant to provide water for safety showers and eyewash stations. Other locations, such as the airstrip terminal, gate houses and satellite lunch trailers (during construction) will receive bottled water as required.

Ultrafiltration or reverse osmosis with UV filtration are proposed for filtration. Chlorination will be needed prior to distribution. The modular plant will be capable of all necessary processes and will contain required HVAC and lighting. The potable WTP will be placed on a concrete pad and will generate 1.4 m³/hr (33 m³) of potable water per day based on 300 L per person per day. Raw water will be pumped to the potable WTP via pipeline from the fire water storage tank and fresh water distribution system.

2.3.6.4 Sewage Treatment Plant

Domestic waste water and sewage will be generated at the camp, processing plant, and the operations centre. Domestic waste was assumed to be generated at the rate of 300 L per person per day. Sewage will either be collected in septic tanks and transported by a vacuum truck or piped directly to the on-site sewage treatment plant. The sewage treatment plant will be a modular facility comprised of two heated and insulated units (likely containers), a holding tank, ancillary filtration, ancillary treatment process equipment, and sludge handling system. Denison may investigate options to dispose of treated sewage underground or through a septic field. Alternatively, the sewage treatment plant will generate effluent suitable for discharge to local surface water. Treated effluent will first be discharged to surface testing ponds where the water quality will be checked to ensure it meets regulatory limits. Reject solids from the treatment process will be collected, dewatered, and stored on the waste pad on site prior to permanent disposal.

2.3.6.5 Water Treatment Plant

The Wheeler WTP will be designed to treat any contaminated water removed from the ISR process (e.g., backwash of sand filters, bleed solution), runoff collected from the waste pad, and any other contact water such as water from the wash bay and process sumps. The WTP will be located inside of the processing plant.

Contaminants will be removed from the system. It is Denison's intent to incorporate treated water back into the mining water balance as make-up water in the processing plant, to the extent possible. Any excess treated water from the WTP will be pumped to appropriately-sized holding

ponds. The holding ponds will be sized to hold effluent for a period of 24 hours for testing before discharge to the environment.

Treated water in the ponds will be monitored prior to release to a surface water body or injected into groundwater via deep well injection. All treated effluent released to surface water will meet federal and provincial regulatory discharge limits. The treated effluent discharge line will be heated and have secondary containment in place.

Details on the proposed treated effluent discharge location, the pipeline, the type of release point, and modelled results of any changes in the aquatic environment will be presented in the EIA.

2.3.7 Waste Management

2.3.7.1 Incinerator

Denison plans to operate an incinerator to incinerate any food waste. This is a best practice to avoid attracting wildlife into the site. It is expected that selection of an appropriate incinerator will have design components to mitigate emissions to air. Correct operation and regular maintenance of the incinerator will be important to achieve the design parameters for minimizing emissions to air and procedures will be in place to achieve this.

2.3.7.2 Landfill

Denison plans to construct, operate, monitor and decommission a domestic landfill on site. A waste management plan will be developed for the Project which will detail how each type of waste generated on site will be managed. In general, only inert non-hazardous wastes such as wood and plastics will be suitable for disposal in the on-site landfill.

2.3.7.3 Waste Pad and Pond

During operations, the waste pad is expected to contain:

- Mineralized drill cuttings from wellfield development;
- solid impurities (mainly iron and/or radium) removed from the uranium rich mining solution during the impurities removal step in the processing plant; and
- dewatered reject solids from the sewage and water treatment processes.

The waste pad will be double lined, with leak detection capabilities and an associated monitoring program to ensure containment. An adjacent pond will be used to collect runoff from the pad and water in the waste pond will be piped to the water treatment plant for treatment. As part of the EIA, Denison will identify options for either on-site disposal of these wastes or off-site disposal at an approved facility.

2.3.7.4 Clean Waste Rock Pad and Pond

Clean waste rock will be generated from the sandstone cuttings from drilling activities. This includes the drilling of the injection and recovery wells to create the ISR wellfield and the drilling of

freeze holes to create the freeze wall. It is estimated that a total of 7,100 m³ of clean waste rock will be generated.

Clean waste rock will be stored on an unlined pad and can be used for road or concrete construction. A pond may be constructed beside the pad to collect runoff if required.

2.3.7.5 Hazardous Substance Storage and Use

Fuel Storage and Dispensing Facility

Since the site's primary power supply will be from the provincial electrical grid, Wheeler fuel consumption at Wheeler may be limited to back-up power supply, auxiliary vehicles (i.e. ATVs and snowmobiles), miscellaneous equipment (i.e. portable pumps), and freight and personnel transportation to site. This will reduce Project fuel consumption and minimize greenhouse gas emissions.

Tanker trucks will deliver diesel and gasoline to the site on an as-needed basis. Fuels will be stored in approved, above-ground, 25,000 L double-walled storage tank(s) equipped with secondary containment in accordance with provincial regulations and standards. Fuel storage and distribution infrastructure will be constructed in accordance with applicable legislation requirements (e.g., *Hazardous Substances and Waste Dangerous Goods Regulations*). Stationary and mobile equipment will be fueled with a fuel-dispensing truck.

Propane Facility

Propane may be used as a primary or backup means to support the camp kitchen, the incinerator, and to heat the buildings. The propane facility will be sized to meet the needs of the site activities and will feature a storage tank (assumed to be 30,000 uswg), vaporizers, a propane bottle fill station, and a propane bottle weigh station. Propane will be delivered to site on an as needed basis.

Other Hazardous Substances

Sulfuric acid, hydrogen peroxide, sodium hydroxide, barium chloride and flocculants are the main chemicals anticipated to be used in the processing plant and in mining. Bulk storage tanks for the processing chemicals, such as sulfuric and/or hydrochloric acid, sodium hydroxide, and hydrogen peroxide, will be located outside the processing plant. The storage tanks will sit inside appropriately designed and sized concrete secondary containment basins. The secondary containment basin for each applicable chemical system will be physically separated from the containment basins for other chemical systems.

The various lubricants and coolants required for regular maintenance of equipment will be stored on site.

Each one of these materials will be stored, handled, recycled or disposed of in an appropriate manner and meet the requirements of the *Hazardous Substances and Waste Dangerous Goods Regulations*.

No fuels, oils or other hazardous substances will be stored within 100 m of any water body and no equipment maintenance or re-fuelling will be conducted within 100 m of a water body. Denison will maintain an up to date record of the various hazardous substances on site and will maintain Material Safety Data Sheets and appropriate procedures for spill management, handling and clean up in an accessible location.

2.4 Project Activities and Schedule

The following sections describe the main activities to be performed in each Project phase and the proposed schedule for Project development.

2.4.1 Pre-Development and Construction

2.4.1.1 Pilot Demonstration Well Pattern

In order to obtain essential data for detailed engineering, licensing and the environmental assessment, Denison may elect to operate a pilot demonstration well pattern. A separate proposal will be submitted to the appropriate regulatory agencies for review and approval. The pilot demonstration may include well development, circulation of mining solution over a small spatial area and subsequent recovery of the mining solution. Permeability enhancement of the uranium deposit may be included as part of the scope. Monitoring wells will be in place and monitoring will be conducted to ensure the well pattern functions as proposed. It is not anticipated that the pilot demonstration will incorporate the use of a freeze wall.

2.4.1.2 Pre-Development Phase

Following receipt of environmental approvals, the preparatory phase will include initiation of licensing activities, organization of the Project execution team, preparation of key Project documents, and procurement of equipment, materials, and labour. These activities will be initiated during the last stages of the feasibility study should results continue to support advancement of the Project.

2.4.1.3 Construction Phase

Following receipt of licensing approvals, construction activities on site will commence. Construction of Wheeler infrastructure can be divided into several key areas as outlined below.

Site Preparation: Clearing and leveling of the surface facilities will be contracted out to a suitable contractor. The initial earthworks construction will focus on preparing roads into the site, specifically to the ISR plant and the two ends of the wellfield where the freeze wall drilling will occur. These two sites will remain the focus of levelling and grading activities. All of this work will be supported by temporary camps and utilities (and/or the existing exploration camp and utilities) while permanent facilities are established. Temporary security checkpoints will be established early in the site preparation phase.

Wellfield and Freeze Hole Drilling: Denison has been drilling on the property since 2004; this experience and knowledge will be applied to the drilling of the freeze and wellfield holes. Suitably qualified and experienced contractors will be overseen by Denison personnel to complete drilling activities.

Ground freezing requires the establishment of a pattern of freeze wells drilled across the uranium deposit and of refrigeration units and corresponding electrical and mechanical services to each. Freeze well drilling will be initiated as early as possible. The ground freezing units will arrive at site and be physically installed and operating when the appropriate tie-ins to the site power distribution system is completed.

Processing Plant Construction: While the processing plant is likely the most complex construction activity for the Project, it is relatively simple when compared to other full-service uranium mills, as there are a limited number of vessels and minimal piping. Furthermore, due to the degree of isolation of the plant from other site facilities, construction of this facility can be prioritized with minimal impact to other facilities. Most of the equipment and materials inside the plant are small in size, enabling the shipment of tanks and other vessels pre-assembled. Processing plant construction will begin immediately following earthworks at the site. After foundations are completed, the building can start constructed. A short commissioning period begins post-construction prior to first uranium production.

Other Surface Infrastructure: Other surface infrastructure includes camp buildings, the operations centre, the airstrip terminal building, and various other smaller infrastructure. With the exception of the operations centre and processing plant, all other buildings are expected to be pre-fabricated buildings to reduce the costs of construction on site.

The operations center is planned to be completed ahead of commissioning. This will allow the operations team to conduct activities in a suitable building and will create a permanent maintenance facility before operations commence. The permanent camp is completed in a similar time frame, along with basic services such as permanent communications and fire systems.

A temporary batch plant will be used during the construction phase. Concrete will be required for construction of foundations and containment walls in select surface infrastructure.

Electrical infrastructure: A powerline will be constructed from the existing provincial power line adjacent to Highway 914 into site to the main substation. Distribution around site will be completed as required to support the various operations.

Other: The balance of the infrastructure items, such as storage areas, incinerator, and security gates, are planned to be completed at about the time of commissioning and will complete the construction at Wheeler.

Commissioning of the facilities is expected to be supported by engineering and/or supplies vendors along with the assistance of the construction teams. This will ensure constructed facilities adhere to the designs and specifications set forth.

Project and construction management during the capital development phase of the Project will be managed by a small dedicated Project management team. During the construction phase, Denison will provide general and administrative services to operate the site and support the contractors in construction (i.e. room and board, flights, general supplies, freight haulage, etc.). It is expected that a mix of employees, contractors, and engineering service providers will support site construction efforts.

Wheeler construction milestones are summarized in Table 2.2.

Table 2.2: Wheeler Conceptual Development Schedule

| Project Activity | Schedule* |
|---|-----------|
| Environmental Impact Assessment and Licensing | 2019-2022 |
| Feasibility Engineering | 2019-2021 |
| Detailed Engineering | 2021-2022 |
| Construction | 2022-2024 |
| Operation | 2024-2044 |
| Decommissioning (does not include progressive decommissioning during operations) | 2044-2049 |
| Post-decommissioning | 2049-2054 |
| Release from licence and transfer back to Crown land or into Provincial Institutional Control Program | 2055 |

*2020 Update: Note on COVID 19 - Given recent social, financial and market disruptions, Denison suspended certain activities at Wheeler River, including the Environmental Assessment program, which is on the critical path to achieving the project development schedule outlined in the PFS. On November 9th, Denison announced its decision to restart the EA, effective January 2021. However, uncertainty associated with the temporary suspension remains and the Company is not yet able to estimate the impact to the project development schedule outlined in the PFS, and users are cautioned that the estimates provided therein regarding the start of pre-production activities in 2021 and first production in 2024 should not be relied upon.

2.4.2 Operation

Operation of Wheeler is planned to last up to 20 years. Denison anticipates operating the site with employees and a limited number of external contractors.

The operation phase is generally focused on operating the Project components presented in Section 2.3. As such, the operational activities for Wheeler include but are not limited to:

- Operation of the ISR wellfield;
- Operation of the ISR processing plant and production of uranium concentrate at a production rate of up to 12 Mlbs U₃O₈/year;
- Maintenance activities at the wellfield, processing plant, roads, airstrip and other site facilities;

- Water withdrawal from groundwater or surface water body for potable use, fire suppression system and make-up water in the processing plant;
- Water treatment of potable water, sewage, and waste water;
- Waste management;
- Environmental monitoring as outlined in the Environmental Management System;
- Package and transport of nuclear substances;
- Reporting to regulators;
- Engagement with local Indigenous and non-Indigenous communities; and
- Systems for maintaining site security.

2.4.3 Decommissioning

The five main decommissioning activities include:

- Mining horizon remediation;
- Decontamination;
- Asset removal;
- Demolition and disposal; and
- Reclamation.

Progressive decommissioning will be completed throughout the life of the Project whenever feasible and reported to the regulatory agencies as part of the annual reporting requirements throughout operations. Progressive decommissioning activities will focus on the decontamination, demolition, and disposal of unused buildings and infrastructure, as well as the removal of unused equipment and machinery. Reclamation of inactive areas will take place when these areas become available.

Closure of the entire Project will be completed in accordance with all provincial and federal regulations and guidance documents with the fundamental considerations being to ensure physical and chemical stability of the site in order to protect human health and the environment.

2.4.3.1 Mining Horizon Remediation

Mining horizon remediation will be initiated once mining is completed. The objective will be to restore the water within the confines of the freeze wall to reach an acceptable decommissioning objective. Details on groundwater quality decommissioning objectives for the mining horizon will be developed as part of the EIA.

To complete mining horizon remediation, water will be injected into the mining horizon via injection wells and then recovered through the recovery wells. Produced water would be processed through the processing plant until non-economic uranium concentrations are observed. Non-economic produced waters will be treated and mixed with fresh water for continued circulation in

the mining horizon. This will continue until recovered water reaches acceptable groundwater quality decommissioning objectives.

During groundwater restoration, reagents may be added to the injected water to accelerate groundwater quality recovery.

After remediation has been completed, the freeze wall will be turned off and allowed to thaw. This will allow the eventual re-establishment of the pre-operational groundwater flow regime in the former mining horizon.

2.4.3.2 Decontamination

Surface facilities and injection, recovery, and monitoring wells will be systematically surveyed and decontaminated as necessary. Surplus chemicals and other hazardous materials will be removed and stored in designated temporary storage facilities. Sumps will be cleaned. All hazardous materials will be disposed of at approved off-site facilities. All radiologically contaminated material will be disposed of on-site in accordance with licence conditions.

Empty tanks will be removed from the sites and sold as scrap or reused. Otherwise, they will be transported to an approved waste management facility. Fuel tanks will be managed by a contractor licenced to handle these types of tanks. Any remaining fuel and tanks will be removed by the contractor from the site. As much waste as possible will be hauled off-site and disposed of at appropriate licenced facilities.

2.4.3.3 Asset Removal

Salvageable machinery, equipment, and other materials will be dismantled, decontaminated, and taken off-site for resale or recycling. Remaining items will either be managed at a facility licenced to manage radioactive wastes or disposed of in an approved facility on-site.

2.4.3.4 Demolition and Disposal

All permanent structures that cannot be removed from the property as an asset will require demolition. Most process equipment and non-supporting structures will be removed from buildings prior to demolition and the buildings will be demolished.

During demolition, dust control will be required. An initial wash may be necessary, in addition to the wetting of demolition debris as structures are disturbed during demolition. The requirement and duration of misting will be determined on a case-by-case basis.

A review prior to the start of demolition will identify areas requiring additional procedures. Where possible, dust generating materials will be removed prior to demolition. Appropriate personal protective equipment and personnel decontamination procedures will be employed.

Valuable recyclable materials will be separated and processed for transport and sale concurrent with demolition. Excavators equipped with grapples will sort the recyclable products from the non-

recyclables. Shears will be used to size recyclables for shipping and sale. Cleaning procedures of recyclables will be integrated into demolition, as necessary.

Concrete foundations will be left in place. Any portions of concrete foundations remaining above grade will be levelled and rebar will be cut-off at grade. Large slabs will be perforated on a 2 m grid to permit drainage. Concrete slabs will be covered with 0.5 m of development rock or locally stockpiled till.

The demolition process will produce:

- Saleable recyclable materials (steel, stainless steel, copper, steel sections, and sheet metal);
- Hazardous materials, including contaminated material that cannot be decontaminated;
- Roofing materials and insulation;
- Wood;
- Concrete; and
- Contaminated soils.

Saleable recyclable materials will also be transported off-site as scrap or recycled.

Hazardous materials will be handled and disposed of in accordance with the appropriate regulations and good practice. Where possible, chemicals will be mixed to produce a neutral solution and disposed of in an approved manner at site. Hazardous materials, such as spent chemicals (that cannot be managed on-site), waste oil, and sludges, will be disposed of off-site at licenced facilities.

Non-hazardous waste materials, such as roofing materials, insulation, wood, co-mingled concrete, and light steel (i.e. hand railings), may be disposed of on-site or off-site in a licensed landfill. Soil testing will be conducted in any areas of known contamination and/or potential spills, including areas around chemical, fuel, and explosive storage areas. Testing will be conducted according to industry standard procedures and compared to provincial and federal soil standards.

2.4.3.5 Reclamation

An overview of the reclamation activities that will be completed for the main Project components is provided below. The main Project components that will require reclamation at closure include:

- ISR wellfield and infrastructure;
- Transportation corridors and laydown areas;
- Ancillary infrastructure;
- Waste pad; and
- Water storage ponds.

Closure of the ISR wellfield and associated infrastructure will require the following activities:

- Decommissioning of all injection and recovery wells, following acceptable wellfield restoration;

- Removal, decontamination, and disposal of all surface piping;
- Decontamination and removal of the pumphouses;
- Decontamination, removal, and/or disposal of the processing plant;
- Allowing the freeze wall to thaw and decommissioning of all freeze pipes and freeze plant; and
- Placement of all waste in an approved long-term licenced facility.

Prior to reclamation, the existing wellfield will be used to circulate neutralizing solution and clean water through the mining horizon. The tanks in the processing plant may be repurposed and used for the closure water treatment process.

Transportation corridors will be graded and scarified to promote natural revegetation. Access roads required for post-closure monitoring will be left as is and maintained to permit access. Access to the site will be restricted by gates and/or berms. Laydown areas will be scarified, covered with 0.5 to 1.0 m of stockpiled overburden, and vegetated with native self-sustaining species.

Reclamation of remaining infrastructure components involves the decommissioning and removal of components such as power transmission lines and electrical infrastructure, water pipelines, and water treatment plants. Ponds and lined settling ponds will be decommissioned once they are no longer required for water management. Any contaminated liners will be removed and hauled to an approved landfill. The footprints of ancillary infrastructure will be scarified and vegetated with native self-sustaining species as required.

2.4.4 Post-Decommissioning

The post-decommissioning period will extend from the end of physical decommissioning until transfer of the site into the provincial Institutional Control Program (Government of Saskatchewan 2009) or direct release of the land back to the Crown, is expected to last five years.

Following decommissioning, physical, chemical, and biological monitoring of the site will be conducted to ensure that the site is chemically and physically stable. The monitoring programs will be designed and conducted in accordance with the provincial and federal regulations and licence conditions.

The following is a summary of the anticipated monitoring programs:

- Groundwater quality;
- Physical stability;
- Biological; and
- Surface water quality.

The monitoring programs will be conducted until the site-specific decommissioning and reclamation objectives for the Project are met. Monitoring reports will be developed and submitted to both the provincial and federal regulators, in accordance with licence conditions.

2.5 Project Alternatives

Denison first initiated evaluation of the production potential from Wheeler in 2010. Since that time the Project has undergone significant design and review stages and has naturally evolved into the current state. During this time, several key alternatives and options were evaluated including:

1. Mining methods: Historical work evaluated a total of 32 mining methods to extract uranium from the deposit. Methods were evaluated through an increasingly rigorous process and considered factors such as: safety, environment, production rates, capital costs, operating costs, schedule, operational flexibility, risk, etc. In addition, specific workshops were held in local Indigenous and non-Indigenous communities to capture community input into the selection of a preferred mining method. After several years of study, the ISR mining approach was selected as the best option across the majority of factors.
2. Mineral Processing: In conjunction with the above assessments, historical work evaluated the construction of an on-site conventional mill to process run of mine ore from an underground mine. Factors such as: safety, environment, production rates, capital costs, operating costs, schedule were considered. Ultimately the decision to avoid construction of a conventional mill and tailings facility was made.

Following the selection of ISR as the mining method, further processing alternatives were evaluated including the use of a toll mill to process the uranium rich mining solution, ion exchange technology (common to international ISR operations) and direct precipitation. Direct precipitation on site scored the highest in all evaluation categories.

3. Site Access Road Routing: The Wheeler site is approximately 4 km from the existing highway 914. An assessment of several routes was completed and considered factors such as: safety, environment (total disturbance), capital costs and risk. In addition, specific workshops were held in the Indigenous and non-Indigenous communities to capture community input into the final route selection.
4. Treated Effluent Discharge Location: After completion of baseline data collection a preliminary evaluation of potential surface water bodies was completed to assess the suitability of the surrounding areas to receive treated effluent from the site. Preliminary modelling identified five surface waterbodies that would likely be able to receive treated effluent without significant adverse environmental impacts. More detailed assessments of these waterbodies were completed and factors such as safety, environment, capital cost, operating costs and risk were considered. In addition, specific workshops were held in Indigenous and non-Indigenous communities to capture community input into the final location selection.
5. Site Infrastructure Layouts: Throughout the design process, several iterations of the site infrastructure and placements were considered. This process is on-going with factors such as safety, environmental disturbance, schedule, capital costs and risk being considered.

2.6 Ancillary Projects

SaskPower will secure permits for and construct the ~5 km powerline extension from along Highway 914 into Wheeler. It is anticipated that the powerline extension will be adjacent to the access road.

Saskatchewan Ministry of Highways has initiated the provincial environmental assessment process for Highway 914 extension and the Key Lake by-pass. As outlined in the project's Terms of Reference (Saskatchewan Ministry of Highways 2016) the Key Lake bypass component includes construction and operation of an approximate 5 km all-weather road by-pass to route traffic around Cameco's Key Lake uranium mill site. The Key Lake by-pass component of the Ministry of Highway's proposed project is considered an ancillary project for Wheeler.

2.7 Socio-Economics

Approximately 300 workers are expected to be required during the two-year construction period. Each component of construction will require workers with different types of skills and training depending on the task (e.g. road construction, wellfield drilling, erection of buildings, connection to services, etc.). During operations, about 150 people will be employed to operate the ISR wellfield and processing plant, as well as provide various supporting activities such as security, camp operations, operation of the water treatment, sewage and potable water plants, environmental monitoring, and maintenance of roads, equipment, and buildings.

The need for goods and services during construction, operations and decommissioning will generate business opportunities throughout the life of Wheeler. Examples of anticipated goods and services may include: catering, housekeeping, food, freight, and bulk materials such as fuel, propane, and reagents.

Employment and procurement opportunities pursued by those from nearby communities will be preferred as outlined in the MOUs executed with nearby communities and Indigenous groups (Section 8). In accordance with the intent of the MOUs, Denison has established an internal procurement approach, which requires the procurement of all goods and services for the Project to first consider businesses based in the communities prior to looking elsewhere in northern Saskatchewan, southern Saskatchewan and/or outside of Saskatchewan.

As a result of Denison's early engagement initiatives, a number of programs and actions focused on producing socio-economic benefits for local Indigenous and non-Indigenous communities have been initiated. Examples of some of the successes to date are described in Section 8.2.1. It is Denison's intent to leverage its early work and existing relationships with local Indigenous and non-Indigenous communities in order to expand upon its existing socio-economic commitments. This will allow Denison to meet or exceed the socio-economic commitments that will be outlined in the Project's Saskatchewan Surface Lease Agreement and the Human Resource Development Agreement to be negotiated between Denison and the province following the successful completion of the environmental impact assessment process.

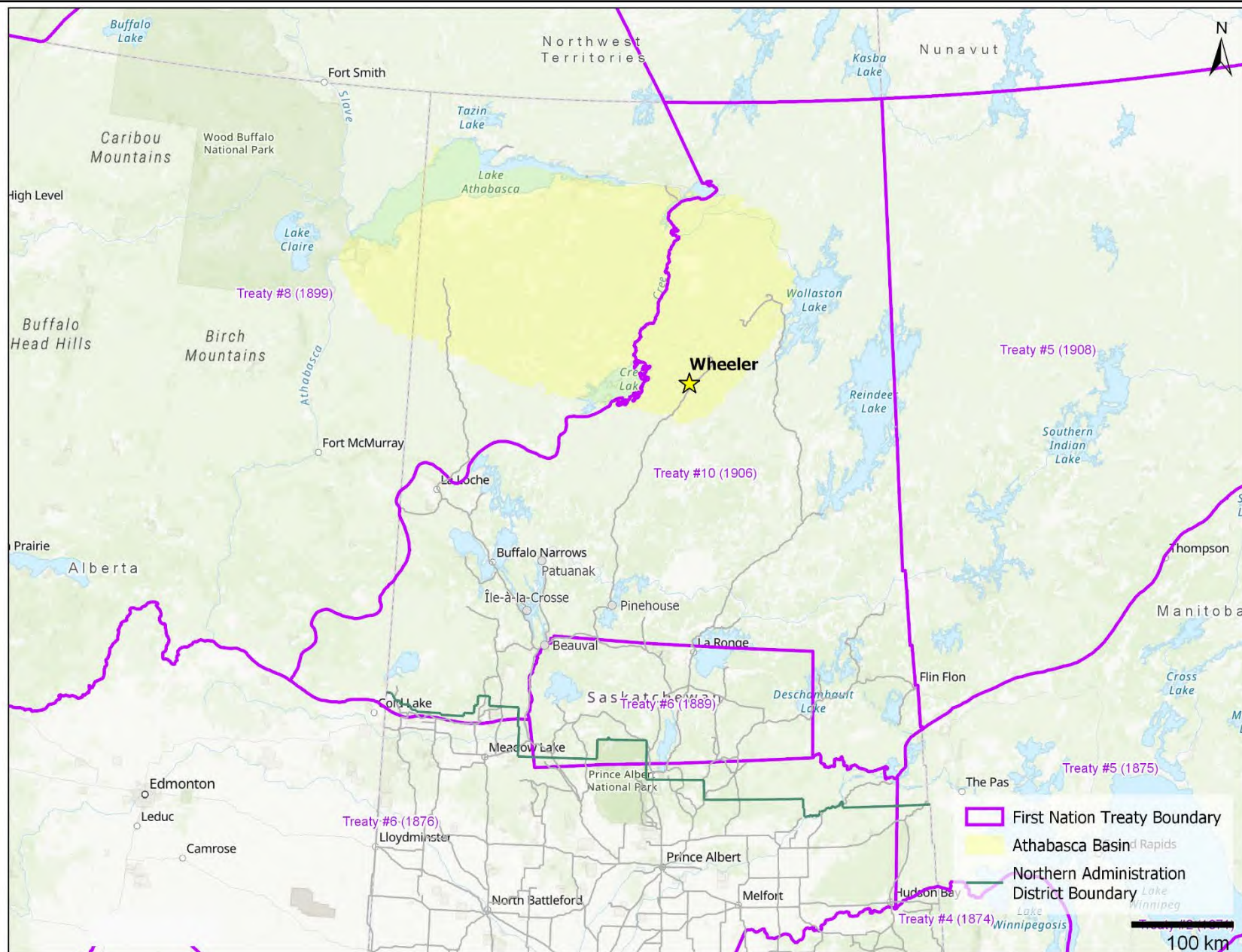
3 Project Location

The property straddles the boundaries of NTS map sheets 74H-5, 6, 11, and 12. The approximate UTM coordinates of the property are 477,000E and 6,374,000N (NAD83, Zone 13). Wheeler is located within Treaty 10 territory (Figure 3.1).

Wheeler is located in Saskatchewan's Northern Administration District (NAD) as defined in the province's Northern Municipalities Act, but its creation dates back to The Northern Administration Act, 1948, which provided for the administration and development of the northern part of Saskatchewan. The NAD includes approximately half of Saskatchewan's land area, but less than four per cent of the province's population. The NAD's population of roughly 37,000 lives in approximately 45 communities, which include municipalities, First Nations reserves, settlements, and sometimes a combination of each.

There are a number of leases near Wheeler including recreational, traditional land use, and industrial surface leases. Figure 3.2 shows the location of recreational and traditional land use leases issued by the Province of Saskatchewan; it is assumed there are seasonally used cabins on these properties and this will be confirmed as part of the EIA. There are potentially eleven (11) cabins within 22 km of Wheeler (Figure 3.2).

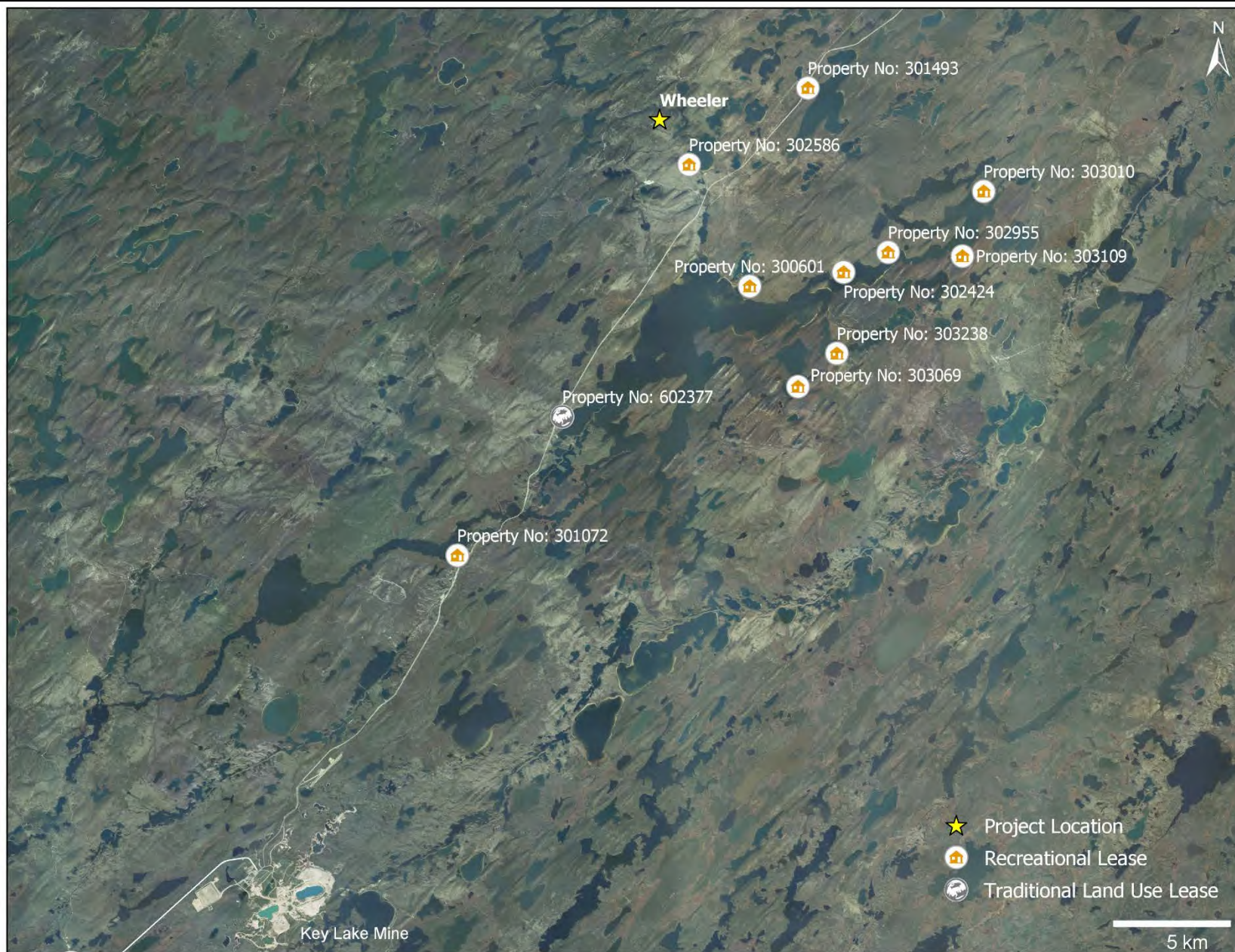
Other nearby surface leases are for industrial sites such as power transmission and mineral exploration (Figure 3.3 and Table 3.1). Industrial surface leases are in place for the Key Lake Operation (a uranium mill) and the McArthur River Operation (an underground uranium mine); milling and mining activities at these sites are currently suspended.



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Figure 3.1: Wheeler Location within the Treaty 10 Boundary

May 2019

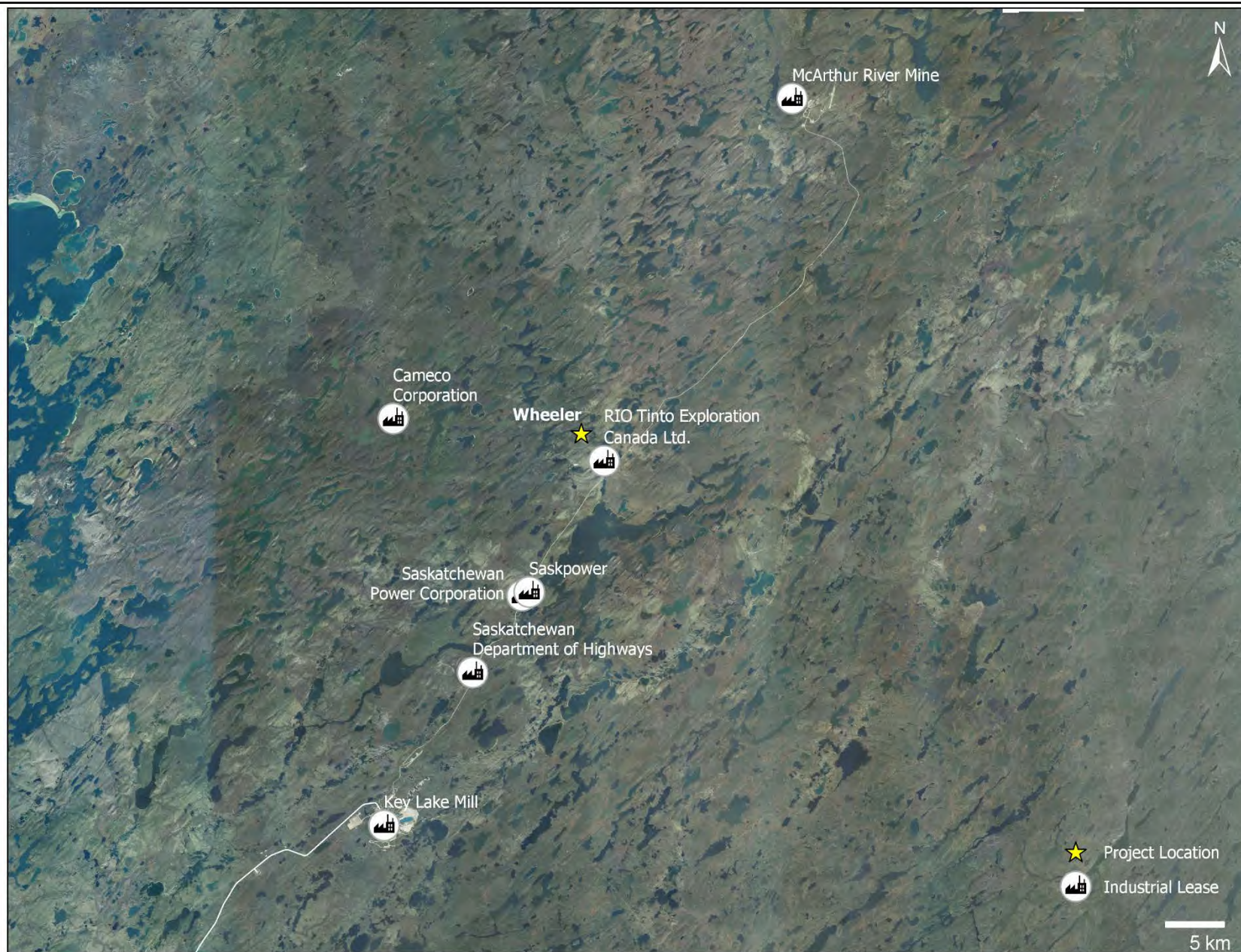


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Figure 3.2: Recreational and Traditional Land Use Leases in Proximity to Wheeler

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**Figure 3.3: Industrial Land Use Leases
in Proximity to Wheeler**

May 2019

Table 3.1: Leased Properties near Wheeler

| Type of Lease | Description | Property Number ¹ | Distance from Wheeler (km) |
|-----------------------|---|------------------------------|----------------------------|
| Recreational Lease | Assumed cabin on lease. Leased to individual(s) – names withheld for privacy. | 302586 | 2.7 |
| Industrial Land Lease | Rio Tinto Exploration Canada Ltd. | 303242 | 3.4 |
| Recreational Lease | Assumed cabin on lease. Leased to individual(s) – names withheld for privacy. | 301493 | 6.3 |
| Recreational Lease | Assumed cabin on lease. Leased to individual(s) – names withheld for privacy. | 300601 | 8.6 |
| Recreational Lease | Assumed cabin on lease. Leased to individual(s) – names withheld for privacy. | 302424 | 10.5 |
| Recreational Lease | Assumed cabin on lease. Leased to individual(s) – names withheld for privacy. | 302955 | 11.5 |
| Recreational Lease | Assumed cabin on lease. Leased to individual(s) – names withheld for privacy. | 303238 | 13.0 |
| Recreational Lease | Assumed cabin on lease. Leased to individual(s) – names withheld for privacy. | 303069 | 13.3 |
| Traditional Land Use | Operated by a member of the English River First Nation | 602377 | 14.0 |
| Recreational Lease | Assumed cabin on lease. Leased to individual(s) – names withheld for privacy. | 303010 | 14.3 |
| Recreational Lease | Assumed cabin on lease. Leased to individual(s) – names withheld for privacy. | 303109 | 14.4 |
| Industrial Land Lease | SaskPower (transmission line from Key Lake to Island Falls) | 303261 | 14.9 |
| Industrial Land Lease | Saskatchewan Power Corporation | 303329 | 15.4 |
| Industrial Land Lease | Cameco Corporation | 603071 | 16.3 |
| Recreational Lease | Assumed cabin on lease. Leased to individual(s) – names withheld for privacy. | 301072 | 21.2 |
| Industrial Land Lease | SK Highways gravel pit for road maintenance | 500490 | 23.1 |

Notes:

¹ Land dispositions from Crown Resource Lands provided by Government of Saskatchewan, Ministry of Environment, Fish, Wildlife and Lands Branch

As a remote site, there are no communities in relatively close proximity to Wheeler (Figure 3.4). Calculated using a straight line, the closest communities are approximately 150 km away in the northern settlement of Wollaston Lake and the neighbouring reserve of Lac La Hache (Table 3.2 and Figure 3.4). Travelling by existing roads the closest community to the Project is Pinehouse which is approximately 260 km away (Table 3.2).

The communities and associated Indigenous groups of Patuanak, Pinehouse, Ile a la Crosse, and Beauval were identified as key through the community selection process; additional details are provided in Section 7 and Section 8.

Table 3.2: Communities and Associated Indigenous Groups in Proximity to Wheeler

| Community | Status | Population in 2016 Census ¹ | Indigenous Groups Affiliated with the Community | Approximate Absolute Distance from Wheeler ² | Approximate Distance from Wheeler (along roads) ³ |
|-------------------|---------------------|--|---|---|--|
| Points North | Camp settlement | Not applicable | Not applicable | 115 | 936 |
| Wollaston Lake | Northern settlement | 99 | Métis | 150 | 940 |
| | Reserve | 1,377 | Hatchet Lake First Nation Treaty 10 | | |
| Black Lake | Reserve | 1,379 | Black Lake Denesuline First Nations, Treaty 8 | 181 | 1,121 |
| Brabant Lake | Indian Settlement | 62 | Métis | 184 | 645 |
| Southend | Reserve | 1,045 | Peter Ballantyne Cree First Nation, Treaty 10 | 185 | 694 |
| Stony Rapids | Northern Hamlet | 262 | Métis | 196 | 1,137 |
| Missinipe | Northern Hamlet | 5 | Métis | 215 | 552 |
| Grandmother's Bay | Reserve | 342 | Lac La Ronge Indian Band, treaty 6 | 216 | 556 |
| Fond du Lac | Reserve | 903 | Fond du lac Denesuline First Nation, Treaty 8 | 217 | 1,217 |
| Patuanak | Northern Hamlet | 73 | Métis | 229 | 454 |
| | Reserve | 565 | English River First Nation, Treaty 10 | 228 | 457 |
| Turnor Lake | Northern Hamlet | 149 | Métis | 232 | 548 |
| | Reserve | 476 | Birch Narrows Dene Nation, Treaty 10 | | |
| Pinehouse | Northern Village | 1,052 | Métis | 233 | 264 |
| Stanley Mission | Northern Settlement | 95 | Métis Band | 238 | 554 |
| | Reserve | 1,840 | Lac La Ronge Indian Band, Treaty 6 | | |
| Buffalo Narrows | Northern Village | 1,110 | Métis | 264 | 479 |
| La Ronge | Town | 2,688 | Métis | 266 | 475 |
| | Reserve | 2,622 | Lac La Ronge Indian Band, Treaty 6 | | |
| La Loche | Northern Village | 2,372 | Métis | 269 | 580 |
| | Reserve | 822 | Clearwater River Dene First Nation, Treaty 8 | | |
| Air Ronge | Northern Village | 1,106 | Métis | 270 | 471 |

| Community | Status | Population in 2016 Census ¹ | Indigenous Groups Affiliated with the Community | Approximate Absolute Distance from Wheeler ² | Approximate Distance from Wheeler (along roads) ³ |
|-------------------|---------------------|--|---|---|--|
| Ile a la Crosse | Northern Village | 1,296 | Métis | 274 | 453 |
| Black Point | Northern Settlement | 43 | Métis | 278 | 580 |
| Dillon | Reserve | 1,273 | Buffalo River First Nation, Treaty 10 | 279 | 526 |
| Michel Village | Northern Hamlet | 57 | Métis | 282 | 543 |
| St. George's Hill | Northern Hamlet | 131 | Métis | 285 | |
| Sandy Bay | Northern Village | 697 | Métis | 290 | 746 |
| | Reserve | 481 | Peter Ballantyne Cree Nation, Treaty 10 | | |
| Uranium City | Northern Settlement | 73 | Métis | 297 | 1,320 |
| Beauval | Northern Village | 640 | Métis | 297 | 367 |
| Pelican Narrows | Northern Village | 630 | Métis | 301 | 705 |
| | Reserve | 1,869 | Peter Ballantyne Cree Nation, Treaty 10 | | |
| Jans Bay | Northern Hamlet | 152 | Métis | 312 | 405 |
| | Reserve | 912 | Canoe Lake Cree First Nation, Treaty 10 | | |
| Camsell Portage | Northern Settlement | 10 | Métis | 323 | 1,357 |
| Cole Bay | Northern Hamlet | 170 | Métis | 325 | 400 |
| Weyakwin | Northern Hamlet | 49 | Métis | 344 | 462 |
| Creighton | Town | 1,402 | Métis | 375 | 726 |
| Denare Beach | Northern Village | 779 | Métis | 375 | 743 |
| Green Lake | Northern Village | 429 | Métis | 389 | 470 |
| Cumberland House | Northern Village | 671 | Métis | 441 | 874 |
| | Reserve | 795 | Cumberland House Cree Nation, Treaty 5 | | |

Notes:

¹ Statistics Canada (2017)

² Approximate absolute distance is in a straight line or 'as the crow flies'

³ Winter roads are included in some distance calculations

The federal lands close to Wheeler are First Nation Reserves, most of which do not have permanent residences. Figure 3.5 shows the location of reserve land within 150 km of Wheeler and Table 3.3 provides the details about the reserve lands. The closest national park to Wheeler is Prince Albert National Park which is 357 km south.



Note: Communities shown in bold font have been the focus of Denison's local Indigenous and non-Indigenous engagement program

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Figure 3.4: Nearby Communities

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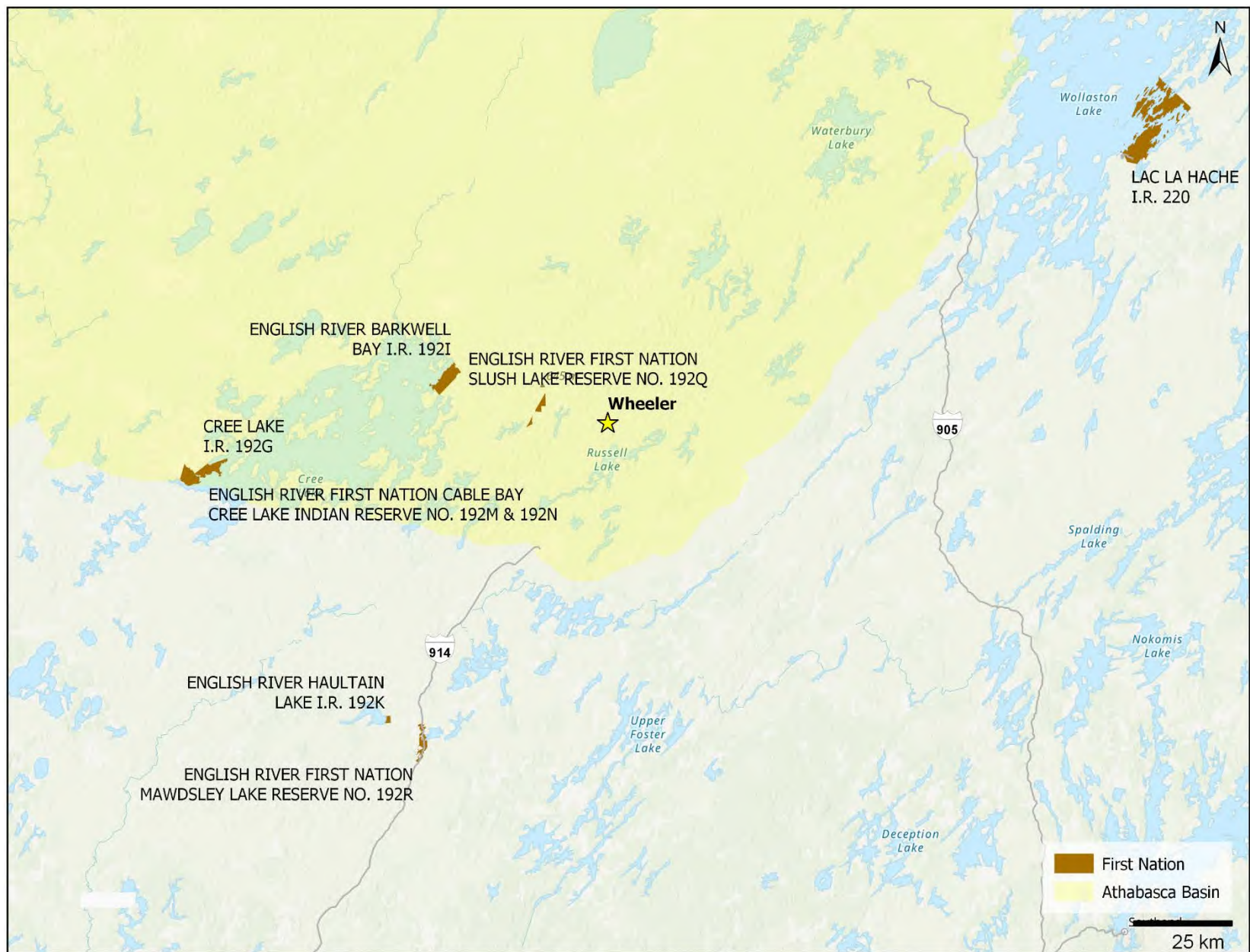
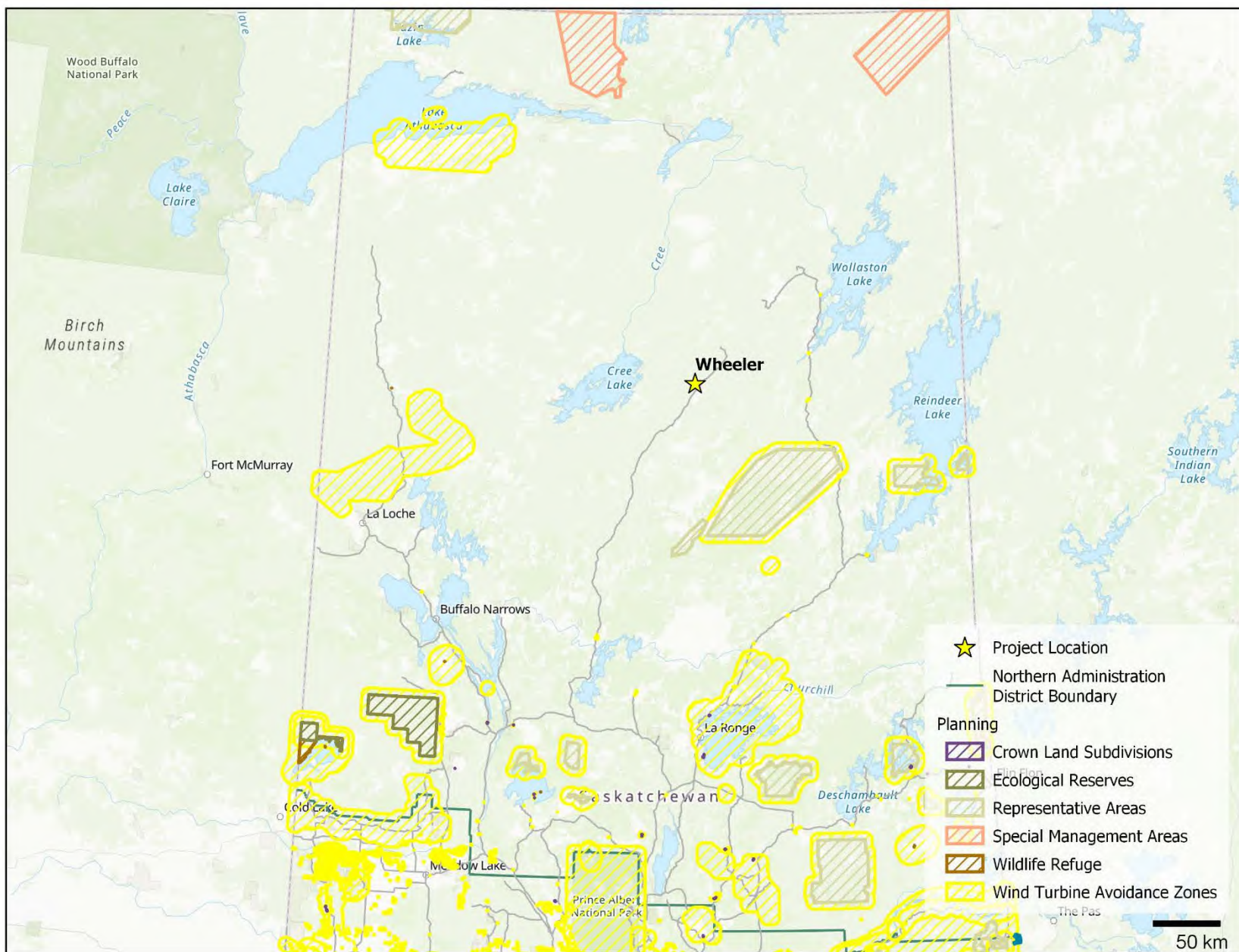


Table 3.3: Federal Lands within 150 km of Wheeler

| Federal Land Type | Name | Distance from Wheeler (km) |
|-------------------|--|----------------------------|
| First Nation | English River First Nation Slush Lake Reserve No. 192Q | 16 |
| First Nation | English River Barkwell Bay Indian Reserve 192I | 39 |
| First Nation | English River First Nation Mawdsley Lake Reserve No. 192R | 91 |
| First Nation | English River Haultain Lake Indian Reserve 192K | 94 |
| First Nation | Cree Lake Indian Reserve 192G | 98 |
| First Nation | English River First Nation Cable Bay Cree Lake Indian Reserve No. 192N | 105 |
| First Nation | English River First Nation Cable Bay Cree Lake Indian Reserve No. 192M | 105 |
| First Nation | Lac La Hache Indian Reserve 220 | 147 |

Denison screened the area around Wheeler to check for environmentally sensitive areas. As shown in Figure 3.6, crown land subdivision, ecological reserves, representative areas, special management areas, wildlife refuges and wind turbine avoidance zones are not located near the Project area. In addition to the information provided on Figure 3.6, there are no game preserve, national wildlife areas, migratory bird sanctuaries, conservation easements, Fish and Wildlife development fund lands, Ramsar wetlands, or wildlife habitat protection areas in the area shown.

In terms of management areas, Wheeler is near the centre of the woodland caribou SK1 administrative unit, fur block 18, and the provincial wildlife management zone 75 (Figure 3.7).

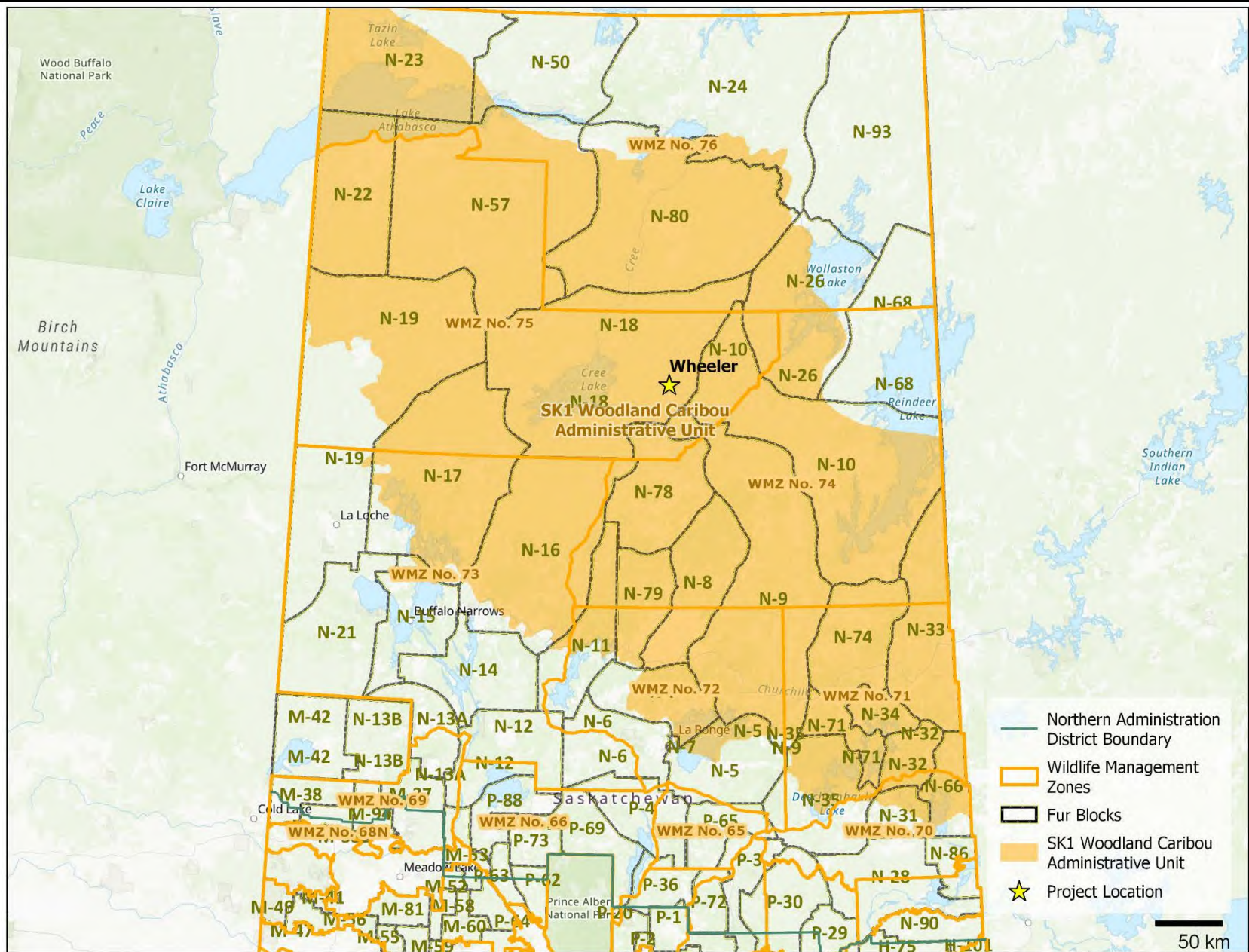


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Figure 3.6: Sensitive Areas and Conservation Areas

May 2019



4 Federal Involvement

No federal funding or support has been provided to the Project.

Federal lands will not be used for the purpose of carrying out the Project.

5 Existing Environment

5.1 Physiography and Terrain

The property is characterized by a relatively flat till plain with elevations ranging from 477 to 490 metres above sea level (masl). Throughout the area, there is a distinctive north-easterly trend to landforms resulting from the passage of Pleistocene glacial ice from the northeast to the southwest. The topography and vegetation at the property are typical of the taiga forested land common to the Athabasca Basin area of northern Saskatchewan.

The regional area is covered with overburden from 0 to 130 m in thickness; the overburden in the immediate area of the Wheeler uranium deposit is 22 to 30 m in thickness. The terrain is gently rolling and characterized by forested sand and dunes. Vegetation is dominated by black spruce and jack pine, with occasional small stands of white birch occurring in more productive and well-drained areas. Lowlands are generally well drained but can contain some muskeg and poorly drained bog areas with vegetation varying from wet, open, non-treed vistas to variable density stands of primarily black spruce as well as tamarack depending on moisture and soil conditions. Lichen growth is common in this boreal landscape mostly associated with mature coniferous stands and bogs.

5.1.1 Geology

The Property is partially covered by lakes and muskeg which overlies a complex succession of glacial overburden deposits. These include eskers and outwash sand plains, well-developed drumlins, till plains and glaciofluvial plain deposits (Campbell 2007). Glacial overburden is comprised of medium to coarse grained sand and gravel till outwash. The quaternary deposits vary in thickness from zero to approximately 120 metres with the orientation of the drumlins reflecting a southwesterly ice flow. Local outcrops of consolidated paleoproterozoic sandstone of the Athabasca formation also occur in select areas on the Property.

The glacial overburden is underlain by relatively undeformed paleoproterozoic Athabasca Group sandstone that unconformably overlie the crystalline basement rocks and have a considerable range of thickness from 170 metres over the quartzite ridge to at least 560 metres on the western side of the property. The unconformity varies dramatically across the property. From elevations of 160 to 230 metres above sea level along the Property's southeastern edge, the unconformity rises gently to a pronounced north-easterly trending ridge up to 350 metres above sea level, coincident with the subcrop of a quartzite unit in the crystalline basement. The unconformity surface drops steeply westward to as low as 30 metres below sea level. A schematic cross-section of the general property geology is shown in Figure 5.1.

Basement rocks on the Wheeler property are located within the Wollaston Domain of the Trans Hudson-Orogeny and comprise metasedimentary and granitoid gneisses. The metasedimentary rocks belong to the Paleoproterozoic Wollaston Supergroup and include graphitic and non-graphitic

pelitic and semipelitic gneisses, felsic and quartz feldspathic gneisses, meta-quartzite and rare calc-silicate gneisses. These metasediments are interpreted to belong to the Daly Lake Group, (Yeo and Delaney, 2007). Pegmatitic segregations and intrusions are common in all units. Garnet, cordierite and sillimanite occur in the pelitic units indicating an upper amphibolite grade of metamorphism. A “Paleoweathered Zone”, generally between three to ten metres thick, is superimposed on the crystalline rocks and occurs immediately below the unconformity.

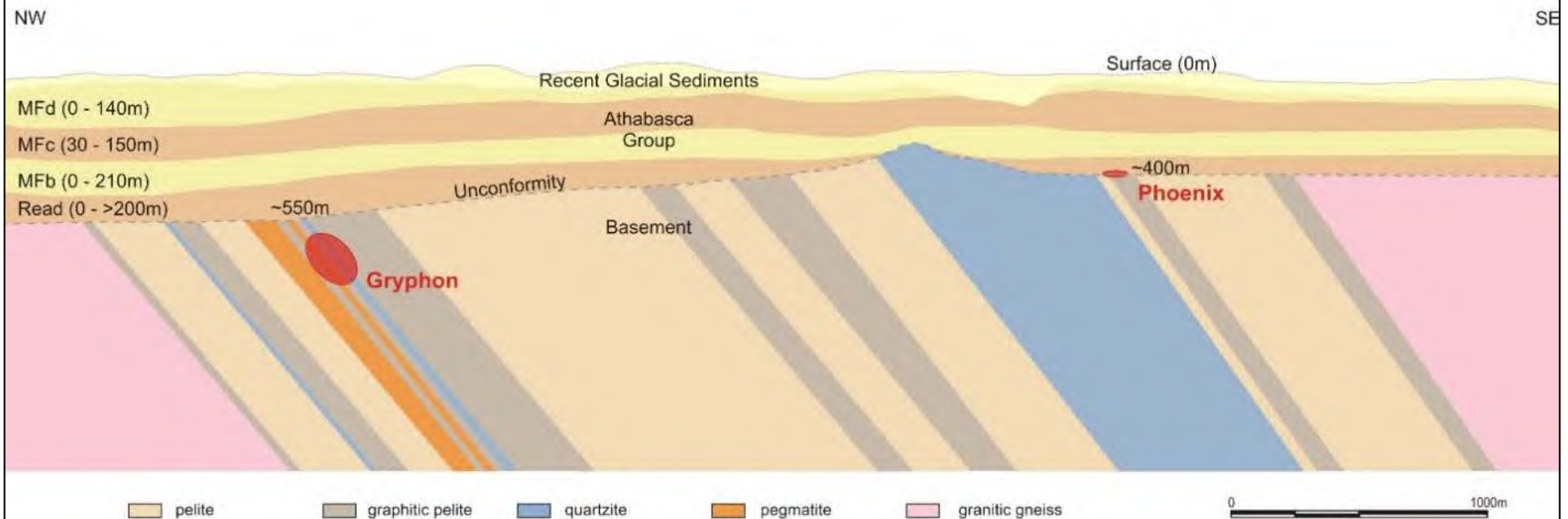
The Wheeler exploration property is host to the Phoenix uranium deposit discovered in 2008 and Gryphon deposit discovered in 2014 (Figure 2.3) plus additional zones of mineralization and other prospective exploration targets. The details below are focused on the Phoenix deposit although other areas of mineralization suitable for ISR mining at Wheeler are anticipated to be geologically similar.

The quartzite ridge, an interpreted impermeable and structural barrier forming the footwall to the mineralization, dominates the basement geology at the Phoenix deposit. The quartzite unit exhibits variable dips from 45° to 75° to the southeast, averaging 50°, and with an undulating, but generally 055° azimuth. Immediately overlying the quartzite is a garnetiferous pelite, which varies from seven metres to 60 metres in thickness. Overlying the garnetiferous pelite is a graphitic pelite. The graphitic pelite is approximately 5 metres wide in the southwest, increases to approximately 70 m in the central portion of the deposit area and is 50 metres wide at the northeast extremity.

Mineralization at Phoenix generally occurs at the Athabasca unconformity in contact with the underlying basement rocks at depths ranging from 390 to 420 metres. It is interpreted to be structurally controlled by the northeast southwest trending (055° azimuth) WS Fault which dips 55° to the southeast on the east side of the quartzite ridge.

A detailed schematic of the geology at the Phoenix deposit is shown in Figure 5.2. The grades and thickness of the deposit vary along the major structure where typically higher grades and thicker portions of the deposit are associated with larger offsets along the structure where the sandstone contact has been displaced allowing for greater structural disruption and permeability of the deposit area. In general, the deposit is comprised of an exceptionally high-grade core, related to the major structure, and is surrounded by a lower grade shell away from the structure. Both the core and the shell are variably structured and are characterised by sandy clays with portions of the deposit containing ‘islands’ of less permeable though high grade ore within the more permeable and structured areas. The Phoenix deposit appears to be amenable to ISR as it is situated within relatively porous and permeable structured sandstones and underlain by less porous and competent basement rocks.

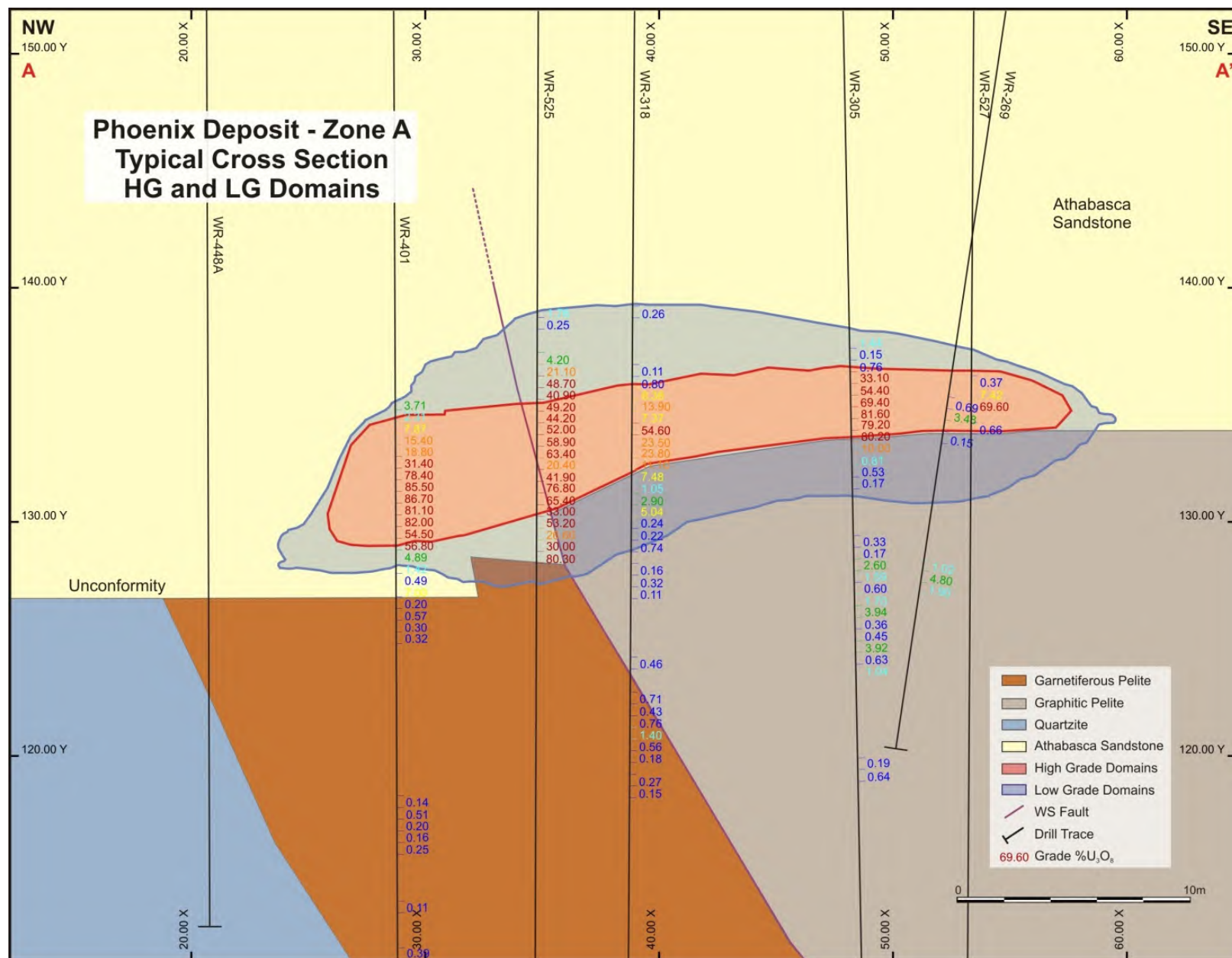
Wheeler River Property Geological Cross Section



Wheeler River Project
Provincial Technical Proposal and Federal Project Description

**Figure 5.1: Schematic Cross Section of the
Wheeler River Property**

May 2019



5.2 Hydrogeology

Shallow groundwater monitoring wells have been installed in the overburden and upper sandstone in a regional area north of the Phoenix deposit to establish baseline conditions. Monitoring has been ongoing since 2018 and results to date are typical for the Athabasca Basin and the water contains low concentrations of total dissolved solids. The water table in this area is located about 2 to 10 meters below surface.

Baseline groundwater quality samples have been collected from the Athabasca Sandstone in the site study area above the uranium deposit. Results from samples collected from between 280 to 363 m below surface show the groundwater quality has low concentrations of total dissolved solids and nutrients and a relatively neutral pH (between 6.0 and 7.0). Conductivity was 71 $\mu\text{S}/\text{cm}$. When compared to Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME 2017), results exceeded the prescribed criteria for dissolved aluminum, dissolved iron, dissolved copper, dissolved lead, and uranium. Radium-226 was 1.9 Bq/L, exceeding the Saskatchewan Environmental Quality Guideline (SEQG) of 0.11 Bq/L for surface water (Government of Saskatchewan 2017b), while the concentration of lead-210 was 0.80 Bq/L.

Baseline groundwater quality samples have also been collected from sandstone in an area immediately above the uranium deposit (352 to 395 m below surface), providing information on the water quality closer to the uranium deposit. The results from the groundwater sampling indicate a neutral pH (6.9 to 7.5), as anion chemistry was dominated by bicarbonate alkalinity and sulphate, whereas chloride was comparatively low. Cation chemistry was shown to be dominated by sodium, calcium, iron, and aluminum. Conductivity was 216 $\mu\text{S}/\text{cm}$. Dissolved iron concentrations were higher than expected given the pH of the samples, as iron hydroxides have low solubility at neutral pH, and under oxidizing conditions, iron is expected to precipitate. The iron results indicate it is likely that iron is out of equilibrium with surface conditions due to the change in redox conditions (to more oxidizing) produced by removal of the water from depth. When compared to Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME 2017), results exceeded the prescribed criteria for aluminum, dissolved iron, dissolved arsenic, dissolved copper, dissolved lead, and dissolved uranium. Radium-226 was 7.2 Bq/L, exceeding the SEQG of 0.11 Bq/L for surface water (Government of Saskatchewan 2017b), while the concentration of lead-210 was 2.1 Bq/L.

An extensive groundwater quality sampling program will be completed in 2019 to further characterize the baseline hydrogeological conditions in and around the proposed wellfield, as well as at the broader regional area. Collection of groundwater quality and water level data will be ongoing at key locations.

5.3 Atmospheric and Acoustic Environment

5.3.1 Radon

Atmospheric or passive radon monitoring commenced in September 2016 to establish baseline radon levels in the Project area. Passive radon detectors were deployed at 10 select locations in duplicate. On a quarterly basis, each deployed detector is exchanged with a new replacement detector, and each collected detector is sent to an accredited laboratory for analysis.

While there is currently no Canadian regulation that prescribes a radon threshold value in outdoor environments, Health Canada has developed a guideline for radon in indoor air for dwellings of 200 Bq/m³. This guideline provides Canadians with guidance pertaining to when remedial action should be taken to reduce radon levels. Results to date demonstrate that baseline atmospheric radon levels within the Project area are low, with the average radon concentration not exceeding 10 +/- 3 Bq/m³ at any location. Baseline radon monitoring will continue as required.

5.3.2 Dustfall

Dustfall monitoring stations were established at six (6) locations around the site in the fall of 2018. Data from these stations is not yet available.

5.3.3 Noise

Noise baseline studies are scheduled to be completed in 2019. It is reasonable to assume the baseline noise levels will be quite low in the Project area since it is located in a relatively isolated area of the boreal forest.

5.3.4 Climate and Meteorology

Regional climate and meteorological data is available from the nearby weather station at Key Lake; the station is approximately 32 km away from Wheeler. Temperature and precipitation data from 1981 to 2010 is provided in Figure 5.3. An on-site metrological station has not yet been established.

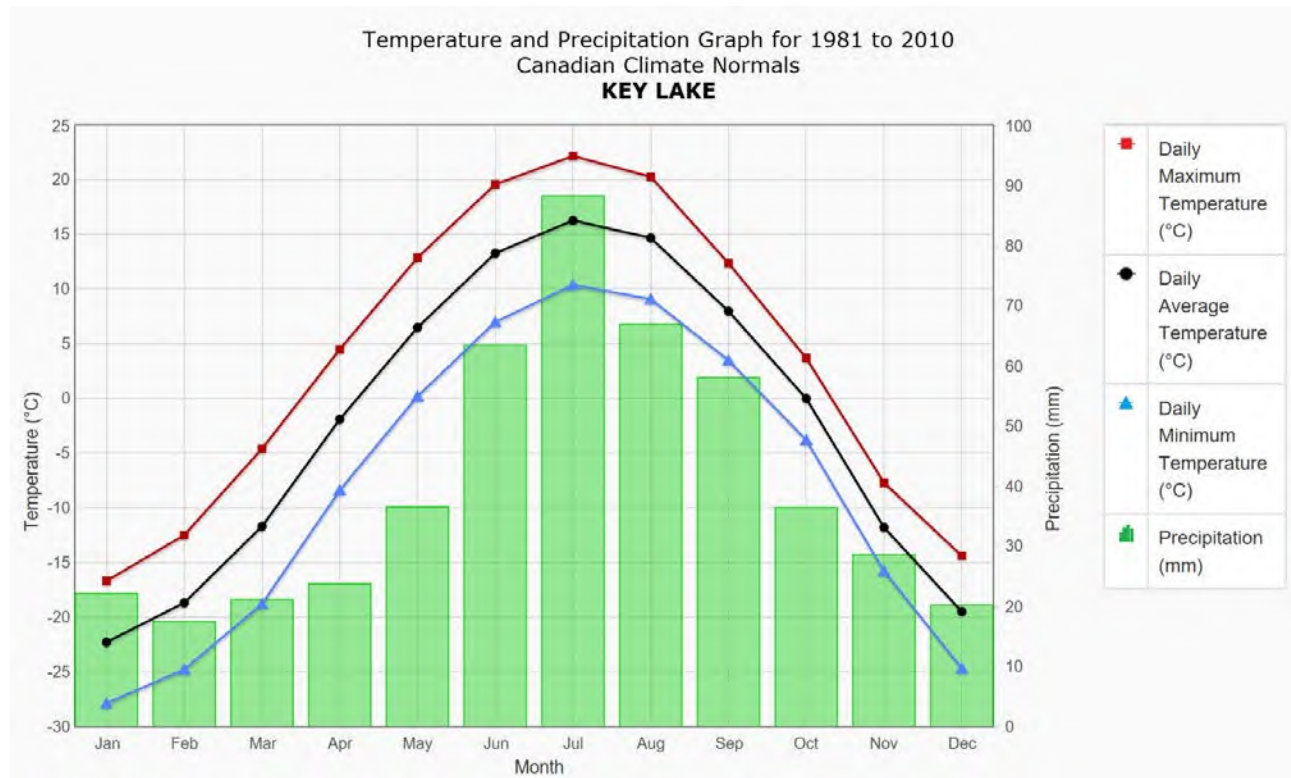


Figure 5.3: Historical Temperature and Precipitation near Wheeler

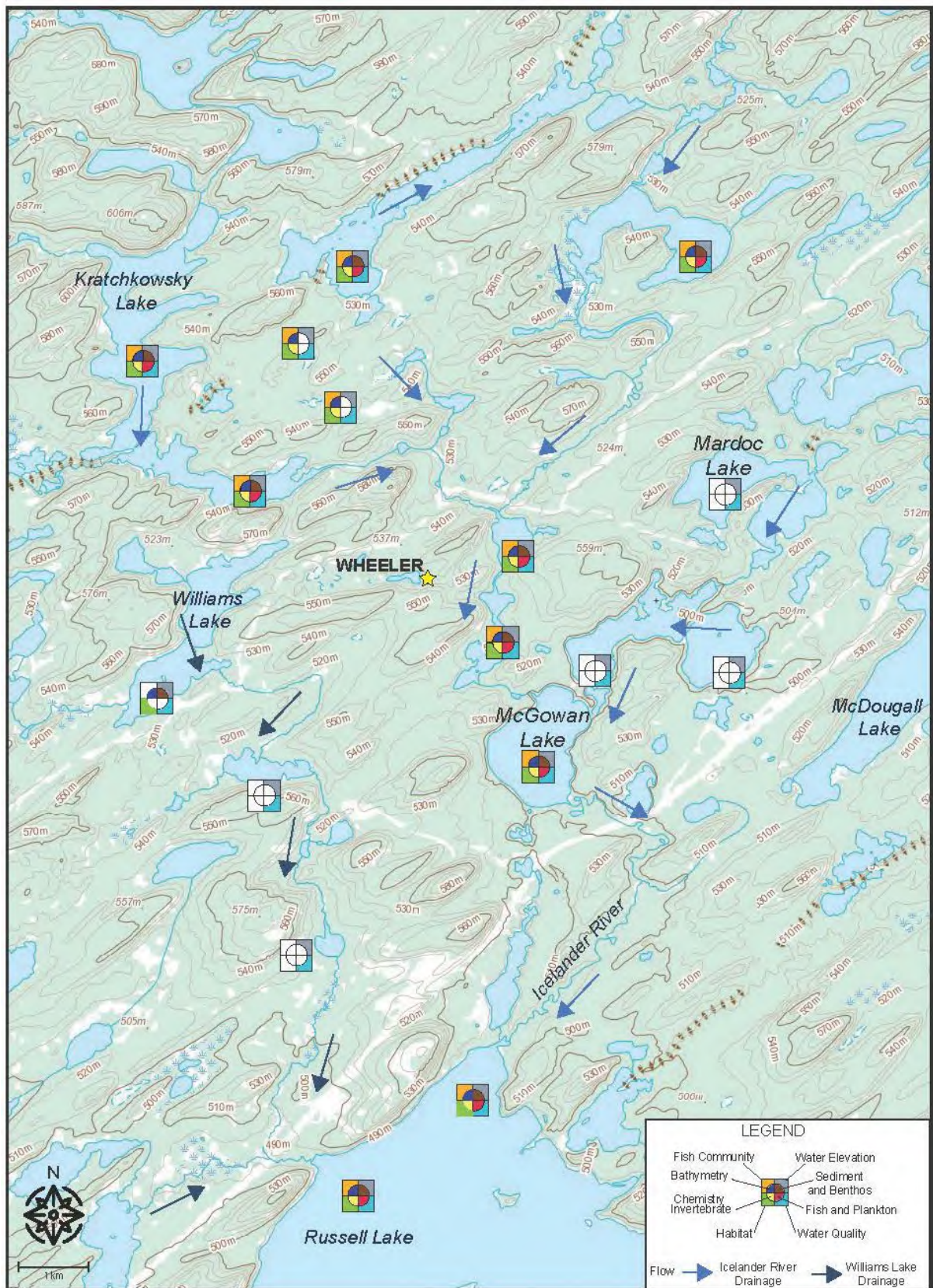
The climate is typical of the continental sub-arctic region of northern Saskatchewan, with temperatures ranging from +32°C in summer to -45°C in winter. Winters are long and cold, with mean monthly temperatures below freezing for seven months of the year. Winter snow pack averages 70 cm to 90 cm. Freezing of surrounding lakes, in most years, begins in November and break-up occurs around the middle of May. The average frost-free period is approximately 90 days.

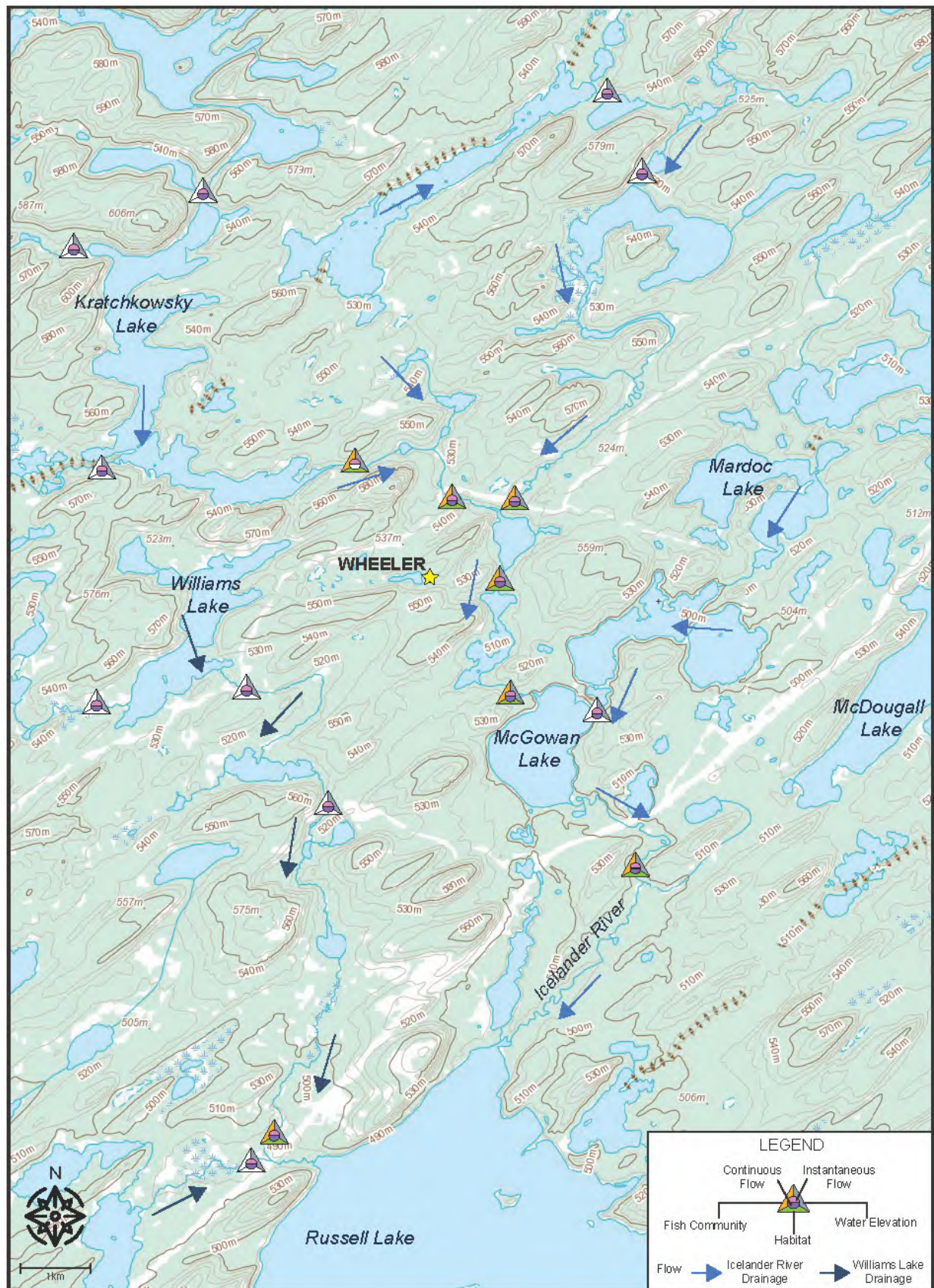
Average annual total precipitation for the region is approximately 480 mm, of which 67% falls as rain, with more than half occurring from June to September. Snow may occur in all months but rarely falls in July or August. The prevailing wind direction is from the north-west/west with a mean speed of 12 km/hr.

5.4 Aquatic Environment

Aquatic environment baseline field surveys completed between 2012 and 2018 focused on hydrology, water quality, limnology, sediment quality, aquatic habitat, bathymetry, plankton community, benthic invertebrate community and tissue chemistry, and fish community, spawning, and tissue chemistry.

A summary of data collected in lakes and ponds is provided in Figure 5.4 and a summary of data collected from streams is provided in Figure 5.5.





5.4.1 Hydrology

The Project area is located within two distinct sub-drainage areas that drain into Russell Lake, the Wheeler River, and ultimately into Wollaston Lake (via the Geikie River). Extending north and east of the Project area, the Iceland River drainage area drains approximately 371 km², while the Williams Lake drainage area is located south of the Project area and drains approximately 78 km² (Figure 5.6).

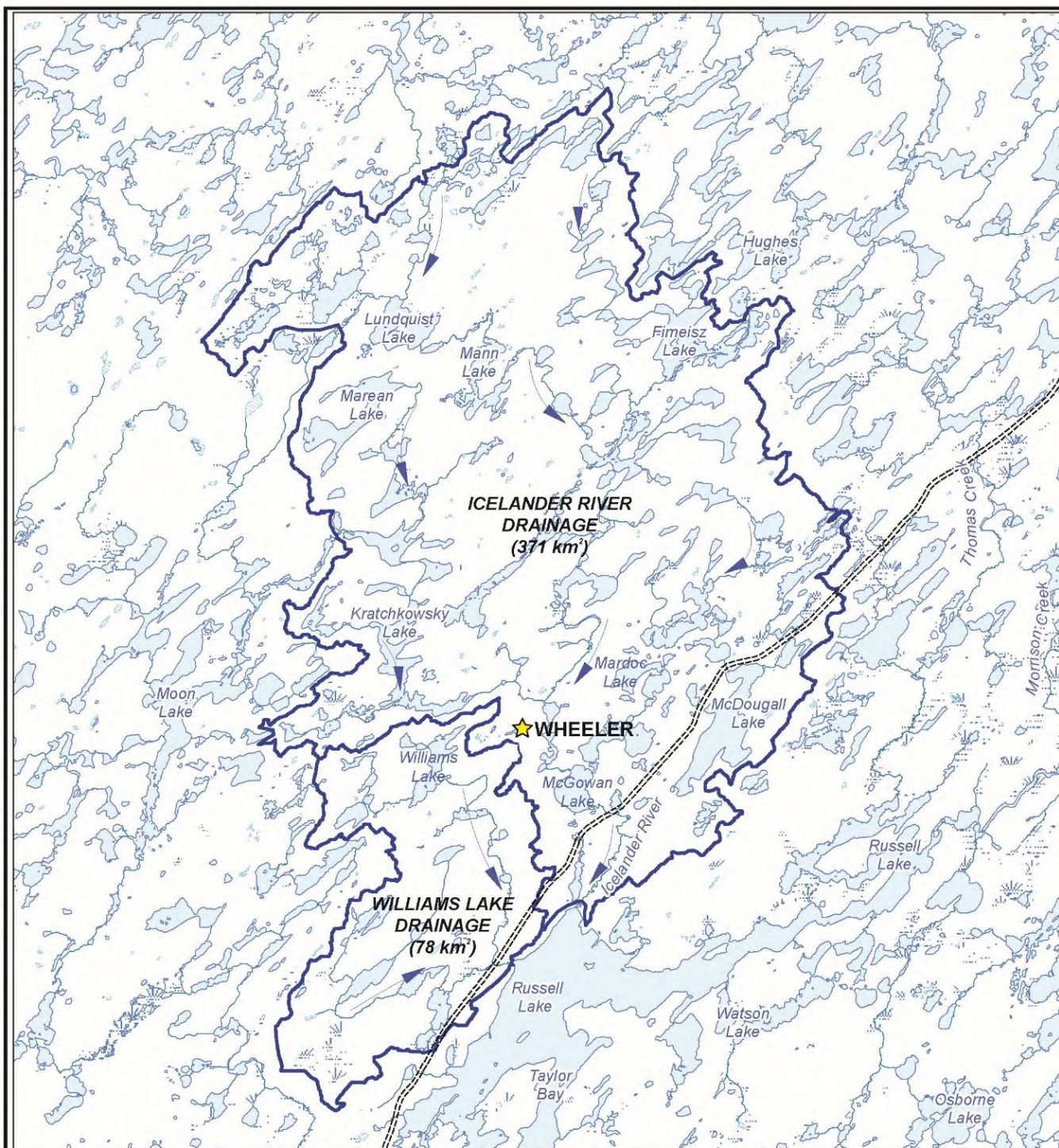
Hydrological baseline studies included manual streamflow measurements, staff gauge and elevation surveys, detailed bathymetric surveys, and continuous water level recording using dataloggers to develop rating curves at select stream locations within the Project area.

The hydrological characteristics of lakes and streams in the Project area were surveyed between 2011 and 2014. Water elevation survey locations were established at nine stream stations and eleven lake stations. Manual flow measurements were performed at each of the nine stream stations, and automated stream elevation instruments (level data loggers) were installed at all stream stations. Rating curves were established for each station based on the manual stream discharge measurements to permit estimation of hydrographic profiles for each location.

Four field programs were completed from fall 2016 to summer 2018 to capture seasonal flow conditions in spring, summer and fall. One winter field program was completed between March 15 and 19, 2018, to assess ice cover in the area and to gain a better understanding of winter baseflow conditions. Continuous monitoring equipment has been installed in seven stream stations and one lake station for continued hydrological data collection.

Project area lake and pond surface water elevations ranged from 520.86 masl at an unnamed headwater lake, to 488.26 masl at Russell Lake. In the Iceland River drainage area, water level elevations at the stream stations ranged from 520.73 masl at the most upstream station, to 492.71 masl at the most downstream station. Stream flow measurements were recorded at 2.34 cm/s at the most downstream location of the Iceland River drainage area.

In the Williams Lake drainage area, water levels at stream stations ranged from 518.33 masl at the most upstream station, to 488.55 masl at the most downstream station. Stream flow measurements recorded during this time were recorded at 0.64 cm/s at the most downstream location of the Williams Lake drainage area.



==== Highway 914

▬ Watershed Boundary

Reference - NTS Mapsheets 74H02, 03, 04, 05, 06, 07, 10, 11 and 12; NAD83 UTM Zone 13

4 0 4
Scale 1:200,000 (kilometres)

Enison Mines

Wheeler River Project
Provincial Technical Proposal and Federal Project Description

Figure 5.6: Drainage Areas around Wheeler

May 2019

5.4.2 Surface Water Quality and Limnology

Baseline surface water quality was assessed at seventeen (17) lentic locations and eleven (11) lotic stations within the Project area. Water quality data were compiled for the years 2012, 2014, 2016, 2017, and 2018 by measuring physical and chemical constituents obtained in situ, as well as by accredited laboratory analyses. Surface waters within the Project area were found to be comparable to other lakes in the region, which are classified as being soft with typically low levels of alkalinity, nutrients (nitrate and phosphorus), total dissolved solids, and total suspended solids. The pH of surface waters within the study area are slightly acidic to neutral.

In general, the concentrations of metals and metalloids were similar throughout the study area. Radionuclide concentrations were low, with the majority of measurements lower than their respective laboratory detection limits. For parameters with Saskatchewan Surface Water Quality Objectives (SSWQO) or Canadian Water Quality Guidelines (CWQG), most were below their respective guideline limits. Aluminum, cadmium, and lead concentrations exceeded guideline values at some locations; however, this appears to be a natural occurrence as demonstrated in surface water throughout the Project area. Elevated concentrations of iron and mercury were measured near the lake bottom in lakes that exhibited thermal stratification at the time they were sampled.

Radionuclide concentrations measured in surface water are low within the study area, and generally below the laboratory detection limits of 0.02 Bq/L for lead-210, 0.005 Bq/L for polonium-210, 0.005 Bq/L for radium-226, and 0.01 Bq/L for thorium-228, thorium-230, and thorium-232.

Limnology profiles were recorded at the deepest location in each lake, measuring conductivity, pH, temperature, and dissolved oxygen. Thermal stratification of the water column was infrequently observed in the Project area lakes.

5.4.3 Sediment Quality

Sediment samples were collected from the depositional areas of selected lakes for analysis of metals, radionuclides, total organic carbon, and particle size during the 2016 field study. Lake sediments within the Project area were found to be generally silty-clay or sandy-silt with total organic carbon present at approximately 16%. For parameters with prescribed sediment quality guidelines, all constituent concentrations were found to be at, or below, their respective threshold values.

5.4.4 Benthic Invertebrate Community and Tissue Chemistry

Benthic invertebrate community samples were collected at select lakes in September 2016. Benthic invertebrates were identified to family and consideration was also given to functional feeding group. Results were analyzed for abundance, relative abundance, and community metrics such as

density, richness, Simpson's Diversity Index, Simpson's Evenness Index, and Bray-Curtis dissimilarity index. Thirty-eight (38) major taxonomic groups (families) present in Project area waterbodies.

Total invertebrate density ranged from 671 to over 10,000 individuals per m². A total of 78 taxa were identified in the study area and mean invertebrate richness ranged from 7 to 24 taxa per sample. Simpson's Diversity Index values suggested that the benthic communities were relatively diverse at all locations; mean Simpson's Diversity Index values ranged from 0.65 to 0.85. Simpson's Evenness Index values ranged from 0.18 to 0.4 and overall few taxa comprised a large proportion of total invertebrate density at any given sampling location.

Thirty-eight major taxonomic groups (Families) were present in the study area. Chironomids were the most prevalent, comprising between 16 to 85% of the total benthic invertebrate density at each location. Furthermore, chironomids were the most numerically dominant taxon at all but two locations where Chydoridae family of water fleas (Cladocera) were the most numerically dominant. Other major taxonomic groups with respect to total benthic invertebrate density were detritus worms (Naididae), pill clams (Pisidiidae), water fleas from the families Holopedidae and Macrothricidae, phantom midges (Chaoboridae), seed shrimps (Ostracoda) and cyclopoid copepods.

Benthic macroinvertebrates from the following functional feeding groups were present at all locations sampled in the study area: scrapers, shredders, collector-gatherers, collector-filterers, and predators.

Benthic invertebrates (dragonfly nymphs and caddisfly larvae) were collected from selected Project area lakes, including Russell Lake and Kratchkowsky Lake, and analyzed for metals and radionuclides. The results of the analyses identified that radionuclide levels were generally below the laboratory method detection limit, with the exception of Po-210 and Ra-226. While metal concentrations observed in benthic invertebrate tissues collected from Project area lakes were generally consistent across all locations, cobalt and nickel concentrations were observed to be more variable. Benthic invertebrate tissues collected from Russell Lake had higher concentrations of some metals, including aluminum, cobalt, and uranium, than other lakes in the Project area.

5.4.5 Plankton Community

Lake phytoplankton and zooplankton samples were collected in September 2016 at six locations.

The biovolume of phytoplankton ranged from 0.69 to 14.0 mm³/m³ water at the locations sampled. In total, 55 phytoplankton taxa were identified from seven classes and at least six classes were identified in each of the waterbodies sampled. Diatoms (Bacillariophyceae) were dominant at all locations, representing approximately 25% to 90% of the total biovolume at each location.

The biovolume for zooplankton ranged from approximately 10 to 2,211 mm³/m³ water at lakes sampled. A total of 32 taxa belonging to 10 classes were identified. Branchiopods (Branchiopoda)

were dominant at all locations representing approximately 33% to 94% of zooplankton biovolume at each location.

At all locations, chlorophyll-a concentrations were below the laboratory method detection limit ($< 0.60 \mu\text{g/L}$). This is a reflection of the typically low primary productivity of oligotrophic lakes in the Project study area.

5.4.6 Fish Community, Spawning, and Fish Tissue Chemistry

Baseline field surveys were conducted to assess aquatic habitats throughout seasonal fluctuations in fish movements and spawning activities. Fish community surveys were undertaken in various habitat types in selected Project area waterbodies to characterize fish species presence and community diversity. A total of 13 species of fish were collected within the Project area during baseline surveys in September 2016 and May 2017. All waterbodies sampled, except one headwater pond, supported fish.

Eleven fish species were collected within study area lakes: lake chub, spottail shiner, longnose sucker, white sucker, lake whitefish, lake trout, northern pike, burbot, ninespine stickleback, yellow perch, and walleye.

Eleven fish species were also collected at stream sampling areas: lake chub, spottail shiner, longnose sucker, white sucker, arctic grayling, northern pike, burbot, ninespine stickleback, slimy sculpin, yellow perch and walleye.

Large-bodied fish spawning surveys were conducted in the fall of 2016 and spring of 2017 at selected lake and stream locations to determine the utilization of these areas for spawning. Fall spawning species present within the study area include lake whitefish and lake trout, and potential spawning habitats for these species were identified in several Project area lakes, including Kratchkowsky Lake. Spring spawning species present within the study area include walleye, northern pike, arctic grayling, white sucker, longnose sucker, and yellow perch. Spawning habitats for walleye and suckers were observed at most stream stations. Northern pike spawning habitats were present in nearly all study area lakes, as well as most stream stations. Burbot spawn during late winter in streams or lake shallows under ice. No specific spawning surveys targeted burbot, however potential spawning habitat occurs within the study area.

Tissue samples (muscle and bone) collected in 2016 and 2017 from northern pike and white sucker were submitted for chemical and radiological analyses. Northern pike represents a predator species whereas white sucker represents a forage species. Mercury concentrations in both northern pike and white sucker tissue were below the Health Canada (2007) standard of $0.5 \mu\text{g/g}$ wet weight for commercially sold fish. Selenium concentrations in both northern pike and white sucker tissue were below the British Columbia Ministry of Environment (2014) guideline of $4 \mu\text{g/g}$ dry weight and the United States Environmental Protection Agency (2016) criterion of $11.3 \mu\text{g/g}$ dry weight for fish muscle.

5.5 Terrestrial Environment

Terrestrial baseline studies were initiated in 2016 to characterize the existing environment in the Wheeler area.

5.5.1 Predictive Ecosite, Anthropogenic, and Fire Mapping

In order to develop baseline disturbance and vegetation cover/fire mapping, as well as provide an accurate characterization of the vegetation cover for future monitoring and/or impact assessment purposes, predictive ecosite mapping was obtained from the Saskatchewan Technical Branch and enhanced to increase accuracy for site, local and regional study areas.

The predictive ecosite mapping identified that there are 22 different ecosite classifications located throughout the Project area, with the most abundant being jack pine/blueberry/lichen (70%), waterbodies (13%), and jack pine/black spruce/feathermoss (5%). The results also identified that the broader regional study area was comprised of the same ecosite classifications, however differing slightly in their proportions (jack pine/blueberry/lichen (52%), waterbodies (21%), and jack pine/black spruce/feathermoss (13%)).

The results of the baseline anthropogenic map of the Project study area identified that the total amount of anthropogenic disturbance in the Project local study area is 2.9% (1.4 km²), and 1.5% (5.8 km²) identified in the broader regional study area.

Historical fire data was obtained from the Saskatchewan Ministry of Environment, Wildfire Management Branch to characterize the proportion of the Project and regional study areas which have been disturbed by past fires. The results of the fire mapping survey identified that 43% percent of the Project area landscape has burned within the last 30-50 years, and the remaining 57% of the landscape has forests aged 70 years and older.

5.5.2 Ecosite Characterization, Plant Structural Diversity, and Species Richness

Detailed vegetation and wildlife habitat characterization field surveys were undertaken in 2017 to describe and quantify the ecological and botanical conditions within recurring mapped ecosite types and regeneration forests. Sample site locations were widely distributed throughout the Project area. One hundred and ninety-four (194) species and/or genus of species were recorded during the vegetation field survey.

5.5.3 Vegetation and Soil Chemistry

The vegetation and soil sampling program was undertaken between August 2 and 7, 2017. Blueberry stems, leaves, fruit (currents year's growth), terrestrial lichen, and soil samples were collected to determine baseline conditions of physical properties, inorganic ions, metals, and radionuclides in vegetation (blueberry and lichen) and soil samples, as well as to support future monitoring, mitigation, and impact assessments.

Lichen and blueberry radionuclide levels were relatively consistent across the Project study area. Metal parameters were variable but relatively consistent, aside from elevated levels of aluminum, chromium, iron, lead, titanium, and vanadium observed at one location.

Radionuclide levels in soil were also variable but relatively consistent, with the exception of one sample site located northeast of Russell Lake where higher levels of lead-210 and polonium-210 were observed compared to other sample sites. Elevated levels of calcium, copper, lead, and manganese were also observed at this location compared to other sample sites.

5.5.4 Winter-Active Wildlife Identification and Abundance

Winter tracking surveys were completed to determine the presence of winter-active animals, determine the relative abundance of winter-active animals, enhance the Project specific area understanding of species-ecosite affiliations, and provide a robust baseline for potential follow-up and monitoring requirements. Winter tracking surveys were completed between January 25 and February 3, 2017, February 1 and 3, 2018 and March 2 and 12, 2018. Methodology was developed with guidance from the provincial snow track survey protocols (Government of Saskatchewan 2014b) and long-term monitoring techniques originating in Finland (Linden *et al.* 1996) and adopted by the Alberta Biodiversity Monitoring Program (Shank and Farr 1999). Tracks from the following species were observed in the Project area during the winter track count surveys:

- Snowshoe hare;
- Red squirrel;
- Grouse;
- Fisher;
- Moose;
- Microtine (voles and muskrats);
- Marten;
- Canada lynx;
- Otter;
- Ermine;
- Woodland caribou;
- Mink; and
- Red fox.

5.5.5 Ungulate Pellet Group/Browse Availability

Pellet group/browse availability transects were completed between June 9 and 20, 2017, and June 6 and 12, 2018 to collect baseline data on the presence and relative abundance of ungulates (moose and woodland caribou), carnivores, and game birds (grouse/ptarmigan species). The

transects were also used to determine the frequency of occurrence and abundance of terrestrial and arboreal lichen, as this species is vital to the woodland caribou population.

Pellets or scats of the following seven species were detected during the pellet group/browse availability surveys:

- Grouse/ptarmigan;
- Moose;
- Woodland caribou;
- Black bear;
- Red fox;
- Mink; and
- Martin.

The pellet group/browse availability surveys will provide baseline data to support future impact assessments and to allow for potential future follow-up and monitoring requirements.

Terrestrial lichen was observed in all ecosite/vegetation cover types sampled, except in areas where black spruce/balsam poplar/river alder swamp and willow shrubby rich fen covers were most prominent. Frequency of occurrence was the highest (greater than 99%) in areas covered by jack pine/blueberry/lichen.

Arboreal lichen occurred in 79% of ecosites/vegetation cover types surveyed throughout the Project area and were observed to be most abundant in areas covered by jack pine/blueberry/lichen.

5.5.6 Woodland Caribou Aerial Survey

In 2018, Denison submitted a permit application for an aerial survey to collect local-regional wildlife (most specifically woodland caribou and moose) data to present regional comparison values (occurrence/relative density) and habitat affiliations of species in the region, and provide context for results recorded in the Project area to date. The aerial survey permit application was denied by Saskatchewan Ministry of the Environment (SK MOE). SK MOE advised that a Project-specific aerial survey was unnecessary; SK MOE advised that in the EIA, Denison should assume presence of woodland caribou in the Project area and reference available regional data on distribution, density and movement. Although regional woodland caribou data is available in an interim, summarized form (i.e., McLoughlin et al. 2016), raw data is currently unavailable to Denison.

5.5.7 Small Mammal Identification, Abundance, and Tissue Chemistry

A small mammal trapping program was completed between September 24 and October 2, 2016 to determine the species composition and relative abundance of voles, mice, and shrews, as well as to collect specimens for baseline metal and radionuclide tissue analyses.

With an overall capture rate of 7.7 captures per 100 trap nights, a total of 197 individual small mammals from the following three species were captured during the program: red-backed voles, meadow voles, and dusky shrews.

The small mammal trap lines were stratified by three general areas: Gryphon deposit, Phoenix deposit, and a reference location. A total of 124 red-backed vole specimens were submitted for metals and radionuclide analysis. Samples collected at the Phoenix deposit indicated elevated levels of aluminum, titanium, uranium, and radium-226 in comparison to other sites surveyed.

5.5.8 Amphibian Nocturnal Call and Visual Identification Surveys

Amphibian surveys were completed to establish the presence/not-absence and relative abundance of amphibian species within the local and regional study areas. Amphibian auditory surveys were completed between June 16 and 20, 2017 and June 6 and 9, 2018. The provincial species detection protocol for amphibian auditory surveys (Government of Saskatchewan 2014c) was used to establish methodology for the amphibian nocturnal call survey.

Visual search surveys were completed between June 7 and 14, 2018. The provincial species detection protocol for amphibian visual surveys (Government of Saskatchewan 2014d) was used to establish methodology for the amphibian visual search surveys.

Wood frogs and boreal chorus frogs were detected.

5.5.9 Breeding Songbird Identification and Abundance

Breeding songbird point count surveys were undertaken in June 2017 to document the diversity and relative abundance of breeding songbirds within the Project study area, as well as to determine the presence of known or potential avian species at risk. The breeding songbird point count survey methodology was developed with guidance from the Saskatchewan Ministry of Environments species detection survey protocol for forest bird surveys (Government of Saskatchewan 2014e). Three hundred and nineteen indicated pairs were observed in the Project study area. The highest number of breeding songbird pairs were detected in jack pine/white birch/feathermoss cover. The following list provides the ten most common species detected:

- Ruby-crowned kinglet;
- Dark-eyed junco;
- Gray jay;
- Yellow-rumped warbler;
- Swainson's thrush;
- Hermit thrush;
- Lincoln sparrow;
- Chipping sparrow;

- Fox sparrow; and
- American robin.

5.5.10 Semi-Aquatic Furbearer Abundance

Semi-aquatic furbearer shoreline surveys were conducted along shorelines of select creeks, lakes, and ponds between September 29 and October 3, 2016 to provide quantitative data on the occurrence and relative abundance of semi-aquatic furbearing mammals (muskrat, mink, beaver, and otter) and to collect spatial data on the distribution within the Project and regional study areas. Signs of three target species, namely muskrat, beaver, and river otter, were observed during the survey.

5.5.11 Aerial Waterfowl and Raptor Identification and Abundance

The aerial waterfowl and raptor stick nest survey was completed across 33 survey sections containing 353 water bodies on June 15 and 16, 2017 to document the presence, diversity, and abundance of breeding waterfowl (including species at risk), as well as to identify the occurrence of active, inactive, and old raptor nests (i.e. bald eagle, osprey, and red-tailed hawk). The survey recorded 20 confirmed unique species and six species groups, for a total of 681 individual waterfowl/raptor(s). The ten most commonly observed species were:

- Ring-necked duck;
- Common merganser;
- Common loon;
- Mallard;
- White-headed gull;
- Bald eagle;
- Canada goose;
- Lesser scaup;
- Yellow legs spp; and
- Bufflehead.

A total of 24 active (currently occupied), inactive (not currently occupied), and old (dilapidated) nests were observed in the Project area during the survey. Eleven nests were active including four bald eagle nests, four osprey nests, one raven nest, one herring gull nest, and one common loon nest, as well as one mew gull colony of 12-15 nests.

5.6 Species at Risk and Sensitive Species

Wildlife resources in the regional area of the Project have been identified as being important due to their contributions to biodiversity, social and economic value, and importance to local culture. A

literature review of available wildlife information identified a number of past inventory and habitat mapping studies within the local and regional study areas, many of which contribute to understanding local animal behaviour, habitat use, and anthropogenic and biological influences.

5.6.1 Wildlife Species

The Saskatchewan Conservation Data Centre (SKCDC) were consulted to identify wildlife species that may occur in the Project area. A total of five amphibians, 219 birds, and 41 mammals potentially occur within the Project area. Of the list of vertebrates known, or with potential to occur in the Project area, thirteen sensitive or federally/provincially listed species at risk were observed. Five are listed as “threatened” or “special concern” under the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and four are listed as Schedule 1 under *Species at Risk Act* (SARA).

Table 5.1 presents the list of sensitive or federally/provincially listed species at risk observed within the Wheeler area, along with setback distances.

5.6.2 Aquatic Species

There are no observations of aquatic species (meaning wildlife that is a fish as defined in section 2 of the *Fisheries Act*) in the Project area with the status of threatened, endangered or special concern under SARA or COSEWIC.

Table 5.1: Vertebrate Sensitive or Species at Risk Observations in the Wheeler River Project Area

| Common Name | Scientific Name | Observation Source | Observation Type | Observations Per Type | Total Observations* | SK Status ¹ | COSEWIC Status ² | SARA Status ³ | SARGSS ⁴ | Setback Distance (high disturbance) ⁵ |
|------------------------|------------------------------|--------------------|------------------------|-----------------------|---------------------|------------------------|-----------------------------|--------------------------|------------------------------|--|
| Common loon | Gavia immer | Field Survey | Auditory and/or Visual | 77 | 106 | S5B, SUN,S5M | Not at Risk | | Breeding Bird May 15-July 15 | 200 m |
| | | Incidental | Auditory and/or Visual | 28 | | | | | | |
| | | Incidental | Nest | 1 | | | | | | |
| Woodland caribou | Rangifer tarandus caribou | Field Survey | Track | 72 | 94 | S3 | Threatened | Threatened | | |
| | | Field Survey | Pellet | 4 | | | | | | |
| | | Incidental | Track/Browse | 5 | | | | | | |
| | | Field Survey | Crater | 13 | | | | | | |
| Bald eagle | Haliaeetus leucocephalus | Field Survey | Visual | 47 | 53 | S5B, S5N,S4M | Not at Risk | | Nest Site Mar. 15-July 15 | 1,000 m |
| | | Incidental | Visual | 3 | | | | | | |
| | | Incidental | Nest | 3 | | | | | | |
| Common nighthawk | Chordeiles minor | Incidental | Auditory and/or Visual | 26 | 33 | S4B, S4M | Threatened | Threatened | Breeding Bird May 1-Aug. 31 | 200 m |
| | | Incidental | Nest | 2 | | | | | | |
| | | SCDC | Visual | 5 | | | | | | |
| Mew gull | Larus canus | Field Survey | Auditory and/or Visual | 16 | 29 | S4B, S4M | | | Nesting Colony May 1-July 15 | 400 m |
| | | Field Survey | Nest | 13 | | | | | | |
| Osprey | Pandion haliaetus | Field Survey | Visual | 8 | 15 | S2B, S2M | | | Nest Site May 1-Aug. 15 | 1,000 m |
| | | Field Survey | Nest | 5 | | | | | | |
| | | Incidental | Visual | 2 | | | | | | |
| Olive-sided flycatcher | Contopus cooperi | Field Survey | Auditory and/or Visual | 8 | 14 | S4B, S4M | Threatened | Threatened | Breeding Bird May 1-Aug. 31 | 300 m |
| | | Incidental | Auditory and/or Visual | 6 | | | | | | |
| River otter | Lontra canadensis | Field Survey | Track | 10 | 11 | S3 | | | | |
| | | Incidental | Visual | 1 | | | | | | |
| Bonaparte's gull | Chroicocephalus philadelphia | Field Survey | Visual | 10 | 11 | S4B, S4M | | | Nesting Colony May 1-July 15 | 400 m |
| | | Incidental | Visual | 1 | | | | | | |
| Herring gull | Larus argentatus | Field Survey | Auditory and/or Visual | 6 | 7 | S5B, S5M | | | Nesting Colony May 1-July 15 | 400 m |
| | | Field Survey | Nest | 1 | | | | | | |
| Barn swallow | Hirundo rustica | Field Survey | Auditory and/or Visual | 4 | 4 | S5B, S5M | Threatened | | | |
| Horned grebe | Podiceps auritus | Incidental | Visual | 1 | 1 | S5B, S5M | Special Concern | Special Concern | | |
| Common tern | Sterna hirundo | Field Survey | Visual | 1 | 1 | S5B, S5M | Not at Risk | | Nesting Colony May 1-July 15 | 400 m |

* Species detections included visual/auditory observations, scat/pellet groups, winter tracking trails and general sign during 2017 and 2018 surveys

¹ SKCDC Rankings:

2 = Imperiled/Very rare

3 = Vulnerable/Rare to uncommon

4 = Apparently Secure

5 = Secure/Common

M = for a migratory species, rank applies to the transient (migrant) population

B = for a migratory species, applies to the breeding population in the province

N = for a migratory species, applies to the non-breeding population in the province

U = status is uncertain in Saskatchewan because of limited or conflicting information (unrankable)

² Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and its recommendations for listing, go to: <http://www.cosewic.gc.ca>

³ Species at Risk Act (SARA) and its registry of protected species go to: <http://www.sararegistry.gc.ca>

⁴ SARGSS: Saskatchewan Activity Restriction Guidelines for Sensitive Species (Government of Saskatchewan 2017c)

5.6.3 Plant Species

Rare vascular plant surveys were completed to identify rare vascular plant occurrence(s) within the Project local and regional study areas, as well as to provide a scientifically defensible baseline for potential follow-up/monitoring requirements. The rare plant survey was completed according to the Government of Saskatchewan (2017d) Rare Vascular Plant Survey Protocol. Alaskan clubmoss (*Diphasiastrum sitchense*), ranked as imperiled/ very rare (SK2), and three-seeded sedge (*Carex trisperma*), ranked as vulnerable/ rare to uncommon (SK3), were observed in the Project area.

5.7 Human Environment

5.7.1 Socio-Economic Context

The following is a summary of social and economic conditions, land use, communities, surface leases, disturbances, and existing infrastructure around the Project area.

The economy in northern Saskatchewan is dominated either directly or indirectly by natural resources. Economic activity is generated through commercial fishing, tourism, harvesting and sale of country foods such as mushrooms, wild rice and berries. The forestry industry is also a significant contributor to the region's economic base. That being said mineral exploration and the mining industry are by far the most dominant contributors to northern Saskatchewan's economy through direct employment, contracting of northern based businesses and the procurement of a multitude of supplies and services. The recent suspension of an operating uranium mine and mill in northern Saskatchewan resulted with layoffs of approximately 550 employees of which approximately half of those individuals were registered as northern residents.

As a remote site, there are no communities in relatively close proximity to Wheeler (Figure 3.4). Calculated using a straight line, the closest communities are approximately 150 km away in the northern settlement of Wollaston Lake and the neighbouring reserve of Lac La Hache (Table 3.2 and Figure 3.4). Travelling by existing roads the closest community to the Project is Pinehouse which is approximately 260 km away (Table 3.2).

A number of recreational leases are held, and it is assumed that cabins are used by both non-Indigenous and Indigenous people (Table 3.1). There are ten (10) recreational leases within 22 km of Wheeler. The federal lands within 150 km of Wheeler are reserve lands (Figure 3.5 and Table 3.3), none of which have permanent residences.

Ground access to Wheeler is along Highway 914; access to the highway north of Key Lake is controlled at the Cameco Key Lake gatehouse. Existing infrastructure in the area includes Highway 914, the provincial power line which is adjacent to the highway, infrastructure for Key Lake Operation, and infrastructure for McArthur River Operation (Figure 1.2). Existing disturbances are from exploration activities such as line cutting drilling and access routes.

Industrial leases in proximity to Wheeler are held for mineral exploration, power supply and road maintenance (Figure 3.2 and Table 3.1).

5.7.2 Heritage Resources

The Project footprints from the preliminary economic assessment stage were submitted to the Heritage Conservation Branch (HCB), Saskatchewan Ministry of Parks, Culture and Sport for heritage screening in 2017. It was identified that portions of the proposed infrastructure and access road options could impact hilly terrain and prominent uplands located within heritage sensitive areas. Accordingly, a Heritage Resource Impact Assessment requirement was attached to the Project, pursuant to Section 63 of *Heritage Property Act*.

A heritage resources baseline study was initiated on July 5, 2017 under Archaeological Resource Investigation, Permit 17-091. Heritage sensitive areas were assessed through a combination of pedestrian reconnaissance and visual inspection field programs, complimented by the excavation of 258 shovel probes and 5 shovel tests. The assessment identified an Artifact Find site (HiNi-6) of an unknown precontact cultural affiliation located on the western terrace of a lake adjacent to the Phoenix 2 access road option. The find was a large, grey quartzite secondary flake. At this stage in the Project design, the Phoenix 2 access road option is no longer being considered.

Upon completion of the Heritage Resources Impact Assessment, it was submitted to the HCB for review. The HCB determined that the new site was small, consisting of a single artifact so it was considered to have limited interpretative value. The HCB determined that the regulatory requirements were satisfactorily completed, and the office had no concerns regarding development occurring within the areas surveyed. An approval letter was issued to Denison by the HCB on December 14, 2017.

Denison recognizes that Project footprints (location, size) assessed in 2017 may change as the Project advances through the EIA and licensing phases. Additional heritage resource baseline studies will be undertaken, and approval will be received prior to executing future land disturbances, as required.

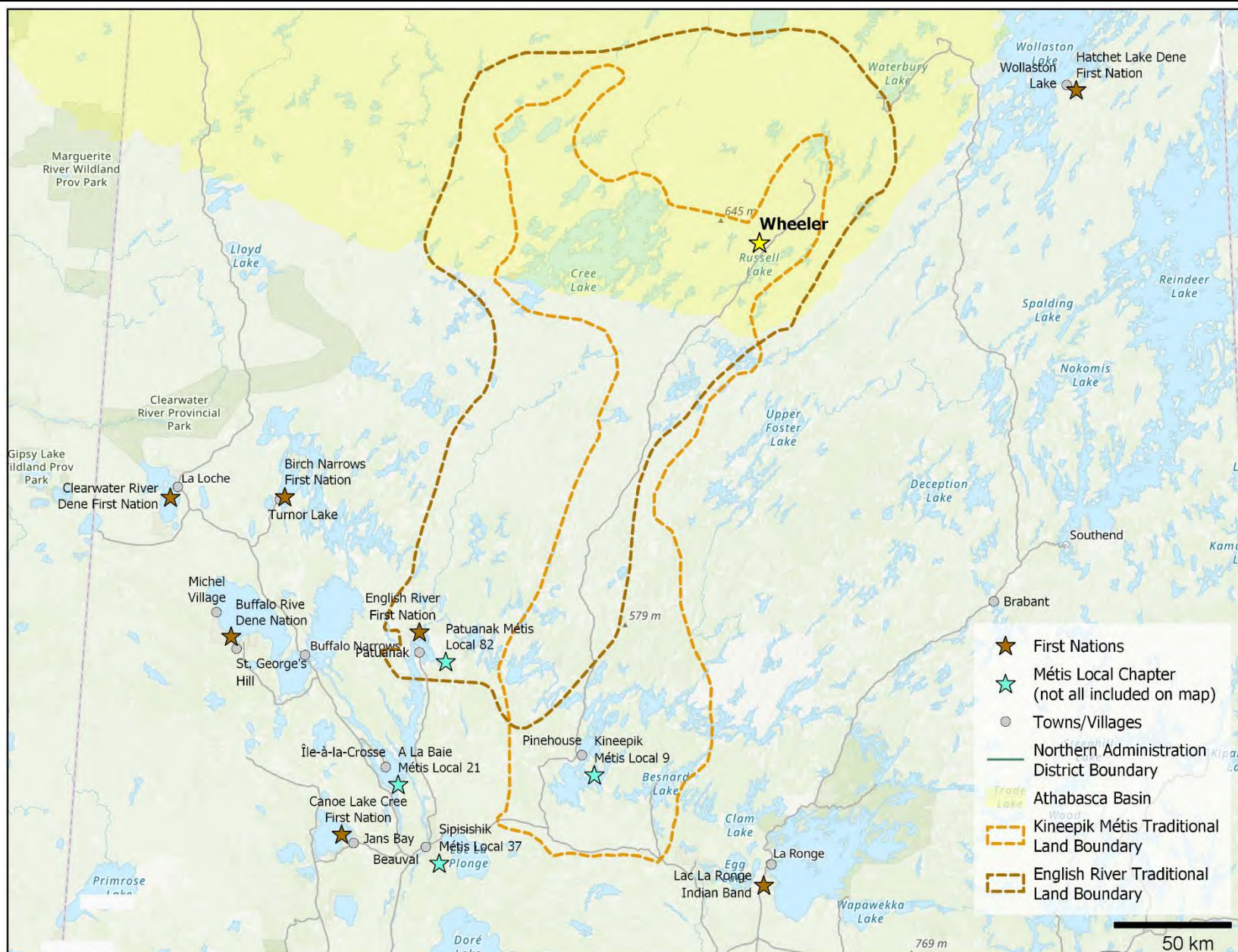
5.7.3 Current Traditional Land Use by Indigenous Communities

Wheeler is located in the Treaty 10 area (Figure 3.1) and the local and regional area surrounding the proposed Project has been claimed by four distinct Indigenous communities as partially or entirely falling within their traditional territories, where traditional land use activities have been historically or are currently practiced. These groups consist of the English River First Nation and the Kineepik, Sipishik and A La Baie Métis locals of the communities of Pinehouse, Beauval and Ile a la Crosse, respectively. Traditional territory boundaries from English River First Nation and Pinehouse Kineepik Métis are provided in Figure 5.7. These traditional land use maps were provided to Denison along with permission to use the maps.

The traditional activities practiced within the immediate and regional area of the Project consist of subsistence hunting and fishing. The immediate area also falls within the trapping block of N18, which is operated by a member of the English River First Nation (Figure 3.2 and Table 3.1).

Seasonal harvesting of native plants for food and medicinal purposes is also common throughout the regional area.

During the open water season the rivers and lakes in the area serve as transportation routes to and from areas of harvest of plants and game as well as preferred campsites and/or cabins. During the winter months the frozen lakes, river banks and muskegs are used as transportation routes to cabins, trap lines and/or preferred hunting areas.



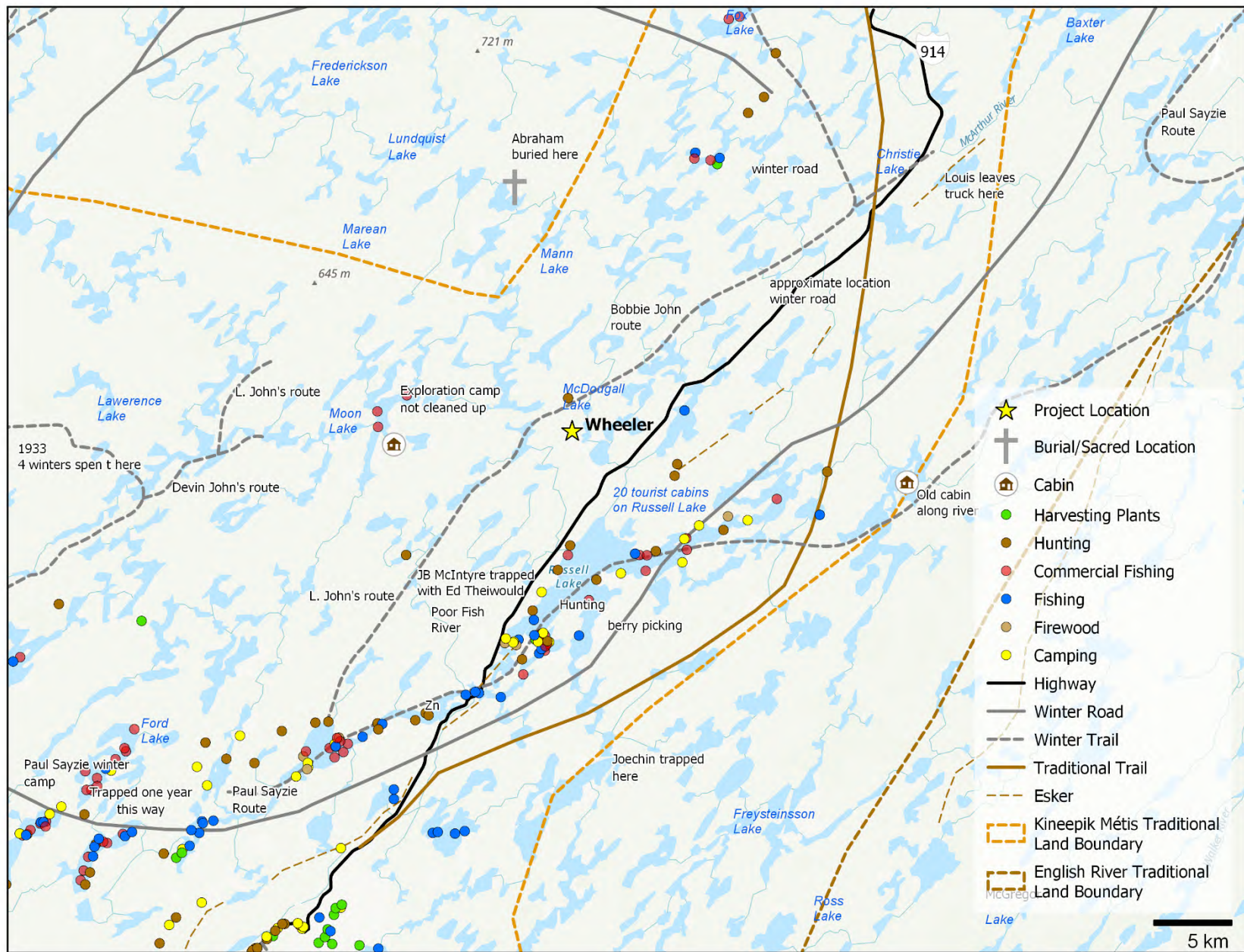
Note: Not all Indigenous traditional territories are included on the map

Enison Mines

Wheeler River Project
Provincial Technical Proposal and Federal Project Description

Figure 5.7: Traditional Territory Boundaries Provided by English River First Nation and Pinehouse Kineepik Métis

May 2019



Note: Traditional territory boundaries provided by English River First Nation and Pinehouse Kineepik Métis

Enison Mines

Wheeler River Project
Provincial Technical Proposal and Federal Project Description

Figure 5.8: Available Traditional Land Use Data around Wheeler

May 2019

6 Environmental Effects

6.1 Overview of Potential Project Effects and Mitigation Measures

This section provides a brief description of changes that may be caused by the Wheeler Project and the proposed mitigations. It includes a high-level summary of potential effects during the construction, operation, decommissioning and post-decommissioning phases under normal operating conditions and potential accidents and malfunctions scenarios. General mitigation measures to minimize or eliminate potential effects are presented for the biophysical or human environment component discussed below. This evaluation is not comprehensive or final; potential effects of the Project at the site, local and regional assessment areas will be rigorously and transparently assessed and presented in the EIA following the general approach of:

- Identifying component- or activity-specific characteristics and site-specific environmental characteristics;
- Identifying both positive and negative interactions between those characteristics (Project-environment interactions) through Project pathways;
- Identifying robust mitigation measures; and
- Assessing the likelihood and significance of these interactions following application of the mitigation measures, the acceptability of these residual risks, if any, and the resulting potential effects they may have on biophysical and human environment valued components (VCs).

In addition to predictions made, monitoring programs will be developed based on results of the environmental assessment and implemented as part of the plan, do, check, act model (Section 6.3).

6.1.1 Biophysical Environment

6.1.1.1 Terrain and Geology

Changes in terrain are expected to be minor as both the footprint and volume of earthworks required for construction of the Project components are minimal. Earthworks are expected for construction of surface infrastructure such as roads, building, and the airstrip. Large volumes for cut and fill are not anticipated, and detailed designs will be tailored to minimize and balance the cut and fill needs of the Project footprint.

Due to the depth of the deposit (~400m below surface), low vertical profile of the deposit (~6-8 m on average) and the fact that the mining only removes uranium from the ground leaving virtually all other material in place, surface ground subsidence is not expected. Ground subsidence may be experienced directly above the deposit, but those effects will be localized and are expected to dissipate in a short distance. To be conservative the potential for any ground subsidence at surface during the post-decommissioning phase as a result of allowing the freeze wall to thaw will be evaluated in the EIA.

General mitigation measures to minimize or eliminate potential effects to terrain and geology:

- Design Project to minimize footprint, and incrementally reclaim where possible;
- Design Project to minimize cut and fill volumes for surface facilities;
- Include freeze wall to provide geotechnical stability during mining;
- Assess the potential for subsidence post-mining and monitor the geochemical and geotechnical conditions within the mine horizon during the decommissioning phase; and
- Evaluate options to backfill the mining area if subsidence during the post-decommissioning is identified.

6.1.1.2 Hydrogeology

Groundwater quality within the mining horizon is expected to change as a result of direct contact with the mining solution during operations. This effect will be localized and groundwater in the mining horizon will be remediated during decommissioning before the freeze wall is allowed to thaw.

Mining solution and uranium rich mining solution may enter groundwater above the mining horizon via accidents and malfunctions. Examples of types of accidents and malfunctions could be: well damage and release above the mining horizon, groundwater contamination from surface through spills at the pumphouses or leaks along the pipelines. However, all flows within the ISR mining system from the processing plant to the mining horizon are contained by the freeze wall and additionally metered and monitored for pressure losses which will allow for early identification of leaks in wells and along pipelines throughout the entire closed circuit. Wells and pipelines will be designed with secondary containment (or equivalent protections) and leak detection monitors. The monitoring and safeguards put in place will allow for the stoppage of any leaks quickly by turning off wells or reversing flows at select wells within the wellfield, thereby minimizing any effects on groundwater quality above the mining horizon. If required, Denison will be able to drill additional wells into any potentially contaminated areas for recovery of the mining solution back to surface. Denison will develop emergency response plans to prevent and clean-up surface spills. In addition, groundwater monitoring wells will be established at key locations within and outside of the wellfield to monitor for any changes in groundwater quality.

Groundwater quality may be changed by discharge of treated effluent into the groundwater environment. Options and potential effects associated with potential discharge of treated effluent into groundwater via deep well injection will be thoroughly examined in the EIA.

Groundwater quality may also be changed by accidents and malfunctions related to: spills or leaks from waste pads and ponds, spills of hazardous substances including reagents and fuels, leaks from water treatment plant ponds, and leaching from the landfill. During normal operating conditions, Denison expects these interactions will be fully mitigated through appropriate Project design (e.g., waste pad will be double lined with leak detection capabilities; hazardous substances stored

in approved storage areas with secondary containment as required) and implementation of management plans (e.g. material sorting for items destined for onsite landfill, hazardous waste handling and storage). Groundwater monitoring wells will be established near the processing plant terrace, landfill, and fuel and hazardous waste storage area to allow for detection of any changes in groundwater quality.

While the freeze wall is in place, groundwater flow will be changed at the site level (e.g., immediately surrounding the mining freeze wall) as groundwater within and outside of the freeze wall will not be able to interact. This will be reversed post-decommissioning once the mining horizon has been remediated and the freeze wall is allowed to thaw. Potential changes in site and local groundwater flow regime will be evaluated as part of the hydrogeological model in the EIA.

Given our understanding of the extent of the hydrogeological environment in the site, local and regional Project areas we do not expect any aspect of the Project will influence groundwater quantity. However, the influence of the wellfield and the in situ recovery mining method on groundwater quantity will be examined and assessed as part of the hydrogeological assessment in the EIA. The assessment will include the potential for localized drawdown in groundwater outside of the mining horizon. Groundwater withdrawal for the fresh water distribution system (fire water system, the potable WTP, the processing plant and the wash bay) will also be evaluated for any potential changes on groundwater quantity. Groundwater monitoring wells will be established at key locations within and outside of the wellfield to monitor any changes in groundwater levels.

General mitigation measures to minimize or eliminate potential effects to the hydrogeological environment:

- Establish freeze wall before mining operations to effectively isolating the area with mining solution (area inside the mining horizon) from the surrounding groundwater environment;
- Design injection and recovery wells to have secondary containment, or adequate containment (e.g. cementing the annulus of injection and recovery wells);
- Recognize option to drill additional wells in order to recover mining solution excursions;
- Design pipelines to have secondary containment or catchment;
- Have leak detection in place for wells and pipelines;
- Remediate groundwater in mining horizon as part of decommissioning;
- Have appropriately designed and monitored storage areas for waste, reagents, and hazardous substances; and
- Design processing plant to allow for collection of any spills.

6.1.1.3 Atmospheric and Acoustic Environment

There is potential for radon and radon progeny degassing from uranium rich mining solution in the wellfield components (i.e., injection and recovery wells, pumphouses, pipelines) and in the processing plant. Ventilation will be designed to provide sufficient worker protection and

monitoring systems will be in place to ensure worker health and safety. Discharge into atmosphere should provide sufficient dilution, although modelling for EIA will indicate if other mitigations are required.

The processing plant exhaust, mainly from drying and packaging areas, will be directed through a stack and released outside of the building. The stack height will be designed based on results of air dispersion modelling to be an appropriate height for optimal dispersion. If the modelling suggests the need, scrubbers will be installed to control atmospheric emissions. Best available technology, with respect to workplace cleanliness will be implemented inside the processing plant in order to reduce radiological exposures. Denison anticipates stack monitoring, ambient radon monitoring and high-volume air to confirm EIA predictions with respect to calculated source terms and dispersion modelling results.

Fugitive dust from access roads, the airstrip and the clean waste rock pile have potential to locally impact vegetation and soil and therefore wildlife habitat. This will be considered as a physical effect of clean dust in the terrestrial environment section of the EIA; elevated metal and radionuclides are not expected at either roads due to the mining method selected or the clean waste rock pile due to sorting of drill cuttings during wellfield development. The need for dust control will be evaluated based on results of modelling predictions results documented in the EIA. These predictions will be calibrated with dustfall or high-volume monitoring during operations and if necessary additional mitigations measures will be implemented.

Dust from material on the waste pad has the potential to contain metals and radionuclides. The pile will be managed to minimize dust and fugitive dust leaving the pad will be monitored. If necessary, dust control mitigation will be implemented. The current plan is to pack precipitate waste or impurities from the processing plant in tote bags that are then placed on the pad, providing an additional level of containment, eliminating dust from this source and reducing potential volumes of contaminated contact water. Options for disposal of the material on the waste pad (mineralized waste rock, precipitates, and water treatment plant solids) will be evaluated in the EIA.

By tying into the provincial power grid and the nearby Island Falls hydroelectric station, greenhouse gases (GHGs) emissions associated with the Project will be minimized. GHGs are expected from operation of back-up diesel generators, vehicles, drill rigs, and exhaust from propane use in the kitchen and camp for heating. Selection of high-quality, low emissions equipment and regular maintenance will help reduce emissions of GHGs. Denison will examine options to further reduce GHG emissions by using alternate emergency generators, electric vehicles, an electric drill rig for wellfield development, and electrical heat in buildings. Denison will assess greenhouse gas emissions and evaluate their significance in the EIA. This will include evaluating whether the Project is a large GHG emitter, or not. Emissions of NO_x, SO_x, and particulate matter will be evaluated in the EIA as a potential input into the human health and ecological risk assessment (HHERA).

Denison plans to operate an incinerator to dispose of food waste. It is expected that selection of an appropriate incinerator will have design components to mitigate emissions to air. Correct operation and regular maintenance of the incinerator will be important to achieve the design parameters and procedures will be in place to achieve this. If required, the exhaust from the incinerator will be examined as part to the air dispersion modelling.

Compared to traditional uranium mining operations in Canada, the Wheeler noise levels are expected to be low. The main sources of noise will be related to transport of people and goods to and from the site via air and land, drilling of holes for the freeze wall and wellfield, operation of the batch plant, operation of the processing plant, and operation of the pumphouses. Selection of high-quality, low sound emission equipment and regular maintenance will help reduce noise associated with Project activities. Denison will examine options to further reduce noise emissions by using electric vehicles and an electric drill rig for wellfield development. Sensory disturbances to wildlife will be examined as required in the terrestrial section of the EIA.

Overall, Denison anticipates that air emissions and noise from Project activities will dissipate very rapidly to background levels within a few hundred metres from the source.

General mitigation measures to minimize or eliminate potential effects to the atmospheric and acoustic environments:

- Implement a waste rock segregation plan;
- Provide dust control along roads and at the airstrip as required;
- Install scrubbers in stacks and incinerator, as necessary;
- Tie into provincial power grid and hydroelectric station at Island Falls as the main way to minimize GHG emissions;
- Evaluate electric vehicles, electric drill rigs and electric heating in buildings to further minimize greenhouse gas emissions;
- Select and purchase equipment to minimize emissions to air and noise generation;
- Follow operating procedures for equipment;
- Conduct regular maintenance of equipment;
- Develop methods for minimizing radon exposure from the venting of wells, pumphouses or anywhere that there is a potential for the degassing of radon in the system; and
- Evaluate options to reduce noise emissions by using electric vehicles and an electric drill rig for wellfield development.

6.1.1.4 Aquatic Environment

Changes in water quality will be examined through various pathways including: discharge of treated effluent, discharge from the clean waste rock pond, potential for contaminated groundwater to affect surface water bodies, construction and maintenance of water crossings, and any on land

activities near water bodies. Changes in water quality have the potential to affect other components of the aquatic environment including sediment, benthic invertebrates, plankton, and fish. The discharge of treated effluent to a surface water body is expected to be the main Project interaction with water, sediment, and aquatic biota.

The Project may be subject to the Metal and Diamond Mining Effluent Regulations (depending on the volume of treated effluent discharge) which outline requirements for effluent monitoring, effluent discharge limits, and biological effects monitoring program in the receiving environment. Details on expected treated effluent quality and volumes will be presented in the EIA. Based on the current Project design with a focus on water recycle in the processing plant and the minimal discharge volumes to surface water, downstream impacts are considered unlikely outside of the local study area. This includes water and sediment quality, changes in benthic invertebrate, plankton, and fish communities, and benthic invertebrate tissue chemistry and fish tissue chemistry. A thorough evaluation of the potential effects of treated effluent in the receiving environment will be completed as part of fate and transport modelling in the EIA. This is an exercise to predict water and sediment quality at locations downstream of the treated effluent discharge point. The results of the water and sediment modelling will be used to predict effects on benthic invertebrates, plankton, fish, semi-aquatic VCs, terrestrial VCs and humans as part of the HHERA.

Changes in certain components of the aquatic environment (e.g., surface water quality, benthic invertebrate communities, fish populations, etc.) may result from accidents and malfunctions related to spills or leaks from pipelines, processing plant, waste pads, ponds, and hazardous substance storage area. During normal operating conditions, Denison expects these interactions will be fully mitigated through integration of best available technology in the Project design (e.g., leak detection and secondary containment along pipelines; hazardous substances stored in approved storage areas with secondary containment as required) and implementation of various management programs, standard operating procedures and monitoring plans (e.g. material sorting for items destined for onsite landfill, hazardous waste handling and storage).

Potential changes in water quantity as measured by water level and flows will be examined through various pathways including: discharge of treated effluent, discharge from the clean waste rock pond, withdrawals for the fresh water distribution system (fire water system, the potable WTP, the processing plant and the wash bay), recharge of groundwater to surface water bodies, possible drawdown from mining activities, and construction and maintenance of water crossings. All interactions are anticipated to be minor as water intake and output volumes are low relative to the baseline flows in the Project drainage areas. Any changes in local drainage around the site due to infrastructure are expected to be minimal and have negligible effects on site and local study area flows and water levels. Flows are not expected to change at the proposed water crossings as the crossing types will be selected, designed and constructed to avoid causing harm to fish and fish habitat. All potential changes in water levels and flow will be examined as part of the hydrological assessment in the EIA.

Potential effects on fish and fish habitat from in-water works and activities near water are expected to be minor and may be managed by following the Department of Fisheries and Oceans Canada's (DFO's) measures to avoid and mitigate impacts to fish and fish habitat into Project planning and implementation. Two water crossings will be required along the road from the site to the airstrip. The crossing types will be selected and designed to avoid causing harm to fish and fish habitat. Installation of a water intake and a treated effluent discharge pipeline will require in-water works which will be done following best management practices and incorporate measures to avoid causing harm to fish and fish habitat. The water intake will be screened to prevent entrainment of fish and the treated effluent release point will be designed to reduce erosion. A 100 m buffer zone will be established along the shoreline of fish bearing water bodies for working near water, where possible, and best management practices such as erosion and sediment control measures will be implemented. Denison does not expect any Project activities will require a *Fisheries Act* Authorization from DFO. As such, Project review for effects to fish and fish habitat will be conducted by the CNSC as per the MOU between the CNSC and DFO (dated December 16, 2013).

General mitigation measures to minimize or eliminate potential effects to the aquatic environment:

- Minimize volume of treated effluent discharge to the environment by recycling mining solution in the processing plant;
- Design water treatment plant to produce treated effluent which meets or is lower than regulatory discharge requirements;
- Design water intake to avoid fish entrainment;
- Design treated effluent release point to reduce erosion;
- Design and monitor storage areas for waste and hazardous substances;
- Design pipelines to have secondary containment or catchment;
- Design surface facilities to allow for the collection of spills;
- Design and construct water crossings to avoid causing harm to fish and fish habitat;
- Follow best management practices for working in and near water; and
- Develop a robust emergency response plan to minimize the impacts of accidents and malfunctions.

6.1.1.5 Terrestrial Environment

Site preparation and construction will involve ground clearing for all facilities including the roads, processing plant area, wellfield, waste pads and ponds, water treatment plant ponds, and support building such as the camp and operations centre. Best management practices will be followed such as completing all site preparation activities outside of the breeding bird season (and or pre-clearing the area outside of breeding periods), maintaining set-backs from water and saving brush for reclamation. Some of the site and local study areas to be cleared have already been disturbed and/or cleared as a result of exploration activities which will help minimize new disturbance.

Construction and operation of the Project will result in a small loss of soil, vegetation and wildlife habitat in the site and local study areas. However, following decommissioning and reclamation, soil, vegetation and wildlife habitat are expected to recover to baseline conditions. During operations progressive reclamation activities will be completed where possible and the progress and success of these activities will be assessed annually.

Project interactions with wildlife may include direct effects (i.e., potential for wildlife-vehicle collisions) and indirect effects such as changes in movement in response to activity and noise. Woodland caribou are of particular interest due to their conservation status (COSEWIC and SARA status of threatened). Mitigation measures to reduce Project footprints, minimize habitat disturbance, and minimize noise will contribute to reducing potential effects of the Project on woodland caribou in the site, local and regional study areas. A Woodland Caribou Management Plan consistent with the management goals of SK-1 zone will be developed as part of the EIA and will assess the needs for habitat offsets.

Migratory birds are present in the Project area. The main potential interaction of the Project with migratory birds is expected to be site clearing activities (primarily during construction) with breeding times for migratory birds. The Project will be designed and planned to avoid disruption of migratory birds' nests and eggs.

The primary pathways for contaminants to interact with terrestrial wildlife includes release of treated effluent and release of contaminated dust. The potential for radiological and non-radiological contaminants to affect the health of terrestrial wildlife will be evaluated in the EIA as part of the HHERA.

Changes in certain components of the terrestrial environment such as soil quality and vegetation quality may result from accidents and malfunctions related to spills or leaks from pipelines, processing plant, waste pad, ponds, and hazardous substances. During normal operating conditions, Denison expects these interactions will be fully mitigated through appropriate Project design (e.g., leak detection and secondary containment along pipelines; hazardous substances stored in approved storage areas with secondary containment as required) and implementation of various management programs and plans (e.g. material sorting for items destined for onsite landfill, hazardous waste handling and storage, a site emergency response plan).

General mitigation measures to minimize or eliminate potential effects to the terrestrial environment:

- Design Project to minimize disturbance of terrestrial habitat;
- Stockpile brush when possible to use in reclamation;
- Complete ongoing decommissioning when possible;
- Design surface pipelines to have secondary containment or catchment;
- Have leak detection systems in place at key locations;

- Develop a caribou management plan and evaluate the need for caribou habitat offsets in the EIA; and
- Design and plan Project activities to avoid disruption of migratory birds' nests and eggs.

6.1.2 Human Environment

6.1.2.1 Worker Health and Safety

Worker health and safety will be evaluated for both conventional health and safety and radiological health and safety. Worker exposure to non-radiological and radiological elements will be evaluated as part of the HHERA in the EIA.

The main conventional health and safety concerns will be working with hazardous substances such as reagents used throughout the ISR mining and uranium extraction processes as well as fuels, lubricants and greases common to an industrial operation. Denison will have a comprehensive health and safety program in place that meets the requirements of both the federal and provincial governments in order to protect workers and to minimize the potential for conventional health and safety incidents.

With respect to radiation protection, there is the potential for worker exposure to radon and radon progeny degassing from uranium rich mining solution in the wellfield components and in the processing plant. Ventilation will be designed with the ALARA principle (as low as reasonably achievable) in mind to provide sufficient worker protection. Monitoring systems will be in place to ensure these mitigation measures are meeting design specifications. Dust control and good housekeeping practices throughout the plant will also form a critical component of the Radiation Protection Management Plan developed for the Project. Radiological exposures will stay under regulatory limits and keeping with the ALARA principal every effort will be made to maintain all exposures below all licenced action levels. The EIA will present an assessment of potential worker dose and quantify the likely range of doses.

The proposed location for the camp facilities was selected to be upwind of the processing plant, waste pile, and other main sources of contaminants to air.

General mitigation measures to minimize or eliminate potential effects to Worker Health and Safety:

- A radiation protection program derived from a robust radiation exposure assessment;
- An occupational health and safety program;
- Programs for any area deemed critical to safety or in the core CNSC safety assessment areas;
- Clear separation of clean and potentially contaminated areas on site for equipment and personnel;
- Appropriate monitoring and reporting;
- Design pumphouses and processing plant to have proper ventilation; and
- Design Project layout to have office and camp upwind of processing plant.

6.1.2.2 Traditional Land Use

The construction and operation phases of Wheeler may positively or negatively change access for any Indigenous or other resource users in the site and local study areas. There are no potential effects expected from the Project at the regional study area. Denison has integrated traditional knowledge provided by several Indigenous groups practicing traditional land use in the regional and local areas in the early design stages of the Project (refer to Section 8.2.1.2). This practice will continue throughout the EIA and all components of the Project will be assessed in an effort to limit or eliminate effects of the Project on traditional land use. One of the principle decommissioning and reclamation objectives will be to reclaim the site and local study areas to a self-sustaining natural environment capable of supporting pre-mining land use. Successfully meeting this decommissioning and reclamation objective will allow for traditional land use in the site, local and regional study area to continue throughout the post decommissioning and reclamation phase of the Project.

General mitigation measures to minimize or eliminate potential effects to Traditional Land Use:

- Continue engagement with Indigenous groups currently practicing traditional land use activities in the Project area throughout the EIA, feasibility and detailed design stages;
- Identify and incorporate any mitigation or accommodation measures obtained during engagement with Indigenous groups currently practicing traditional land use activities in the Project area;
- Implement Caribou and other Wildlife Management Plans, which will limit or eliminate harvesting of fish and game throughout the construction, operation and decommissioning and reclamation phases of the Project by Project staff;
- Ensure the design and construction of all water crossings over navigable waters are constructed in a manner that does not impede the use of these water courses as a means of transportation for traditional users;
- Ensure the implementation of monitoring programs for all three study areas and present the results of these monitoring programs to key Indigenous groups on regular intervals, demonstrating the environmental protection management plans being implemented are meeting their objectives;
- Design and implement a decommissioning and reclamation plan that incorporates best management practices; and
- Design Project with minimal footprint.

6.1.2.3 Heritage Resources

It is expected that effects on heritage resources will be mitigated through the completion of heritage resource impact assessments and avoidance of any known heritage resources. Procedures will be in place to appropriately respond to any unanticipated heritage resource encounters. These

unanticipated encounters would primarily be expected during site clearing and construction activities.

General mitigation measures to minimize or eliminate potential effects to heritage resources:

- Complete heritage surveys and avoid areas with known resources;
- Submit results of heritage resource impact assessments to Heritage Conservation Branch for review;
- Develop and implement a Heritage Resource Management Plan for the construction and operating phases of Wheeler in accordance with Saskatchewan's *Heritage Property Act*;
- Obtain Indigenous feedback on and incorporate feedback into the Heritage Resource Management Plan; and
- Design Project with minimal footprint.

6.1.2.4 Members of the Public

Exposure to non-radiological and radiological elements for members of the public will be evaluated as part of the HHERA in the EIA. Based on the Project design, Denison anticipated any effects on members of the public will be fully mitigated.

Releases to the environment will be controlled and monitored by the effluent, emissions and environmental monitoring program. Results of these monitoring and control activities will be used to validate results of the HHERA for dose and exposure to members of the public.

6.1.2.5 Socio-Economics

It is expected that the Project will provide a net positive socio-economic effect. This effect will be realized at national, provincial and local northern community levels. All of these socio-economic benefits will be assessed as part of the EIA.

Briefly, the Project will contribute to the national and provincial economies through taxes and royalties as well as through out of province employment generated through downstream processing and transportation requirements of the Wheeler final product. In addition, socially the Project will contribute a significant supply of GHG free energy, in a GHG friendly manner, supporting Canada and Saskatchewan's commitment to addressing global climate change.

The Project itself will generate significant employment and business opportunities throughout all four phases of the operation: construction, operation, decommissioning and post-decommissioning.

In line with Denison's MOUs, direct and indirect employment opportunities as well as business development opportunities will preferentially target individuals and businesses residing in and based in northern Saskatchewan, respectively. Denison is also committed to support education and training opportunities as well as community investment within local northern and Indigenous

communities. Progress on all of these commitments is currently being realized in northern and Indigenous communities and will continue throughout all phases of the Project. The existing commitments and future commitments will be evaluated as part of the EIA.

Denison is an equal opportunity employer and has established strong policies against harassment in the workplace and unlawful discrimination. Denison will continue to work with regulatory agencies, government and communities to reduce employment barriers for all people.

There is currently no tourism land use documented on the site or local study area. However, there is tourism use documented within the regional study area. There are no effects anticipated from the Project that would impact tourism in the regional study area. However, this will be assessed as part of the EIA under the socio-economic aspects of the Project.

General mitigation measures to minimize or eliminate potential negative effects and continue the growth of socio-economic benefits associated with the Project:

- Continue Denison's Indigenous and non-Indigenous engagement program;
- Continue to fulfill commitments outlined in Denison's existing MOUs with Indigenous groups and communities;
- Continue employment practices and efforts to reduce employment barriers for all people;
- Involve and inform representatives of the tourism industry active in the regional study area as part of the ongoing implementation of the engagement program;
- Ensure the implementation of monitoring programs for site, local and regional study areas and present the results of these monitoring programs to regulatory agencies, Indigenous groups and members of the public on regular intervals, demonstrating the environmental protection management plans being implemented are meeting their objectives; and
- Design Project with minimal footprint.

6.1.2.6 Indigenous Peoples

It is anticipated that Wheeler will have a net positive effect on the Indigenous peoples of northern Saskatchewan. Many of these effects have been discussed above, in Sections 6.1.2.1 through Section 6.1.2.5. However, Denison believes they have an additional obligation to the Indigenous peoples who assert claim of the site, local and regional study area as being part of their traditional territory.

The ongoing implementation of the Indigenous engagement program (Section 8.2) will help to identify programs that can be developed within the spirit of the objectives of Denison's existing MOUs with northern and Indigenous groups. These programs will be included as part of the socio-economic aspects of the Project's EIA.

Denison has already engaged with Indigenous peoples to obtain and incorporate feedback directly into the Project designs (refer to Section 8.2.1.2). Denison intends to continue this process to help

minimize impacts through design. Denison intends to continue to engage Indigenous groups on any of the Project's potential impacts to their potential or established Indigenous and/or treaty rights. Engagement efforts will continue as the Project advances and additional conversations will be held once potential Project effects are more thoroughly understood and assessed as part of the EIA process.

As part of ongoing engagement and the EIA process, Denison can review cultural programs in place at other mine sites and brainstorm with Indigenous groups to identify effective cultural support programs that could be implemented at Wheeler.

Examples of additional programs that could be assessed as part of the EIA are:

- Employ Elders at site throughout the construction, operation and decommissioning phases of the program to provide cultural support to Indigenous employees;
- Initiate cultural awareness training for employees periodically throughout the construction and operational phases of the Project; and
- Work with Saskatchewan's northern medical health office to initiate additional programs that may not be currently easily accessed in remote communities. These programs could be made available at site to the Project's work force to encourage wellness and healthy lifestyle choices.

6.1.3 Summary of Environmental Effects under CEAA 2012

This section provides a summary of information presented in Section 6.1.1 and Section 6.1.2 in order to clearly address the requirements of CEAA 2012, s. 5(1).

6.1.4 Fish and Fish Habitat

There is potential for contaminants in water to affect fish health and fish communities. The two main pathways for contaminants to enter fish bearing water bodies are anticipated to be 1) release of treated effluent and 2) spills or leaks of hazardous substances.

The volume of treated effluent (if any) is expected to be minimal with maximum water recycle in the processing plant. In addition, the quality of the effluent will meet or be lower than regulatory limits designed to protect the aquatic environment. This will be fully evaluated as part of the HHERA in the EIA.

Through Project design, best management practices, monitoring, and development of a robust emergency response plan, it is anticipated that the potential for accidents and malfunctions will be minimized.

Potential effects on fish and fish habitat from in-water works and activities near water are expected to be minor and can be mitigated by following the Department of Fisheries and Oceans Canada's (DFO's) measures to avoid and mitigate impacts to fish and fish habitat. The design and installation of any in-water Project components such as water crossings, a water intake, and a treated effluent

discharge pipeline and release point will incorporate measures to avoid causing harm to fish and fish habitat. Work near the shoreline of fish bearing water bodies will be avoided where possible and all work will follow best management practices such as erosion and sediment control.

Denison does not expect any Project activities will require a *Fisheries Act* Authorization from DFO. As such, Project review for effects to fish and fish habitat will be conducted by the CNSC as per the MOU between the CNSC and DFO (dated December 16, 2013).

Based on the above, no significant impacts to fish or fish habitat (as defined in subsection 2(1) of the *Fisheries Act*) are expected from Project activities.

6.1.5 Aquatic Species

There are no observations of aquatic species (meaning wildlife that is a fish as defined in section 2 of the *Fisheries Act*) in the Project area with the status of threatened, endangered or special concern under SARA or COSEWIC.

6.1.6 Migratory Birds

Migratory birds as defined in the Migratory Birds Convention Act are present in the Project area. The main potential interaction of the Project with migratory birds is expected to be site clearing activities (primarily during construction) with breeding times for migratory birds. The Project will be designed and executed to avoid disruption of migratory birds' nests and eggs. This may involve pre-clearing Project footprints outside of breeding periods.

6.1.7 Changes to the Environment on Federal Lands, in a Province other than Saskatchewan, or outside Canada

Denison does not anticipate any changes to the environment on federal lands, in a province other than Saskatchewan, or outside Canada as a result of construction, operation and decommissioning of Wheeler. Potential effects of the Project are expected to be limited to the VC-specific local study areas. No impacts outside of the province of Saskatchewan are expected.

The nearest federal land is 16 km away (Table 3.3 and Figure 3.5). This is reserve land registered to English River First Nation which currently and has no permanent residences.

Any potential changes to the environment on federal lands, outside of Saskatchewan or Canada will be fully evaluated in the EIA.

6.1.8 Effects on Indigenous People

Health and Socio-economic Conditions

Exposure to non-radiological and radiological elements for members of the public will be evaluated as part of the HHRA in the EIA. Based on the Project design, Denison anticipated any effects on members of the public will be fully mitigated.

Denison anticipates a net positive socio-economic effect on Indigenous peoples. In line with Denison's MOUs with Indigenous groups, direct and indirect employment opportunities as well as business development opportunities will preferentially target individuals and businesses residing in and based in northern Saskatchewan, respectively. Denison is also committed to support education and training opportunities as well as community investment within local northern and Indigenous communities.

Physical and Cultural Heritage

Based on traditional knowledge shared with Denison to date, physical areas of cultural importance have not been identified in the Project local study area. Protection of cultural heritage will be incorporated into potential initiatives such as cultural awareness training to employees and employing Elders at site throughout the construction, operation and decommissioning phases of the Project to provide cultural support to Indigenous employees.

Current use of lands and resources for traditional purposes:

Denison has integrated Indigenous knowledge provided by several Indigenous groups practicing traditional land use in the regional area in the early design stages of the Project (refer to Section 8.2.1.2). This practice will continue throughout the EIA and all components of the Project will be assessed in an effort to limit or eliminate effects of the Project on traditional land use.

Traditional land users in the Project area could be affected by restricted access to the site for hunting and fishing during construction and operation; however, following decommissioning, access to the site and resources harvesting will be fully restored. Denison intends to continue to engage Indigenous groups on any of the Project's potential impacts to their potential or established Indigenous and/or treaty rights. Denison will also identify and incorporate any mitigation or accommodation measures obtained from engagement activities. Engagement efforts will continue as the Project advances and additional conversations will be held once potential Project effects are more thoroughly understood and assessed as part of the EIA process.

Any structure, site or thing that is of historical, archaeological, paleontological or architectural significance:

Based on knowledge of the existing environment, Project effects on any structure, site or thing that is of historical, archaeological, paleontological or architectural significance are not expected.

Denison is committed to completing heritage surveys for all Project footprints and avoiding areas with known resources. Denison will also develop and implement a Heritage Resource Management Plan which will outline steps to be taken should an unexpected artifact be encountered. Denison is committed to obtaining Indigenous feedback on and participation with the Heritage Resource Management Plan.

6.1.9 Conclusions

The selection of ISR results in a uranium mining and milling Project with no tailings, a relatively small footprint, minimal volumes of clean waste rock, minimal volumes of waste rock, minimal generation of other contaminated wastes, and limited water treatment and discharge. Wheeler will be designed to contain potential contaminants and careful consideration will be taken to ensure contaminated areas are kept separate from non-contaminated areas.

Groundwater quality will be a main focus in the EIA in order to fully describe the potential range of effects of any leaks or spills of mining solution to the area outside of the freeze wall. Planning for mining horizon restoration at the end of operations provides confidence that protection of groundwater quality will be a primary focus for decommissioning. Denison anticipates that air emissions and noise from Project activities will dissipate very rapidly to background levels within a few hundred metres from the source. Aquatic effects are expected to be low as the Project will minimize volumes of treated effluent through water recycling in the processing plant. Effects on fish and fish habitat are expected to be avoided and mitigated and it is anticipated that a *Fisheries Act* Authorization will not be required. Disturbance of terrestrial habitat will be minimized to the extent possible; progressive reclamation will be practiced throughout operations and a robust decommissioning and reclamation plan will be implemented following the operations phase of the Project. Potential Project effects on woodland caribou will be carefully considered in the EIA. A Caribou Management Plan will be developed and the need for any caribou habitat offsets will be presented in the EIA. Worker health and safety is of the utmost importance and effects on members of the public are not expected. Any effects on traditional land use will be limited to the site and local study areas and these effects will be short term limited to the construction and operating phase of the Project. No effects on traditional land use will occur in the regional study area. Wheeler is expected to provide a net positive effect on socio-economics throughout all levels of the Canadian economy with the most significant positive impact being realized by the Project's local Indigenous and non-Indigenous communities through direct employment and business opportunities. Wheeler can be decommissioned and reclaimed to meet decommissioning objectives resulting in a site that is safe and stable where traditional land use activities may be freely conducted. The site is expected to be accepted into the provincial Institutional Control Program or possibly released back into the Crown land inventory within five years following final decommissioning and reclamation.

In the EIA Denison will demonstrate that the Wheeler Project can be constructed, operated, and decommissioned with no significant adverse effects on the biophysical and human environments. An HHRA will be performed as part of the EIA to demonstrate the overall low impacts of the Project. The preliminary EIA results will be provided for discussion and feedback with local Indigenous and non-Indigenous communities as part of Denison's ongoing engagement activities.

6.2 Cumulative Effects

For the purposes of a cumulative effects assessment, the Project's net environmental effects (i.e. after mitigation) are assessed in combination with the environmental effects of past activities, existing projects and projects or activities that can be reasonably predicted to occur in the region. A cumulative effects assessment is required in both the federal and provincial environmental assessment processes. Denison commits to including an assessment of how other developments or activities in the area may impact the proposed development, its potential impacts on Valued Components (VCs), and whether they contribute to any cumulative environmental impacts. This will take the form of a cumulative environmental effects assessment as part of the description of Project impacts and mitigations that describes the net cumulative impact of the Project. The assessment would also include an assessment of potential impacts due to reasonable emergency or upset conditions.

Potential cumulative impacts will be identified in the assessment of potential Project impacts during baseline environmental work, subsequent analysis and pathways modelling. This will include an examination of any potential cumulative effects identified in the consultation and engagement processes. The potential impacts will be assessed against proposed mitigations to determine if there is any residual risk. Should the residual risk remain high, different mitigations may be necessary.

Wheeler lies within the eastern Athabasca Basin between two existing uranium operations; Cameco's McArthur River mine, and the Key Lake mill and tailings management facility where ore from the McArthur River mine is processed. The Project would also utilize the existing Highway 914, which includes the haul road between McArthur River and Key Lake. There are considerable amounts of information available for use in a cumulative effects assessment, including, but not limited to:

1. Existing site baseline and monitoring data, including any modelling;
2. Baseline and project information from previous EIAs;
3. Government monitoring information;
4. Monitoring data available from uranium projects in the area (i.e. annual monitoring reports; Environmental Performance Reports);
5. Regional monitoring studies, such as the Northern Mines Monitoring Secretariat program with the Northern Saskatchewan Environmental Quality Committee;
6. Eastern Athabasca Regional Monitoring Program;
7. Community monitoring programs in the Athabasca funded by the companies; and
8. State of the Environment reports and CNSC independent third-party reviews of environmental performance at existing uranium operations.

This information combined with the Project specific baseline and pathways modelling should allow for a sufficient cumulative effects assessment. The main areas with potential to generate cumulative effects are due to:

1. Any effluent discharge, as Wheeler will share a watershed with the Key Lake Operation, and possibly Millennium project;
2. Overlap of air emissions with other projects;
3. Vehicle traffic to and from the site. This will include shipments of supplies, construction materials, reagents and fuel to the site, and shipments of uranium and recyclables from the site to the south;
4. Habitat disturbance for operations and ancillary facilities, including any access road. This may have an impact on caribou habitat that will have to be assessed through the site's Caribou Management Plan;
5. Emergency or upset conditions;
6. Requirements for employees from northern communities in competition with other operations;
7. Traditional use and harvesting; and
8. Requirements for services from northern businesses.

At Wheeler, the potential for the development of the Gryphon deposit is a reasonably foreseeable project, and it would be included as part of the cumulative effects assessment.

Cameco's proposed Millennium uranium mining project, although currently withdrawn from the federal regulatory process, is the only project that might reasonably be expected to proceed during the life of the Wheeler Project. While that is the only project currently identified, any project subsequently identified during the environmental assessment process with a reasonable chance of affecting the cumulative effects assessment would be added. Other projects that have potential for consideration for inclusion include UEX's West Bear cobalt/nickel deposit, but there are few details at this time.

Although largely covered in other sections of the EIS, the cumulative effects assessment will also require an examination of any potential to impact traditional Indigenous use of lands and resources, or on communities in a cumulative sense. There is an expectation of meaningful public and Indigenous participation in environmental assessments, and that the discussion of cumulative effects is included in consultations as part of the Wheeler engagement program with feedback recorded and included in the environmental assessment.

6.3 Monitoring

An effective monitoring program is important in a modern mining operation as it provides the proof that the Project is operating legally and within the bounds of its permissions. Both the federal and provincial regulators require comprehensive monitoring programs and reporting. While the focus

here is on the federal requirements due to the broader scope of those requirements, the provincial requirements are no less important.

The CNSC has defined several safety and control areas, and all of these require monitoring and reporting as part of the ongoing performance assessment, improvement and management review within the respective management systems. The CNSC's safety and control areas are:

- Management
 - Management systems
 - Human performance management
 - Operational performance
- Facilities and Equipment
 - Safety analysis
 - Physical design
 - Fitness for service
- Core Controls and Processes
 - Radiation Protection
 - Human health and safety
 - Environmental Protection
 - Emergency management and fire protection
 - Waste management
 - Security
- Safeguards and Non-proliferation
- Packaging and Transport

All these areas will require a structured program that demonstrates effective management and control, usually within an ISO/CSA plan-do-check-act style system (PDCA). While all the safety and control areas will have monitoring, the environmental program is further described here as an example.

Environmental monitoring is performed to demonstrate the Project's environmental and safety performance, and to provide the necessary feedback to manage that performance in the areas of:

- Gaseous and liquid discharges;
- The transport of nuclear and hazardous substances within the environment;
- Public exposure and dose;
- Exposure and effects on terrestrial and aquatic biota; and
- Any changes in habitat and effects on species that rely on that habitat.

Through the baseline program and environmental risk assessment, predictions on the Project's performance will be made in the above areas and monitoring is essential in tracking and managing

that performance. Denison will incorporate the results of the EIA predictions into the Environmental Management System (EMS), including the effluent and environmental monitoring plans (CNSC 2017). The EIA predictions for physical disturbances and releases, and the associated environmental responses and potential effects, will be measured and tested using site-specific monitoring data during construction, operation, decommissioning and post-decommissioning phases. As such, a comprehensive monitoring program will be required as part of the Project's ISO/CSA 14001-2015 compliant EMS, providing the necessary feedback to:

1. Demonstrate compliance with applicable laws and permit conditions;
2. Inform the required follow-up program(s), especially within the EMS;
3. Demonstrate continual improvement;
4. Provide process feedback to operations and to management;
5. Provide warning of process changes or upsets;
6. Provide data for maintaining up to date site models; and
7. Information to Indigenous groups, regulatory agencies, and the public.

The EMS will be based on the ISO/CSA PDCA methodology with monitoring playing a critical role in the check process, providing the necessary information for management to act, if necessary, to implement changes in performance. The Canadian Standards Association, as a natural offshoot of its ISO/CSA EMS requirements (e.g. ISO 14001-2015) has been working with the nuclear industry in Canada and have issued standards for Environmental Risk Assessment (CSA N288.6), which lead directly to effluent monitoring (CSA N288.5), environmental monitoring (CSA N288.4), and supplementary studies. The CSA standards are specifically referenced within the CNSC's REGDOC 2.9.1 (CNSC 2017) as functioning parts of the overall EMS.

For radiation, the offsite monitoring is included in the environmental monitoring program while the on-site worker radiation safety program and monitoring activities are subject to a stand-alone Radiation Safety Management program with its own management plan, structure and reporting.

While there are discharge limits for mining in the Saskatchewan Mineral Industry Environmental Protection Regulations, 1996, and the federal Metal and Diamond Mining Effluent Regulations (MDMER), the expectation of the federal regulator will be that a modern uranium mine will have effluent concentrations protective of the environment and well below the values in the above regulations. The MDMER in addition to defining discharge limits also defines a biological effects monitoring program to ensure that discharges remain with limits that are protective of the environment.

Monitoring for potential impacts on traditional use or northern communities may be done through several mechanisms such as surface leases conditions, licence conditions, commitments in the EIA, agreements directly with potentially affected parties, etc. This monitoring would become part of the Project's monitoring and reporting program.

Monitoring is not done in isolation by the company as both the federal and provincial governments will undertake inspections of the operations, including side-by-side sampling to verify compliance. The CNSC will also periodically contract independent third-party consultants to undertake an assessment of an operation's environmental performance. In addition, there are other independent groups that provide monitoring such as the Northern Saskatchewan Environmental Quality Committee (NSEQC), which is composed of members from communities across northern Saskatchewan who meet to review monitoring data and tour the operations to monitor performance, providing feedback and recommendations to regulators and proponents.

7 Stakeholder Engagement

Denison recognizes the importance of engaging with local and Indigenous communities, residents, businesses, organizations, land users and the various regulatory authorities, collectively referred to as 'Stakeholders.' Since 2016 Denison had been engaging with Stakeholders in ongoing efforts to build positive relationships with all parties. Broadly speaking, Denison has categorized the Stakeholders into three categories:

- Regulatory agencies;
- The general public; and
- Indigenous communities.

Further details regarding engagement with specific Indigenous communities can be found in Section 8.

In accordance with Denison's Environmental and Social Management System, a Stakeholder engagement program has been developed to capture all Stakeholder groups within the categories identified above. The design and considerations associated with stakeholder engagement activities for the Project are in compliance with provincial (Government of Saskatchewan 2014f), federal (CNSC 2016a; Canadian Environmental Assessment Agency 2015a) and international guidance (International Finance Corporation 2012) for stakeholder engagement.

Denison is committed to operating Wheeler in a fully sustainable manner, giving consideration to not only maintaining high standards of safety, and environmental compliance, but also financial discipline.

Generally speaking, stakeholder engagement is an exercise of building and maintaining relationships with groups, communities and individuals who are potentially affected by, interested in and/or may be in a position to influence the direction of the Project throughout its entire life cycle. To that end, the following six key principles of stakeholder engagement apply:

1. Provide meaningful, relevant information in a culturally appropriate format and language that is easily understandable by each specific stakeholder group.
2. Conduct all stakeholder engagement in a manner that respects local traditions, culture, timeframes, and the decision-making processes of each stakeholder group.
3. Conduct stakeholder engagement in a variety of ways, venues and make every effort to identify and include all stakeholders.
4. Where relevant, complete stakeholder engagement activities in advance of final decisions, allowing for the consideration and inclusion of comments and recommendations received to be incorporated into Project decisions.
5. Provide frequent feedback, including the results of meetings, incoming suggestions, requests and key recommendations.

6. Provide frequent monitoring and evaluation of the effectiveness of the Plans during and after each engagement session and adjust the engagement program as required and/or suggested by the participating stakeholders in order to improve follow up engagement sessions.

7.1 Engagement with Regulatory Agencies

The Project will undergo a joint provincial- federal environmental assessment process which will be led by Saskatchewan Ministry of Environment's Environmental Assessment and Stewardship branch and the CNSC. The CNSC will be the federal responsible authority for Wheeler's environmental assessment under CEAA 2012. Wheeler will be subject to a number of provincial and federal acts and regulations (Section 1.3.1) and Denison anticipates involvement of other federal and provincial departments once the Wheeler EIS has been submitted and is under review.

With respect to the schedule for engagement with regulatory agencies Denison believes that engagement will largely be initiated in conjunction with the initiation of Wheeler's environmental impact assessment process. In an effort to be proactive and in accordance with existing guidance documents, engagement with CNSC staff and SK MOE staff was initiated during the completion of the prefeasibility engineering and early collection of the environmental baseline data (Table 7.1). The purpose of the engagement meetings in early 2018 was to provide the regulatory agencies with an update on Wheeler with respect to: the technical/engineering aspects, the environmental baseline collection programs, the Indigenous engagement activities and how the selection of these communities were made, as well as an update on the socio-economic activities resulting from these early engagement activities. The more recent meetings in late 2018 were intended to serve as pre-engagement meetings i.e., prior to submission of this document. Denison provided a Project overview, sought guidance and addressed questions before submission of the Technical Proposal and Project Description.

7.2 Engagement with General Public

Members of the public may have an interest in the development of Wheeler. Denison has identified nearby cabin owners, commercial lodges and the villages of Patuanak, Pinehouse, Ile a la Crosse and Beauval as potentially interested in the Project.

Non-Indigenous people who reside near or within one of the four local communities (Patuanak, Pinehouse, Ile a la Crosse and Beauval) were included and invited to participate in the engagement sessions scheduled in those communities along with their Indigenous neighbours (Table 7.1). In addition, Denison has engaged with mayors, council and economic development entities in the local communities (Table 7.1).

As part of Denison's early engagement activities, one of the existing recreational cabin owners located within the Project area requested an update on the status of the Project via a telephone call to a Denison representative. The cabin owner indicated that he has a positive existing relationship with Denison employees given the proximity of his cabin to the existing Wheeler exploration camp and was hopeful that this relationship could continue.

Table 7.1 Summary of In-Person Stakeholder Engagement (Excluding Indigenous Communities)

| Group | Organization or Individual | Date | Summary of Engagement |
|---------------------|--|-------------------|--|
| Regulatory Agencies | Canadian Nuclear Safety Commission, Uranium Mines and Mills Division | February 14, 2018 | Introduced Denison and the Wheeler River Project; provided an overview of the Project from the Preliminary Economic Assessment and scope for the Prefeasibility Study which is underway; discussion and Q&A. |
| | Saskatchewan Ministry of Environment, Mining Industry and Audit Environmental Protection Branch | March 1, 2018 | Introduced Denison and the Wheeler River Project; provided an overview of the Project from the Preliminary Economic Assessment and scope for the Prefeasibility Study which is underway; discussion and Q&A. |
| | Canadian Nuclear Safety Commission, Uranium Mines and Mills Division and Environmental Assessment Division | April 25, 2018 | Introduced Denison and the Wheeler River Project; provided an overview of the Project from the Preliminary Economic Assessment and scope for the Prefeasibility Study which is underway; discussion and Q&A. |
| | Canadian Nuclear Safety Commission, Uranium Mines and Mills Division and Environmental Assessment Division | November 13, 2018 | Denison provided a Project update including an overview of the Prefeasibility Study and the Project scope for the Project Description. Answered any questions about the Project. Denison advised on plans to submit a Project Description in 2019 and the group discussed plans for regulatory process moving forward. |
| | Saskatchewan Ministry of Environment, Environmental Assessment Branch and Uranium and Northern Operations branch | November 21, 2018 | Denison provided a Project update including an overview of the Prefeasibility Study and the Project scope for the Technical Proposal. Denison advised on plans to submit a Technical Proposal in 2019 and the group discussed plans for regulatory process moving forward. |
| | Saskatchewan Ministry of Environment, Uranium and Northern Operations | December 3, 2018 | Denison provided a Project update including an overview of the Prefeasibility Study and the Project scope for the Technical Proposal. Denison advised on plans to submit a Technical Proposal in 2019 and the group discussed plans for regulatory process moving forward. |

| Group | Organization or Individual | Date | Summary of Engagement |
|----------------|--|-------------------|---|
| General Public | Local community members (Patuanak) | July 27, 2016 | Following a community meal, introductory presentations on Denison Mines, the company and its Wheeler River Project were given to those in attendance. The presentations were followed by a Question and Answer session. |
| | Mayor, Councillors, community members and the leadership team of Pinehouse Business North (Pinehouse Lake) | September 7, 2016 | Following a community meal, introductory presentations on Denison Mines, the company and its Wheeler River Project were provided to those in attendance. These presentations were followed by a Question and Answer session. This session was followed by a presentation to Denison from Pinehouse Business North focused on their current capacity. |
| | Mayor, Councillors, Co-management board, Métis local community members (Beauval) | December 6, 2016 | Following a community meal, introductory presentations on Denison Mines, the company and its Wheeler River Project were provided to those in attendance. These presentations were followed by a Question and Answer session. |
| | Mayor, Councilors, Co-management Board, Métis Honorable Member of the Legislature (Athabasca riding) and other local community members (Ile a la Crosse) | December 7, 2016 | Following a coffee and snacks, introductory presentations on Denison Mines, the company and its Wheeler River Project were provided to those in attendance. These presentations were followed by a Question and Answer session. |
| | Local community members (Pinehouse) | January 16, 2018 | Held a community workshop in Pinehouse. A workshop was completed with participants at the meeting to help identify (1) the most effective mine access route from the existing public highway to the project, (2) the pros and/or cons with respect to which lake would be the most appropriate lake to select in terms of discharging treated effluent once the mine was operational and, (3) the pros and/or cons the community saw with respect to the mining methods under evaluation at the time. |
| | Local community members (Beauval) | January 18, 2018 | Held a community workshop in Beauval. A workshop was completed with participants at the meeting to help identify (1) the most effective mine access route from the existing public highway to the project, (2) the pros and/or cons with respect to which lake would be the most appropriate lake to select in terms of discharging treated effluent once the mine was operational and, (3) the pros and/or cons the community saw with respect to the mining methods under evaluation at the time. |

| Group | Organization or Individual | Date | Summary of Engagement |
|----------------|---|-------------------|---|
| General Public | Local community members (Patuanak) | May 3, 2018 | Denison representatives traveled to Patuanak to provide a Project update. A workshop was completed with participants at the meeting to help identify (1) the most effective mine access route from the existing public highway to the project, (2) the pros and/or cons with respect to which lake would be the most appropriate lake to select in terms of discharging treated effluent once the mine was operational and, (3) the pros and/or cons the community saw with respect to the mining methods under evaluation at the time. |
| | Local community members (Ile a la Crosse) | January 17, 2018 | Held a community workshop in Ile a La Crosse. A workshop was completed with participants at the meeting to help identify (1) the most effective mine access route from the existing public highway to the project, (2) the pros and/or cons with respect to which lake would be the most appropriate lake to select in terms of discharging treated effluent once the mine was operational and, (3) the pros and/or cons the community saw with respect to the mining methods under evaluation at the time. |
| | Mayor, Business Development Corporation (Ile a la Crosse) | January 18, 2019 | Provide an update to leadership regarding: the finalization of the Project Description for submission to the CNSC and the Province of Saskatchewan to initiate the environmental assessment of the Wheeler River Project; provide an overview of the details of the pending environmental assessment submission |
| | Business Develop Corporation (English River First Nation) | January 31, 2019 | Provide an update to leadership regarding: the finalization of the Project Description for submission to the CNSC and the Province of Saskatchewan to initiate the environmental assessment of the Wheeler River Project; provide an overview of the details of the pending environmental assessment submission; discuss future opportunities |
| | Business Development Corporation (Pinehouse) | February 1, 2019 | Provide an update to leadership regarding: the finalization of the Project Description for submission to the CNSC and the Province of Saskatchewan to initiate the environmental assessment of the Wheeler River Project; provide an overview of the details of the pending environmental assessment submission |
| | Mayor (Beauval) | February 1, 2019 | Provide an update to leadership regarding: the finalization of the Project Description for submission to the CNSC and the Province of Saskatchewan to initiate the environmental assessment of the Wheeler River Project; provide an overview of the details of the pending environmental assessment submission |
| | Northern Saskatchewan Environmental Quality Committee | November 28, 2018 | General overview of the Project, including the ISR methodology. |

Note: Since 2016, additional engagement has been completed via letters, emails, and phone calls.

7.3 Planned Engagement Activities with Regulatory Agencies and the General Public

Denison is committed to continued engagement via various methods of engagement for all groups including regulatory agencies and the general public. Denison is also prepared to engage with any representative of these groups on an as-needed basis should any specific requests to do so be received. Denison will ensure the CNSC and the SK MOE are kept up-to-date on scheduling and the scope of future engagement activities so they have the opportunity to be included in the planning and ultimately participate when desired.

It is anticipated interest from these groups will largely be expressed as part of the formal environmental impact assessment process once this process has been initiated.

Records of these engagements will continue to be documented and meeting notes will be created to maintain a record of the discussions, questions, concerns and answers provided. All of these written records will be added to the Stakeholder engagement section of the Wheeler EIS.

7.4 Socio-Economics

The early engagement activities completed to date have developed the foundations of genuine relationships between Denison and the Indigenous and non-Indigenous groups local to the Project. These relationships have precipitated follow up meetings and discussions with the economic development divisions of these groups and communities who are expressing a strong interest in continuing an open dialogue with Denison in order to afford them access to socio-economic opportunities associated with the Project. Denison has committed to continue to support these discussions.

8 Engagement with Indigenous Communities

Denison is committed to continuing meaningful engagement with Indigenous communities potentially affected by the Project, and to maintaining relationships with these communities throughout all phases of the Project. The approach to engagement has considered relevant guidance, specifically CNSC's REGDOC-3.2.2 Aboriginal Engagement (CNSC 2016a), the Government of Saskatchewan's guidelines for Consultation with First Nations and Métis in Saskatchewan Environmental Impact Assessment (2014f), the Canadian Environmental Assessment Agency's reference guide on considering Aboriginal traditional knowledge in environmental assessments (2015b) and the IFC Performance Standards on Environmental and Social Sustainability (2012).

The following information outlines the list of Indigenous communities identified for engagement activities, including the rationale for inclusion / exclusion; a summary of the activities conducted to date; and an outline of planned activities and associated milestones. Indigenous engagement activities will be adapted, modified and reported on at various points during the associated regulatory process for the Project.

General Guiding Principles

Indigenous peoples' have a unique and important relationship with the environment, and importantly, Indigenous and Treaty Rights which must be fully respected during the process of project development, construction, operation and decommissioning. To this end, Denison's objectives with respect to Indigenous engagement associated with the Project are as follows:

- Build and maintain authentic relationships built on trust and transparency;
- Create a respectful dialogue process that promotes communication between Denison and Indigenous communities, in a timely and accurate fashion; and
- Understand how the proposed development of the Project may adversely impact Indigenous' peoples ability to exercise collective Indigenous and /or Treaty rights.

8.1 Identified Communities and Supporting Criteria

The Northern Administration District (NAD) of Saskatchewan (northern Saskatchewan) includes approximately half of Saskatchewan's land area, but less than four per cent of the province's population. Northern Saskatchewan is approximately 250,000 square kilometres, or about 44% of Saskatchewan's area and is home to about 38,000 people (Statistics Canada 2017) living in approximately 45 communities which include incorporated municipalities (such as towns, villages, hamlets and settlements – most of which self-identify as Métis communities), First Nation reserves, and unincorporated areas. More than 80% of people who live in northern Saskatchewan self-identify as Indigenous. Within the NAD, the communities are roughly divided between three regions: the Athabasca Basin region, the North Central region, and the West Side region

(Figure 8.1). The NAD, while sparsely populated, celebrates a diversity amongst Indigenous communities that requires a unique approach to engagement activities.

Consistent with the history associated with other uranium mining projects located within the NAD, Denison recognizes that all of the communities within the NAD typically have an interest in uranium activities, but that an approach based on appropriate criteria to determine those included in the Program is required.

It is important to note that, as a remote site, there are no communities in relatively close proximity to Wheeler. Calculated using a straight line, the closest communities are approximately 150 km from the site (Table 3.2). Travelling by existing roads, the closest community to the Project is approximately 260 km away.

The following criteria have been used to appropriately evaluate the significant number of communities located in the NAD to those Indigenous communities that will be engaged by Denison.

- Treaty 10 signatory (Treaty in which the Project is located);
- Potential or established Indigenous and /or Treaty Rights within the Project area;
- Geographic proximity of community and / or reserve land to the Project site;
- Known traditional territory in and around the Project site, including travel routes;
- History of relationship with operating companies, the CNSC, and the Province, in relation to other projects located near the Project (McArthur River, Key Lake, Millennium); and
- The potential for collective exercising of Indigenous and /or Treaty rights in proximity to the Project

The results of the initial assessment against the above criteria determined that English River First Nation, the Kineepik Métis Local 9, the Sipisishik Métis Local 37, and the A La Baie Métis Local 21 would form part of Denison's initial focus for Indigenous engagement activities (Table 8.1). Upon further evaluation and identified through various engagement activities, Denison also recognizes that the Patuanak Métis Local 82 should be included as part of the Indigenous engagement program.

It is also important to note that the communities of Ile a la Crosse, Beauval, and Pinehouse, and most of the community-members residing in these communities self-identify as Métis communities and members. Denison recognizes and follows the Métis Nation of Saskatchewan's approach to formal consultation, which occurs with the elected Métis representation; however, it is noted that there is often overlap in engagement activities when, for example, community meetings occur. More often than not, the elected officials of Métis locals are also elected members of the municipality and therefore represent both their Indigenous community as well as their municipality, and rarely acknowledge a separation between the two entities.

The following outlines the criteria used to support the inclusion of the above Indigenous communities into the Program.

Table 8.1: Indigenous Communities

| Indigenous Stakeholder Group | Brief Description |
|------------------------------|---|
| English River First Nation | <ul style="list-style-type: none"> • Treaty 10 signatory • Potential or established Indigenous and /or Treaty rights within the Project area • Geographic proximity of community and / or reserve land to the Project site (Slush Lake reserve approximately 16 km away; Barkwell Bay reserve 39 km away; community of Patuanak 229 km away); • Known traditional territory in and around the Project site, including travel routes (see Figure 5.7 and Figure 5.8); • History of relationship with operating companies, the CNSC and the Province in relation to other projects located near the Project (McArthur River, Key Lake, Millennium); • The potential for collective exercising of Indigenous and /or Treaty rights in proximity to the Project |
| Kineepik Métis Local 9 | <ul style="list-style-type: none"> • Potential or established Indigenous Rights within the Project area • Geographic proximity of community and / or reserve land to the Project site (233 km away); • Known traditional territory in and around the Project site, including travel routes (see Figure 5.7 and Figure 5.8); • History of relationship with operating companies, the CNSC and the Province in relation to other projects located near the Project (McArthur River, Key Lake, Millennium); • The potential for collective exercising of Indigenous rights in proximity to the Project |
| Sipisishik Métis Local 37 | <ul style="list-style-type: none"> • Potential or established Indigenous Rights within the Project area • Known traditional territory in and around the Project site, including travel routes; • Familial ties through the ERFN Membership and La Plonge reserve (immediately adjacent to Beauval) • The potential for collective exercising of Indigenous rights in proximity to the Project |
| A La Baie Métis Local 21 | <ul style="list-style-type: none"> • Potential or established Indigenous Rights within the Project area • Known traditional territory in and around the Project site, including travel routes; • Familial ties through the ERFN Membership • the provision of 'script' to Métis residents during the signing of Treaty 10 • The potential for collective exercising of Indigenous rights in proximity to the Project |
| Patuanak Métis 82 | <ul style="list-style-type: none"> • Potential or established Indigenous Rights within the Project area • Known traditional territory in and around the Project site, including travel routes; • Familial ties through the ERFN Membership and Wapachewunak 192D reserve (immediately adjacent to Patuanak) • The potential for collective exercising of Indigenous rights in proximity to the Project |

Indigenous Organizations

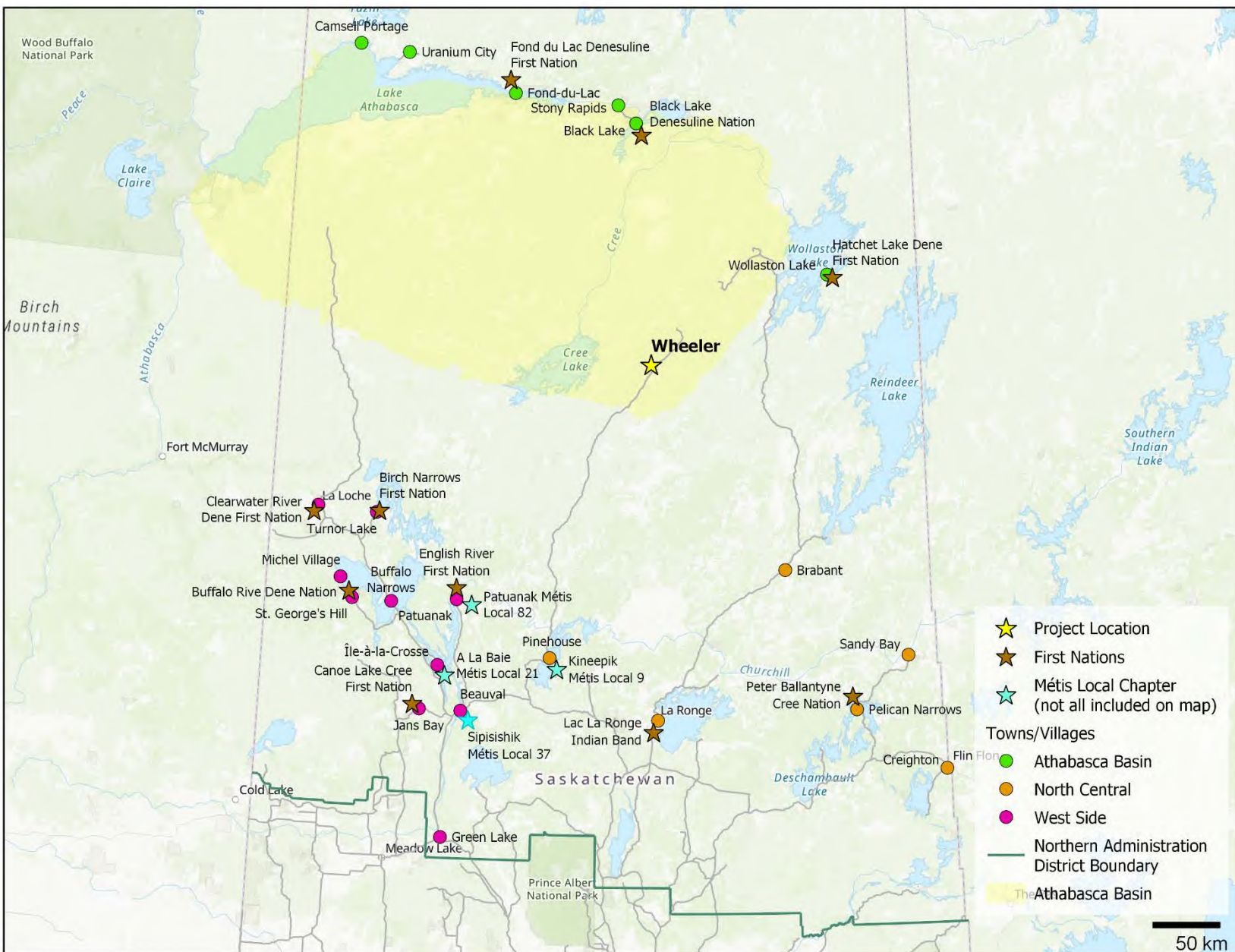
Indigenous organizations can provide a single point of contact for Denison to share information more broadly to a wide variety of Indigenous communities and their leadership regarding Project information, company information, etc. These organizations can also provide specific information regarding their members, interests their members may have, opportunities for Denison to work collaboratively together on various initiatives, etc.

As such, Denison has identified three Indigenous organizations to be included in the Program. The following outlines the criteria for their inclusion:

Ya'thi Nene Land and Resource Office: The Ya'thi Nene Lands and Resources Office (YTNLRO) was created as a not-for-profit organization to be the single point of contact between industry, government and the local Athabasca communities of Hatchet Lake First Nation, Black Lake First Nation, Fond du Lac First Nation, Camsell Portage, Stony Rapids, Uranium City and Wollaston Post. Hatchet Lake First Nation is a Treaty 10 signatory. Denison has evaluated the information currently available online (<http://yathinene.ca/#open-map>) which suggests that there are limited contemporary traditional land use activities near the Project location, relative to the high concentration of traditional land use activities in the Athabasca Region. However, Denison recognizes that these communities may have an interest in the Project and therefore, Denison intends to engage with the YTNLRO in order to better understand contemporary traditional land use activities that are currently being undertaken in the Project area by the member Indigenous communities of the YTNLRO.

Métis Northern Region I: The Project is located within Métis Region I in Saskatchewan. The Métis in Saskatchewan are currently structured with a President, an Executive, Regional Presidents, and Local Presidents. As noted on the Métis Nation of Saskatchewan's (MNS) website, the MNS identifies that 'consultations must be with the Métis government structures that are elected and supported by the Métis people.' As a result, since the Regional Presidents are elected (in addition to the Local Presidents), Denison will engage with the MNS Regional President I regarding the Project.

Métis Northern Region II: While the Project is not located within Métis Region II, a number of key Métis communities with whom Denison is engaging, are located in Northern Region II. The Métis in Saskatchewan are currently structured with a President, an Executive, Regional Presidents, and Local Presidents. As noted on the Métis Nation of Saskatchewan's (MNS) website, the MNS identifies that 'consultations must be with the Métis government structures that are elected and supported by the Métis people.' As a result, since the Regional Presidents are elected (in addition to the Local Presidents), Denison will engage with the MNS Regional President II regarding the Project.



8.2 Summary of Indigenous Engagement Activities to Date

Since the spring of 2016, Denison has completed over 20 in-person engagement events (Table 8.2) involving the leadership and general public of the communities of Patuanak, Pinehouse, Ile a la Crosse and Beauval, involving representatives of English River First Nation, the Kineepik, the A La Baie, and the Sipisishik Métis Locals and non-Indigenous residents of these communities as well.

In all cases, Denison's reception by the Indigenous leadership as well as the general populations at each of the communities visited was positive. This early and frequent engagement fostered the development of a positive, mutually respectful relationship between Denison and the community leadership and members at large, and as a result, Denison was complimented by the communities for their decision to come to the communities at the very early stages of the proposed project. In addition, it allowed the Denison team to solicit feedback on aspects of the project engineering early enough in the design phase of the project such that this feedback could be integrated into the designs (Section 8.2.1.2).

Table 8.2 Summary of In-Person Indigenous Engagement Activities

| Indigenous Community | Organization or Individual | Date | Summary of Engagement |
|----------------------------|---|-------------------|---|
| English River First Nation | Chief | July 6, 2016 | Denison introduced their leadership team to leadership of English River First Nation and requested permission to visit the community and provide an introductory presentation to the community |
| | English River First Nation Members | July 27, 2016 | Following a community meal, introductory presentations on Denison Mines, the company and its Wheeler River Project were given |
| | High School Students and Teachers | November 17, 2016 | Denison staff hosted a booth at the English River First Nation job fair, providing advice to high school students on the career opportunities in the mining and exploration industries. |
| | Lands and Resources Manager | November 30, 2016 | Discussed the upcoming schedule of the Wheeler River Project as well as the best way of obtaining and incorporating English River First Nation Traditional Knowledge into the Project's 2017 environmental baseline data collection. |
| | Lands and Resources Manager | March 3, 2017 | Obtained and discussed the English River First Nation Traditional Knowledge map of their Traditional Territory |
| | Chief of English River First Nation, English River First Nation Members | May 3, 2018 | Denison representatives traveled to Patuanak to provide a Project update. A workshop was completed with participants at the meeting to help identify (1) the most effective mine access route from the existing public highway to the project, (2) the pros and/or cons with respect to which lake would be the most appropriate lake to select in terms of discharging treated effluent once the mine was operational and, (3) the pros and/or cons the community saw with respect to the mining methods under evaluation at the time. |
| | Land & Resources Officer, Elder | January 31, 2019 | Provide an update to leadership regarding: the finalization of the Project Description for submission to the CNSC and the Province of Saskatchewan to initiate the environmental assessment of the Wheeler River Project; provide an overview of the details of the pending environmental assessment submission; discuss future opportunities |

| Indigenous Community | Organization or Individual | Date | Summary of Engagement |
|--------------------------------|---|-------------------|---|
| Pinehouse Kineepik Métis Local | Local President, community councillors, local community members, and Business Development Corporation | September 7, 2016 | Following a community meal, introductory presentations on Denison Mines, the company and its Wheeler River Project were provided to those in attendance. These presentations were followed by a Question and Answer session. This session was followed by a presentation to Denison from Pinehouse Business North focused on their current capabilities. |
| | Local President, Community Councillor | November 29, 2016 | Discussed upcoming activities at the Wheeler project and how best to obtain and incorporate community Indigenous Knowledge into the 2017 environmental baseline data collection. In addition, spoke about potential training and employment opportunities with Denison's exploration activities. |
| | Local President, Community representatives, Business Development Corporation | September 6, 2017 | Provide the community Leadership with an update on the development of the Wheeler River project |
| | Local President, Community Representative | November 3, 2017 | Discussions regarding maintaining the strong relationship developed to date between Pinehouse and Denison. |
| | Local community members | January 16, 2018 | Held a community workshop in Pinehouse. The workshop was completed with participants at the meeting to help identify (1) the most effective mine access route from the existing public highway to the project, (2) the pros and/or cons with respect to which lake would be the most appropriate lake to select in terms of discharging treated effluent once the mine was operational and, (3) the pros and/or cons the community saw with respect to the mining methods under evaluation at the time. |
| | Local President | February 1, 2019 | Provide an update to leadership regarding: the finalization of the Project Description for submission to the CNSC and the Province of Saskatchewan to initiate the environmental assessment of the Wheeler River Project; provide an overview of the details of the pending environmental assessment submission |

| Indigenous Community | Organization or Individual | Date | Summary of Engagement |
|------------------------------|--|------------------|---|
| Beauval Sipishik Métis Local | Local President and representatives, local community members | December 6, 2016 | Following a community meal, introductory presentations on Denison Mines, the company and its Wheeler River Project were provided to those in attendance. These presentations were followed by a Question and Answer session. |
| | Local community members | January 18, 2018 | Held a community workshop in Beauval. A workshop was completed with participants at the meeting to help identify (1) the most effective mine access route from the existing public highway to the project, (2) the pros and/or cons with respect to which lake would be the most appropriate lake to select in terms of discharging treated effluent once the mine was operational and, (3) the pros and/or cons the community saw with respect to the mining methods under evaluation at the time. |
| A La Baie Métis Local | Local representatives, and local community members | December 7, 2016 | Following a coffee and snacks, introductory presentations on Denison Mines, the company and its Wheeler River Project were provided to those in attendance. These presentations were followed by a Question and Answer session. |
| | Local community members | January 17, 2018 | Held a community workshop in Ile a La Crosse. The workshop was completed with participants at the meeting to help identify (1) the most effective mine access route from the existing public highway to the project, (2) the pros and/or cons with respect to which lake would be the most appropriate lake to select in terms of discharging treated effluent once the mine was operational and, (3) the pros and/or cons the community saw with respect to the mining methods under evaluation at the time. |
| | High School Students and Teachers | May, 2018 | Denison Geologists hosted a booth at the high school job fair, providing advice to high school students on the career opportunities in the mining and exploration industries. |

Note: Since 2016, additional engagement has been completed via letters, emails, and phone calls.

Early and frequent engagement also fostered the development of a positive, mutually respectful relationship between Denison and the community leadership and members at large. It has allowed the Denison team to solicit feedback on aspects of the Project engineering early enough in the design phase of the Project such that this feedback could be integrated into the designs.

Some examples of successes achieved with Indigenous communities as a result of Denison's commitment to early and effective engagement are listed below in Section 8.2.1.

8.2.1 Achievements

8.2.1.1 Memorandums of Understanding

In order to formalize Denison's commitment to its local Indigenous communities (and their associated non-indigenous communities), Memorandums of Understanding (MOU) have been signed between Denison and:

- English River First Nation;
- Kineepik Métis Local and the community of Pinehouse;
- A La Baie Métis Local 21 and the community of Ile a la Crosse; and
- Sipsisishik Métis Local 37 and the community of Beauval.

These non-binding MOUs formalize the signing parties' intent to work together in a spirit of mutual respect to cooperate in order to collectively identify practical means by which to avoid, mitigate, or otherwise address potential impacts of the Project upon the exercise of the indigenous rights, treaty rights, and interests. In addition, the MOUs formalize the signing parties' intent to work together regarding the benefits that will flow from the Project, provide a process for continued Project engagement and information-sharing about the project and establishes a relationship to identify business, employment and training opportunities for the parties with respect to the Project.

8.2.1.2 Integration of Indigenous Knowledge

Indigenous knowledge (IK) has been incorporated into the early design stages of the Project.

English River First Nation provided their IK map to Denison along with the permission to use it. Denison provided the map to consultants responsible for the collection of the baseline data prior to the development and initiation of these studies in 2016. This allowed Denison's consultants to incorporate English River First Nation IK data into the early designs of their field programs. More recent IK data has been received from Pinehouse Kineepik Métis Local 9, and this IK, along with that from English River First Nation, will be incorporated into the design of all subsequent baseline programs, the selection of VCs and ultimately, the Environmental Impact Statement. In addition, Indigenous field support staff worked closely with consultants during baseline field programs whenever possible, which, in Denison's experience, also provides a valuable Indigenous worldview when undertaking the supporting activities for the eventual EIS preparation.

Knowledge from Indigenous community members was also included in the Project design and influenced the selection of access road alignments, mining method, and proposed treated effluent discharge location. Engineering options developed as part of the prefeasibility study were taken to the Indigenous communities and discussed in focussed workshops. Project design options under the following three topics were discussed:

- Preferred access road routing to the site from Highway 914. Three different options analyzed in the prefeasibility engineering studies were presented.
- Preferred surface water course, to be used for the discharge of treated effluent associated with the proposed Project: six options that were shortlisted as a result of the hydrological and biological data collection were presented.
- Two mining methods under consideration for the Project were presented.

Participants at these workshops consisted of general members of the public (divided into groups of Elders and youth) as well as high school students who were specifically invited to the workshops through each school's administration.

Each group was led through a series of slides explaining the options within all three of the topic areas. Participants were then asked to identify the pros and cons of each of the options within the three topics. The participants were specifically asked to consider these pros and cons from their perspective and backgrounds. In all three topics discussed at the workshop, the options identified by the Indigenous communities as carrying the highest number of pros were ultimately chosen as the preferred options to advance through the Project's Prefeasibility Study (Denison 2018).

Denison's work to collect and integrate IK into the Project design will continue as the Project design is refined through feasibility and detailed design stages and as the regulatory process advances. Updates on any new and continued integration of IK will be included in updates to the IER and the environmental impact statement (EIS).

8.2.2 Summary of Questions and Feedback from Indigenous Engagement

All questions and answers provided during the community engagement sessions as well as one set of written questions provided to Denison by two residents of Beauval have been recorded and captured by Denison (Table 8.3). The themes arising out of many of the engagement sessions generally followed two main areas: economic development opportunities for northerners and environmental protection associated with the eventual operation of the Project.

Table 8.3: Summary of Project Questions and Feedback from Indigenous Groups

| Date | Type of Meeting | Question or Feedback | Denison Response |
|-----------------------------------|-------------------|---|--|
| English River First Nation | | | |
| 27-Jul-16 | Community Meeting | Band Asking for a monetary agreement based on percentage | Denison recorded the request |
| | | Request to see results of environmental studies | The environmental work is just starting; our consultants have been mandated to maximize northern employment. |
| | | Request for employment, including drilling and environmental disciplines. Insistence on hiring now. | We share benefits between communities and look for opportunities to hire northerners. |
| | | How much money have you and your investors made so far? | We have made none; our investors may have made some, but likely very little. We, and they, are investing for the future. |
| | | Specific questions from Marius Paul regarding safety, cleanup, funding, taxes, health & safety, emergency cleanup, tailings, long-term contamination, weapons, environmental impact, pollution, worker mortality, | Written answers would be provided to all questions given that they were provided in writing as well as verbally. |
| | | | The government does not allow Canadian uranium to be used for nuclear weapons. |
| | | Concern about ongoing access to the Wheeler River; and protection of whitefish spawning and moose/caribou calving areas. Some changes to the landscape take time to manifest. | Denison recorded the concern. |
| | | Will the project be sold to another company? | Denison plans to stay with the project throughout production as the Operator. |
| | | Noted that a road will be required between McArthur River and Cigar lake to transport the ore. The province will come to the people for approval, but Province is likely to do it anyway. | This road is key for the Gryphon deposit. Without that road the Gryphon project may not be viable. |
| | | We need an agreement that benefits us ahead of the mine or the government. | We understand. As a small example, Denison has switched its grocery supplier from La Ronge to the ERFN store at Beauval Forks. |

| Date | Type of Meeting | Question or Feedback | Denison Response |
|-----------|--------------------|---|---|
| 03-May-18 | Community Workshop | The Chief outlined some historical and cultural considerations. Insisting that ERFN is the only community that should benefit. Denison does not need to speak with any other communities about the project. You don't need MOUs with anyone but us. | We have your traditional land use map posted at camp and are using it to help steer the project. |
| | | People want to work. What types of jobs will be available? What can Denison do to help build capacity in elementary and middle school students? | Our hiring priorities are from here. |
| | | | Initially, environmental or geological technicians. For technical positions, they need math and science skills. For management positions, the same plus experience. |
| | | | We're open to scholarship programs. |
| | | Would like a resident elder at site. | Denison noted the request. |
| | | Concern about additional impact to Russell Lake; there are already many cabins on that lake. | The cumulative effect will be considered in the environmental assessment. |
| | | If you sell or merge, what happens to the contracts? | The buyer would take over the contracts previously established. |
| | | Questions about the ISR mining method | The mining method was explained and the environmental protection measures that come with Denison's planned application of the method. |
| | | Could you power the mine using solar and wind? ERFN has considered power generation as an economic development opportunity. | Would probably need grid power for the base load; solar and wind could be supplemental sources. If ERFN chose to generate, we would be open to buying power. |
| | | Is there cell service at the site? | With a booster, or on a high hill coverage from the Key Lake cell tower can be obtained. |
| | | We want more ERFN people being trained in the drill helper program. | Denison noted the comment. |

| Date | Type of Meeting | Question or Feedback | Denison Response |
|--|--------------------|---|--|
| Kineepik Métis Local / Pinehouse Lake | | | |
| 07-Sep-16 | Community Meeting | What are environmental baseline studies are being completed? | Local and regional data is being collected. Denison is also hoping to use existing data from Cameco's Millennium project and the provincial government. Cumulative Effects Monitoring is part of the monitoring that is needed as well. |
| | | We as a community want to start to understand the science involved so we can create local capacity – our area will always have commodities and mining and require services. | Denison is happy to work with the community to help them develop capacity. |
| | | How do current markets affect your decisions? | They are very important to our decisions. We expect prices to be better by 2025 when we start production. |
| | | What is Denison's market cap? | About \$370 million. If the price was \$55/lb, our market cap could be as high as \$1.5 billion. |
| | | Where does your revenue come from? | Some from toll milling Cigar Lake ore at McClean Lake., and some from our environmental services division. A little from managing Uranium Participation Corp. We have a 25% interest in GoviEx Uranium, and 12% in Skyharbour Resources. |
| 16-Jan-18 | Community Workshop | What is a shareholder and how do I become one? | Denison explained to process of how to purchase shares in a public company. Noting there is risk of losing money as well. |
| | | Discussion on price and markets. | |
| | | How would you get Gryphon ore to surface? Technical questions about ground conditions and mining method. | Skipped as rock up a conventional mine shaft, not pumped as slurry. |
| | | | Gryphon Ore is in hard basement rock; no freezing necessary the ground conditions are very good. |
| | | Cost of ISR vs. jet boring | ISR is much cheaper; too deep for jet boring from surface. ISR only works on some ore bodies. You can't use it on the Gryphon deposit as we understand the technology today. |

| Date | Type of Meeting | Question or Feedback | Denison Response |
|-----------------------------------|----------------------|--|---|
| | | How do you treat tailings | There are no tailings produced with ISR. |
| | | Need for independent water sampling program alongside of the company’s sampling program. | Governments require independent sampling for the State of the Environment Report every five years. Environment Canada requires independent Environmental Effects Monitoring every three years. |
| | | We never get this independent information | Part of the MOU process is to establish what information the community wants, so as to allow Denison to provide it to the community. |
| | | Can you prove there is no long-range impact – that cumulative effects are zero. | Through the environmental assessment process, we expect to prove that the Project will be below guidelines and that there is no cumulative effect in the regional assessment area. Cumulative Effects Monitoring is usually the government’s responsibility; however, we will need to address the issue of potential cumulative effects as part of the environmental assessment. We do not believe the project will negatively affect tourism activities in the region. |
| | | At what point is tourism affected? | |
| A La Baie Métis / Ile a la Crosse | | | |
| 07-Dec-16 | Community Engagement | Why hire drillers from BC when there are drillers in La Ronge? | Hy-Tech hires locally and has a shop in Saskatoon. Local companies sometimes do not bid on the job. It’s sometimes a financial decision. |
| | | Requested copy of feasibility study | It will be public when it is completed. |
| | | Will you present to schools on future jobs? | Denison would be happy to do so. |
| | | How are you financed? | We seek investors from global capital markets; we get a portion of revenue from McClean Lake mill and our environmental services division. |
| | | How much are you investing in the north? | We’re in the early stages and trying to invest as much as we can in the north. |
| | | How can this project be feasible given recent shutdowns? | We are planning for production when prices rise again. The world is moving towards more nuclear energy. |

| Date | Type of Meeting | Question or Feedback | Denison Response |
|------|-----------------|---|---|
| | | We are developing a goods and services database of northern businesses. | We're encouraged to hear that and would welcome the opportunity to receive a copy. |
| | | Is this consultation? | Formal consultations will start when the project description is written, and the environmental assessment starts. We are trying to be proactive. |
| | | Can we see the EA before it goes to government? | The process will be interactive with the communities, so you will have opportunities to see it and make comments during that process. |
| | | We would like Sakitawak Development Corporation to be involved in mine development and operation. | Hopefully we can work something out as we go forward. |
| | | We would like to have northerners work with your human resources people on hiring. | So far we only need drillers. We can train driller helpers. Environmental sampling is part-time. We are at early stages of developing the project. |
| | | One attendee spoke of his changed attitude to uranium mining and nuclear power – He is now in full support of the industry stating he has seen a lot of jobs go to northerners as a result of the uranium mines in northern Saskatchewan. | Denison thanked him for his support. |
| | | Any Impact Management Agreement should be made with the whole north, not just specific communities. It puts the others at a disadvantage. | That's the next stage of discussions. While it could be much easier for the company, it is also a challenging proposition. |
| | | We need a north-wide fund to draw from. | |
| | | Are there still investment possibilities for First Nations, development corporations or individuals? | We already have two other partners, but the door is never closed for investment. |
| | | Why not process ore at the closer Key Lake mill? | Our share of the ore is expected to go to McClean Lake, which we part-own. Cameco may take their 30% to Key Lake. Each company can decide what to do with their portion of the ore. |

| Date | Type of Meeting | Question or Feedback | Denison Response |
|-----------|--------------------|---|---|
| 17-Jan-18 | Community Workshop | Concern that this is engagement, not duty to consult. | Denison was in the community to gather input from the members to help inform the project design and continue to build a relationship with the communities. |
| | | What will be left behind at the site after the mine is closed? | Probably there will be a decommissioned landfill at site but not much more than that. Almost everything is taken off site. |
| | | Concern that the Métis Nation (Region) was not formally invited to be part of the MOU. Students need to understand what a MOU is. | The MOU names the La Baie Métis Local and the community and has been discussed with representatives of the Local. The MOU is a commitment to talk and work together for mutual support in the areas of environmental sustainability, education, employment and training, business opportunities and community investment. |
| | | Concern about who the agreements will be with. | |
| | | Again, white people telling us what they want to do. Would like to hear from the Serpent River First Nation (Elliot Lake). | This is a dialogue; we want your input. Denison is considering having local community liaison people added to the team as the project advances. |
| | | The students need to know this information. | Denison agrees, that is why we invited them to be a part of this workshop and why they are here. |
| | | Are the jobs transferable to the community? | Most, if not all, of the trades needed are transferable across the country. Other more specific mining jobs are strictly mining-related. It's a risk you take depending on what training you select. |
| | | Any news on the McArthur - Cigar Lake road? | We have met with the province. If the road is not built, the Gryphon component of the project is unlikely to go ahead. |
| | | When will you sign a surface lease agreement? | After the environmental assessment is successfully completed. Before construction begins. |
| | | Northerners can supply a lot of goods and services. Look at Sakitawak Development Corp. | We agree. One of the components of the MOU is to help identify these opportunities. |

| Date | Type of Meeting | Question or Feedback | Denison Response |
|---------------------------------|-------------------|---|---|
| | | Should work with local people on culture and climate change. | Denison is happy to do that. We have English River's Traditional Territory map. and have asked for similar information if available from Pinehouse, Ile a la Crosse and Beauval. |
| Sipishik Métis / Beauval | | | |
| 06-Dec-16 | Community Meeting | | Currently these are supplied from La Ronge. |
| | | Our local post plant could produce core boxes | We are in communication with KCDC on the topic of career development. |
| | | What jobs are and will be available? | Drillers are the main employment opportunity at this stage of the project. Geologists and environmental specialists are also going to be needed. At the feasibility stage, also need additional safety people. There are only about 10-12 people on site at this stage. Workers to build roads, power lines etc. will be needed once construction starts. |
| | | Do you have a HR department? | Yes |
| | | Need for a more sophisticated human resource development strategy to attract high school students into some of the careers in mining. | Denison noted the comment. |
| | | There's still a trust gap between development and peoples' relationship to the land. It's time to build environmental monitoring liaisons to help build trust. | Denison noted the comment. |
| | | To help develop opportunities, Beauval has Northwest Communities (NWC), Primrose Lake Economic development Corp (PLEDCO), the resources of the Gabriel Dumont Institute (GDIO) for apprenticeship training. | Denison noted the comment and welcomed the opportunity to work with these groups as the project advanced. |
| | | What is the potential for you to invest in our communities? | The next stage of discussion is to explore those options as the project moves forward. |

| Date | Type of Meeting | Question or Feedback | Denison Response |
|-----------|--------------------|--|--|
| 18-Jan-18 | Community Workshop | Could we invest in, say, heavy equipment? | |
| | | We need to plan properly to get a piece of the action. | We will keep you informed as to what we're doing in order to help you prepare. |
| | | Questions about hiring drillers, community response and logistics of accessing site. | Hired 2 driller helper trainees. One from Cole Bay and one from Pinehouse. Hy-Tech Drilling is the company running the training program. |
| | | Preference to avoid spawning areas and general stress to fish and animals when choosing a discharge point. Preference to discharge into swift-flowing water at a point that allows flow through the entire river system. Preference not to discharge directly to Russell Lake. | Denison noted comments. |
| | | Questions about the ISR technique and directional drilling. Glad to hear of closed-loop system, no waste water and no tailings. | Comments were noted by Denison. |
| | | Concern that ore bodies may be under lakes | Denison indicated that both orebodies are under land approximately 500 metres below surface. |
| | | How many employees will be needed for the ISR mining method. | Denison indicated about 100 to 150. |

8.3 Planned Indigenous Engagement Activities

The Indigenous engagement activities initiated by Denison in 2016 are part of an ongoing commitment by Denison to actively engage both Indigenous and non-Indigenous throughout all phases of the Project. In addition, Denison's ongoing engagement program honours the commitments outlined in the MOUs.

The ongoing engagement schedule is also a product of the results of the previous engagement sessions. Denison has agreed to visit the Indigenous communities and provide project updates as the development activities advance. It is currently envisioned that community meetings will be held at least once per year with the Patuanak Métis, the Kineepik Métis, the A la Baie Métis Local 21 Sipishik Métis Local 37, English River First Nation, along with their associated municipal communities. Denison will meet more frequently if desired and warranted.

Denison is also committed to meeting with the leadership of each of these Indigenous communities as and when they make a request to do so. In addition, Denison has a standing commitment to respond to any enquires to meet and/or make presentations on the Project to informal or formalized groups.

As the project advances, Denison will continue to utilize local community radio stations, social media as well as print media that may reach appropriate Indigenous audiences.

In accordance with current guidance documents and illustrated in Table 8.4, Denison will undertake engagement activities during the Project's stages as outlined below.

Table 8.4: General Engagement Schedule

| Project Evolution | Indigenous Groups Engaged | Coordination to include Federal and Provincial Governments | Rationale |
|---|---|---|---|
| Prefeasibility engineering and environmental baseline collection | Indigenous communities potentially affected and interested in the Project | Denison will contact federal and provincial governments to coordinate attendance at engagement events wherever possible | Allows for Indigenous communities to be engaged at earliest stage of the Project, allows for adjustments to baseline collection if needed |
| Initiation of environmental impact assessment – submission of Project Description | Indigenous communities potentially affected and interested in the Project | | Allows continued engagement |
| Throughout completion of environmental impact assessment | Indigenous communities potentially affected and interested in the Project | | Allows continued engagement throughout entire process |

Detailed schedules and work plans for engagements will be developed in consultation with the various Indigenous groups at the appropriate stage of the Project's evolution. As referred to above in Table 8.4, some engagements will be mandatory requirements of the EIA process and as such, the scheduling of those sessions may be determined by the regulatory schedule. Denison and individual Indigenous communities will work together to propose an appropriate schedule for follow-up discussions. In general, it has been agreed between each of the Indigenous communities and Denison to attempt to hold update meetings every quarter or half year with leadership representatives and an open invitation for each group to request a meeting with Denison as and when desired.

Denison will include the CNSC and the Province of Saskatchewan in the planning and participation within ongoing engagement activities. Denison's Community Social Responsibility Manager will contact the CNSC Project Officer once formal and specific engagement plans have been developed for the various stages of the Project.

It is expected that a more formalized schedule will be developed as part of the EA process.

8.3.1 Ongoing Engagement – Specific Topics for Upcoming Engagement

In addition to Project updates, a number of specific topics will be the focus of ongoing engagement as Denison prepares the EIS. The anticipated topics for the foreseeable future are:

- Contemporary traditional land use activities occurring in proximity to the Project and potential impacts of taking up the land associated with the surface lease during construction and operation.
- Identification of both biophysical and human environment VCs.
- Traditional / contemporary local names for features such as lakes and other geographic areas or features.

Other topics will likely arise as outcomes of the engagement activities with Indigenous communities present themselves and as the Project advances.

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Appendix A:
Table of Concordance with Prescribed Information for the Description of a Designated Project
Regulations

Table of Concordance with Prescribed Information for the Description of a Designated Project Regulations

| Section in <i>Prescribed Information for the Description of a Designated Project Regulations</i> | | Wheeler Technical Proposal and Project Description Document Section |
|--|---|---|
| General Information | 1 The project's name, nature and proposed location. | Section 1 Introduction |
| | 2 The proponent's name and contact information and the name and contact information of their primary representative for the purpose of the description of the project. | Section 1.1 Project Proponent |
| | 3 A description of and the results of any consultations undertaken with any jurisdictions and other parties including Aboriginal peoples and the public. | Summary in Section 1.5 Engagement |
| | | Details in Section 7 Stakeholder Engagement and Section 8 Engagement with Indigenous Communities |
| | 4 The environmental assessment and regulatory requirements of other jurisdictions. | Section 1.3.1.2 Provincial |
| | 4.1 A description of any environmental study that is being or has been conducted of the region where the project is to be carried out. | Section 1.4 Regional Studies |
| Project Information | 5 A description of the project's context and objectives. | Section 2.1.4 Objective and Overview of Wheeler In Situ Recovery |
| | | In addition, context on the Project components and activities is provided in Section 2, context on the Project's location is in Section 3, and context on the existing biophysical and human environment is provided in Section 5 |
| | 6 The provisions in the schedule to the Regulations Designating Physical Activities describing the project in whole or in part. | Section 1.3.1.1 Federal |
| | 7 A description of the physical works that are related to the project including their purpose, size and capacity. | Section 2.3 Project Components |
| | 8 The anticipated production capacity of the project and a description of the production processes to be used, the associated infrastructure and any permanent or temporary structures. | Section 2.3 Project Components and Section 2.4 Project Activities and Schedule |
| | 9 A description of all activities to be performed in relation to the project. | Section 2.3 Project Components and 2.4 Project Activities and Schedule |
| | 10 A description of any waste that is likely to be generated during any phase of the project and of a plan to manage that waste. | Section 2.3 Project Components and Section 2.4 Project Activities and Schedule |

| Section in <i>Prescribed Information for the Description of a Designated Project Regulations</i> | | Wheeler Technical Proposal and Project Description Document Section |
|--|--|---|
| | 11 A description of the anticipated phases of and the schedule for the project's construction, operation, decommissioning and abandonment. | Section 2.4 Project Activities and Schedule |
| Project Location Information | 12 A description of the project's location, including (a) its geographic coordinates; | Section 3 Project Location |
| | (b) site maps produced at an appropriate scale in order to determine the project's overall location and the spatial relationship of the project components; | Section 2 Project Information, including Figure 2.6 and Figure 2.7 |
| | | Section 3 Project Location, including Figure 3.1, Figure 3.2, Figure 3.3, Figure 3.4, Figure 3.5, Figure 3.6 and Figure 3.7 |
| | (c) the legal description of land to be used for the project, including the title, deed or document and any authorization relating to a water lot; | Section 2.2.2 Land Tenure |
| | (d) the project's proximity to any permanent, seasonal or temporary residences; | Section 3 Project Location, including Table 3.1, Table 3.2, Figure 3.2 and Figure 3.4 |
| | (e) the project's proximity to reserves, traditional territories as well as lands and resources currently used for traditional purposes by Aboriginal peoples; and | Section 3 Project Location, including Table 3.3, Table 3.2, Figure 3.2, Figure 3.4 and Figure 3.5 |
| | | Section 5.7.3 Current Traditional Land Use by Indigenous , including Figure 5.7 and Figure 5.8 |
| | (f) the project's proximity to any federal lands. | Section 3 Project Location, including Table 3.3 and Figure 3.5 |
| Federal Involvement | 13 A description of any financial support that federal authorities are, or may be, providing to the project. | Section 4 Federal Involvement Federal Involvement |
| | 14 A description of any federal land that may be used for the purpose of carrying out the project. | Section 4 Federal Involvement Federal Involvement |
| | 15 A list of the permits, licences or other authorizations that may be required under any Act of Parliament to carry out the project. | Section 1.3.3 Licensing and Permitting |
| Environmental Effects | 16 A description of the physical and biological setting. | Section 5 Existing Environment |
| | 17 A description of any changes that may be caused, as a result of carrying out the project, to (a) fish and fish habitat as defined in subsection 2(1) of the Fisheries Act; | Section 6.1.4 Fish and Fish Habitat (see 6.1.1.4 Aquatic Environment for supporting information) |

| Section in <i>Prescribed Information for the Description of a Designated Project Regulations</i> | | Wheeler Technical Proposal and Project Description Document Section |
|--|--|---|
| | (b) aquatic species, as defined in subsection 2(1) of the Species at Risk Act; and | Section 6.1.5 Aquatic Species |
| | (c) migratory birds, as defined in subsection 2(1) of the Migratory Birds Convention Act, 1994. | Section 6.1.6 Migratory Birds |
| | 18 A description of any changes to the environment that may occur, as a result of carrying out the project, on federal lands, in a province other than the province in which the project is proposed to be carried out or outside of Canada. | Section 6.1.7 Changes to the Environment on Federal Lands, in a Province other than Saskatchewan, or outside Canada |
| | 19 Information on the effects on Aboriginal peoples of any changes to the environment that may be caused as a result of carrying out the project, including effects on health and socioeconomic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes or on any structure, site or thing that is of historical, archaeological, paleontological or architectural significance. | Section 6.1.8 Effects on Indigenous People (see 6.1.2 Human Environment for supporting information) |
| Summary | 20 A summary of the information required under Sections 1 to 19. | Summary – English version Page ii |
| | | Summary – French version Page x |
| | | Summary – Dene version Page xx |
| | | Summary – Cree version Page xxviii |

PRESS RELEASE**DENISON ANNOUNCES DECISION TO RESUME FORMAL ENVIRONMENTAL ASSESSMENT PROCESS FOR WHEELER RIVER**

Toronto, ON – Nov 9, 2020. Denison Mines Corp. (“Denison” or the “Company”) (DML: TSX, DNN NYSE American) is pleased to announce its decision to restart the formal Environmental Assessment (“EA”) process for the 90% owned Wheeler River Uranium Project (“Wheeler River” or the “Project”) effective January 2021. The decision to resume the EA process marks the end of the temporary suspension announced in March 2020 amidst the significant social and economic disruption that emerged as a result of the COVID-19 pandemic (see Denison’s news release from March 20, 2020).

David Cates, Denison's President & CEO, commented, *“In the coming days, formal notifications will be submitted to the Canadian Nuclear Safety Commission (‘CNSC’) and the Saskatchewan Ministry of Environment (‘MOE’) to restart the EA process. These notifications will inform the regulators of Denison’s intention to resume various activities designed to meet the regulatory requirements for an Environmental Impact Statement (‘EIS’) supporting the advancement of Wheeler River as Canada’s first In-Situ Recovery (‘ISR’) uranium mine.*

With over \$29 million in cash on the balance sheet at the end of October, Denison is well funded to resume the Wheeler River EA process and is currently finalizing its plans for the resumption of the EA as part of the Company’s 2021 budgeting process. A key milestone for the EA process in 2021 is expected to be the resumption of community engagement activities, adapted to reflect COVID-19 protocols and best practices, to facilitate information sharing with interested parties. Additionally, advancing the EA process will involve the completion of third-party technical studies and assessments, ahead of the preparation and submission of a draft EIS, which is currently targeted for early 2022.”

Background on the Environmental Assessment Process

The EA is an important planning and decision-making tool that involves predicting potential environmental effects throughout the project lifecycle (construction, operation, decommissioning and post-decommissioning) at the site, and within the local and regional assessment areas. The EA process is part of the critical path for the advancement of Wheeler River to a future development decision. Denison initiated the EA for Wheeler River in 2019 with the submission of a Project Description and Technical Proposal (together referred to as the “Project Description”) to the CNSC and MOE. The Project Description was accepted in the second quarter of 2019, formally initiating the EA process for the Project in accordance with the requirements of both the Canadian Environmental Assessment Act, 2012 and the Saskatchewan Environmental Assessment Act. In late December 2019, Denison received a Record of Decision from the CNSC on the scope of the factors to be taken into account for the Wheeler River EA, which indicate that the EA will follow the CNSC's generic guidelines.

The Wheeler River EA will draw on the knowledge and expertise of various technical experts in the fields of hydrogeology, aquatics, hydrology, terrestrial ecology, socio economics, and atmospheric and acoustic sciences. The expert knowledge collected through this process will be used to evaluate the potential project effects on the environment and, where applicable, develop mitigation criteria for the life of the operation. Denison considers this process to be iterative – involving repeated and ongoing interaction with project design, as the Company advances towards a future feasibility study and further detailed engineering. This integrated approach ensures the Project will meet regulatory requirements, protect people and the environment, and maintain operational efficiency.

Impact on the Company's Outlook for 2020

The Company previously announced plans for 2020 in its annual Management Discussion & Analysis ("MD&A") for the year ended December 31, 2019 (the "Initial 2020 Outlook"). Those plans identified discretionary work related to the advancement of the Wheeler River EA with a total cost of approximately \$7.0 million. As updated in the Company's MD&A for the quarters ended March 30, 2020 and June 30, 2020, the Company's Outlook for 2020 was adapted in response to the COVID-19 pandemic and the decision to temporarily suspend the Wheeler River EA ("Updated 2020 Outlook"). While the Company's internal environmental and technical teams continued to advance certain scopes of work related to the EA during 2020 (see Denison's news release dated October 28, 2020), the Updated 2020 Outlook did not include the discretionary EA work identified in the Initial 2020 Outlook.

Now, in support of the planned resumption of the EA in 2021, the Company has approved certain discretionary scopes of work for the remainder of 2020 – each of which is designed to best position Denison to resume the EA process. The Company's latest Outlook for 2020 ("Latest 2020 Outlook") is outlined in its MD&A for the period ended September 30, 2020 and reflects these additional discretionary scopes of work as part of the \$700,000 of additional evaluation expenditures outlined for Wheeler River in 2020.

The future scope and cost associated with the resumption of the EA and the associated activities for 2021 are still to be determined, and are expected to be included in the Company's future disclosure of its overall business plans for 2021, which is expected to follow the completion of the Company's annual budgeting process.

About Wheeler River

Wheeler River is the largest undeveloped uranium project in the infrastructure rich eastern portion of the Athabasca Basin region, in northern Saskatchewan – including combined Indicated Mineral Resources of 132.1 million pounds U_3O_8 (1,809,000 tonnes at an average grade of 3.3% U_3O_8), plus combined Inferred Mineral Resources of 3.0 million pounds U_3O_8 (82,000 tonnes at an average grade of 1.7% U_3O_8). The project is host to the high-grade Phoenix and Gryphon uranium deposits, discovered by Denison in 2008 and 2014, respectively, and is a joint venture between Denison (90% and operator) and JCU (Canada) Exploration Company Limited (10%).

A PFS was completed for Wheeler River in late 2018, considering the potential economic merit of developing the Phoenix deposit as an ISR operation and the Gryphon deposit as a conventional underground mining operation. Taken together, the project is estimated to have mine production of 109.4 million pounds U_3O_8 over a 14-year mine life, with a base case pre-tax NPV of \$1.31 billion (8% discount rate), Internal Rate of Return ("IRR") of 38.7%, and initial pre-production capital expenditures of \$322.5 million. The Phoenix ISR operation is estimated to have a stand-alone base case pre-tax NPV of \$930.4 million (8% discount rate), IRR of 43.3%, initial pre-production capital expenditures of \$322.5 million, and industry leading average operating costs of US\$3.33/lb U_3O_8 . The PFS is prepared on a project (100% ownership) and pre-tax basis, as each of the partners to the Wheeler River Joint Venture are subject to different tax and other obligations.

Further details regarding the PFS, including additional scientific and technical information, as well as after-tax results attributable to Denison's ownership interest, are described in greater detail in the NI 43-101 Technical Report titled "Pre-feasibility Study for the Wheeler River Uranium Project, Saskatchewan, Canada" dated October 30, 2018 with an effective date of September 24, 2018. A copy of this report is available on Denison's website and under its profile on SEDAR at www.sedar.com and on EDGAR at www.sec.gov/edgar.shtml.

Denison suspended certain activities at Wheeler River during 2020, including the formal EA process, which is on the critical path to achieving the project development schedule outlined in the PFS. The Company is not currently able to estimate the impact to the project development schedule outlined in the PFS, and users are cautioned against relying on the estimates provided therein regarding the start of pre-production activities in 2021 and first production in 2024.

About Denison

Denison is a uranium exploration and development company with interests focused in the Athabasca Basin region of northern Saskatchewan, Canada. In addition to the Wheeler River project, Denison's Athabasca Basin exploration portfolio consists of numerous projects covering over 250,000 hectares. Denison's interests in the Athabasca Basin also include a 22.5% ownership interest in the McClean Lake joint venture ("MLJV"), which includes several uranium deposits and the McClean Lake uranium mill, which is currently processing ore from the Cigar Lake mine under a toll milling agreement, plus a 25.17% interest in the Midwest and Midwest A deposits, and a 66.71% interest in the J Zone and Huskie deposits on the Waterbury Lake property. Each of Midwest, Midwest A, J Zone and Huskie are located within 20 kilometres of the McClean Lake mill.

Denison is engaged in mine decommissioning and environmental services through its Closed Mines group (formerly Denison Environmental Services), which manages Denison's Elliot Lake reclamation projects and provides post-closure mine care and maintenance services to a variety of industry and government clients.

Denison is also the manager of Uranium Participation Corp., a publicly traded company which invests in uranium oxide and uranium hexafluoride.

For more information, please contact

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@DenisonMinesCo

Qualified Persons

The technical information contained in this release related to mineral resource estimates has been reviewed and approved by Mr. Andrew Yackulic, P. Geo, Denison's Director, Exploration, who is a Qualified Person in accordance with the requirements of NI 43-101.

The balance of the technical information contained in this release has been reviewed and approved by Mr. David Bronkhorst, P.Eng, Denison's Vice President, Operations, who is a Qualified Person in accordance with the requirements of NI 43-101.

Cautionary Statement Regarding Forward-Looking Statements

Certain information contained in this news release constitutes 'forward-looking information', within the meaning of the applicable United States and Canadian legislation concerning the business, operations and financial performance and condition of Denison.

Generally, these forward-looking statements can be identified by the use of forward-looking terminology such as 'plans', 'expects', 'budget', 'scheduled', 'estimates', 'forecasts', 'intends', 'anticipates', or 'believes', or the negatives and/or variations of such words and phrases, or state that certain actions, events or results 'may', 'could', 'would', 'might' or 'will be taken', 'occur', 'be achieved' or 'has the potential to'.

In particular, this news release contains forward-looking information pertaining to the following: the planned resumption of the EA process, including regulatory notices and procedures, and anticipated scope, objectives and timing; the duration and scope of impacts of the COVID-19 pandemic and affiliated operational adjustments; the results of the PFS and expectations with respect thereto; development and expansion plans and objectives, including plans for a feasibility study; and expectations regarding its joint venture ownership interests and the continuity of its agreements with its partners.

Forward looking statements are based on the opinions and estimates of management as of the date such statements are made, and they are subject to known and unknown risks, uncertainties and other factors that may cause the actual results, level of activity, performance or achievements of Denison to be materially different from those expressed or implied by such forward-looking statements. For example, Denison may be unable to resume or, once resumed, decide or otherwise be required to discontinue the EA or other testing, evaluation and development work at Wheeler River if it is unable to maintain or otherwise secure the necessary resources (such as testing facilities, capital funding, regulatory approvals, etc.) or operations are otherwise affected by COVID-19 and its potentially far-reaching impacts. Denison believes that the expectations reflected in this forward-looking information are reasonable but no assurance can be given that these expectations will prove to be accurate and results may differ materially from those anticipated in this forward-looking information. For a discussion in respect of risks and other factors that could influence forward-looking events,

please refer to the factors discussed in Denison's Annual Information Form dated March 13, 2020 or subsequent quarterly financial reports under the heading 'Risk Factors'. These factors are not, and should not be construed as being exhaustive.

Accordingly, readers should not place undue reliance on forward-looking statements. The forward-looking information contained in this news release is expressly qualified by this cautionary statement. Any forward-looking information and the assumptions made with respect thereto speaks only as of the date of this news release. Denison does not undertake any obligation to publicly update or revise any forward-looking information after the date of this news release to conform such information to actual results or to changes in Denison's expectations except as otherwise required by applicable legislation.

Cautionary Note to United States Investors Concerning Estimates of Measured, Indicated and Inferred Mineral Resources and Probable Mineral Reserves: This press release may use the terms 'measured', 'indicated' and 'inferred' mineral resources. United States investors are advised that while such terms have been prepared in accordance with the definition standards on mineral reserves of the Canadian Institute of Mining, Metallurgy and Petroleum referred to in Canadian National Instrument 43-101 Mineral Disclosure Standards ('NI 43-101') and are recognized and required by Canadian regulations, these terms are not defined under Industry Guide 7 under the United States Securities Act and, until recently, have not been permitted to be used in reports and registration statements filed with the United States Securities and Exchange Commission ('SEC'). 'Inferred mineral resources' have a great amount of uncertainty as to their existence, and as to their economic and legal feasibility. It cannot be assumed that all or any part of an inferred mineral resource will ever be upgraded to a higher category. Under Canadian rules, estimates of inferred mineral resources may not form the basis of feasibility or other economic studies. United States investors are cautioned not to assume that all or any part of measured or indicated mineral resources will ever be converted into mineral reserves. United States investors are also cautioned not to assume that all or any part of an inferred mineral resource exists, or is economically or legally mineable. In addition, the terms "mineral reserve", "proven mineral reserve" and "probable mineral reserve" for the purposes of NI 43-101 differ from the definitions and allowable usage in Industry Guide 7. Effective February 2019, the SEC adopted amendments to its disclosure rules to modernize the mineral property disclosure requirements for issuers whose securities are registered with the SEC under the Exchange Act and as a result, the SEC now recognizes estimates of "measured mineral resources", "indicated mineral resources" and "inferred mineral resources". In addition, the SEC has amended its definitions of "proven mineral reserves" and "probable mineral reserves" to be "substantially similar" to the corresponding definitions under the CIM Standards, as required under NI 43-101. However, information regarding mineral resources or mineral reserves in Denison's disclosure may not be comparable to similar information made public by United States companies



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› [Participant Funding Program](#) › [Participant Funding Program opportunities](#)

Participant funding to review the draft environmental impact statement for Denison Mines Corp.'s Wheeler River project

This participant funding offering is open from **January 10 to March 14, 2022**.

Participant funding notice

The Canadian Nuclear Safety Commission (CNSC) is offering participant funding to assist Indigenous peoples, members of the public, and stakeholders in the review of the draft environmental impact statement (EIS) for the Wheeler River project proposed by Denison Mines Corp. (Denison).

Denison is proposing to develop an *in situ* recovery uranium mining and processing operation located in the Athabasca Basin in northern Saskatchewan, approximately 600 km north of the city of Saskatoon, 4 km west of Highway 914 and midway between Cameco Corporation's Key Lake Mill and McArthur River Mine. The proposed Wheeler River mine would produce up to 5,400 tonnes of U₃O₈ annually for 20 years. Under the *Nuclear Safety and Control Act*, Denison's proposal requires CNSC approval.

Before the Commission can make a licensing decision on this proposal, an environmental assessment (EA) conducted under the *Canadian Environmental Assessment Act, 2012*, is required, along with an EA decision affirming that the proposed activities will not cause significant adverse environmental effects.

For further details on Denison's proposal and the EA process, please see [Canadian Impact Assessment Registry project #80178](#). The dates and location of associated CNSC public Commission hearings will be announced at a later date in a notice of public hearing.

Up to **\$250,000** in participant funding will be disbursed among all eligible applicants for the provision of new, distinctive and valuable information on Denison's upcoming draft EIS and related documentation. It is anticipated that the draft EIS will be submitted in late June 2022. Please note that this first phase of funding is intended to assist in the review of the draft EIS. A second phase of funding to assist with participation in the remainder of the regulatory process, including the review of the EA report and related Commission member documents, will be announced at a later date.

To apply for participant funding, interested parties must complete and submit a [participant funding application form](#). Certain [terms and conditions](#) apply. An application form can be submitted by:

- email: pfp@cnsccsn.gc.ca
- mail: Canadian Nuclear Safety Commission
c/o Participant Funding Program Administrator
P.O. Box 1046, Station B
280 Slater Street
Ottawa, ON, Canada K1P 5S9
- fax: 613-995-5086

The deadline for submitting a participant funding application is March 14, 2022.

A funding review committee that is independent of the CNSC will consider all applications for funding and make recommendations on the allocation of funds.

For information on how to participate, view the [Wheeler River project](#) and [Participant Funding Program](#) sections of the CNSC website.

For questions about this specific funding opportunity, contact:

Adam Zenobi

Participant Funding Program Administrator

613-415-2814

pfp@cnscccsn.gc.ca

Date modified:

2022-01-05



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Webinar: NexGen Rook I and Denison Wheeler River Projects – CNSC Regulatory Review Process Overview

Join us on September 13, 2022, for a webinar on the CNSC regulatory review process for the proposed NexGen Rook I and Denison Wheeler River projects.

The CNSC's regulatory framework consists of laws passed by Parliament that govern the regulation of Canada's nuclear industry, and regulations, licences and documents used by the CNSC to regulate the industry.

The purpose of this webinar is to:

- present an overview of the CNSC's regulatory review process for licensing and environmental assessment
- provide an update on the progress and status of the proposed Rook I and Wheeler River projects

Join the webinar

September 13, 2022

Time: Noon to 1 pm EST

Register to receive login details for the selected webinar.

Register:

https://us06web.zoom.us/webinar/register/WN_JcgfMRPXQXSGzNniMjdkcw

Ask a question

We welcome questions any time. These may be addressed during or after the session.

Submit your question

Related links

- NexGen Rook I Canadian Impact Assessment Registry **Reference number: 80171**
- Denison Wheeler River Canadian Impact Assessment Registry **Reference number: 80178**

Date modified:

2022-08-17



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› Public Notice - Conformity Review for the Wheeler River Project EIS Submission



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SEARCH

Wheeler River Project

PDF Version (Portable Document Format) 237 KB (Kilobyte)

Document reference number: 17

Public Notice - Conformity Review for the Wheeler River Project EIS Submission

October 24, 2022: On October 21, 2022, Denison Mines Ltd. submitted a draft environmental impact statement (EIS) for the proposed Wheeler River Project to the Canadian Nuclear Safety Commission (CNSC). CNSC staff are currently conducting a 30-day conformity review to ensure that sufficient information has been submitted in accordance with the CNSC *Generic*

Guidelines for the Preparation of an Environmental Impact Statement. If the draft EIS is deemed sufficient, a technical review will commence, along with a 90-day public comment period.

Date modified: 2022-11-21



November 18, 2022

Ms. Janna Switzer
Environment Manager
Denison Mines Corp.
jswitzer@denisonmines.com

Subject: Outcome of CNSC Staff Conformity Review of the October 21, 2022 Draft Environmental Impact Statement for the Proposed Wheeler River Project

Dear Ms. Switzer:

On October 21, 2022, Denison Mines Corp. (Denison) submitted a draft Environmental Impact Statement (EIS) for the Wheeler River Project, proposed for the Athabasca Basin region of Northern Saskatchewan [1]. CNSC staff have conducted a conformity review of this submission, along with the supporting information submitted by Denison on November 9, 2022 [2], to form a conclusion on whether the required information has been provided, in order to proceed with the EIS technical review.

The scope of the conformity review was to evaluate this submission against CNSC staff's [*Generic Guidelines for the Preparation of an Environmental Impact Statement pursuant to the Canadian Environmental Assessment Act, 2012*](#).

Review Results:

CNSC staff have found the submission to contain the required information, to proceed with the technical review of the draft EIS.

Next Steps:

On November 21, 2022 or shortly thereafter, CNSC staff will post the draft EIS, the Executive Summary, and all Technical Support Documents on the Canadian Impact Assessment Registry (CIAR) page for the [*Wheeler River Project \(Reference number: 80178\)*](#). The Federal-Indigenous-Review-Team (FIRT) will then begin a 120-day technical review of the draft EIS submission and at the same time, or shortly thereafter, a 90-day public comment period will commence.

Near the end of the technical review period, CNSC staff will then compile the FIRT Information Request (IR) Table. This will be sent back to Denison for response no later than March 21, 2023.

A compiled table of comments from First Nations, Métis and the public will also be shared with Denison before the end of April, 2023. Submissions will be posted to the CIAR as they are received, throughout this comment period.

Should you have any questions, please do not hesitate to contact me directly by phone at 343-540-6213 or by email at jessica.way@cnsccsn.gc.ca.

Sincerely,

Jessica Way

Environmental Assessment Officer
Environmental Assessment Division

c.c.: CNSC: N. Kwamena, W. Yen, P. Burton, S. Akhter
Denison Mines: J. Switzer, D. Cates, K. Himbeault

References:

- [1] Letter and email, J. Switzer (Denison) to J. Way (CNSC), *Denison Mines: Wheeler River Draft EIS*, October 21, 2022 ([e-Doc: 6913198](#))
- [2] Email, J. Switzer (Denison) to J. Way (CNSC), *RE: Wheeler River Conformity Review - Update and Requests*, November 9, 2022 ([e-Doc: 6913199](#))



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Wheeler River Project

Public Notice - Public Comment Period on Denison's Draft Environmental Impact Statement for the Proposed Wheeler River Project

The Canadian Nuclear Safety Commission (CNSC) is seeking comments during a 90-day public comment period on the [draft environmental impact statement](#) (EIS), for the proposed Wheeler River Project submitted by the proponent, Denison Mines Corp. At the same time, the CNSC, with the support of the federal-Indigenous Review Team, will begin an EIS technical review.

For the purposes of the public comment period, the draft EIS and supporting documents can be accessed by visiting All Records for the project page. The EIS can also be found under Key Documents, located on the main page of the Canadian Impact Assessment Registry for the Wheeler River Project.

The draft EIS provides an analysis of the project's potential environmental effects and measures to mitigate those potential impacts. The public comment period gives Indigenous nations and communities, members of the public, and government departments and agencies an opportunity to submit their views in writing to the CNSC on the adequacy of the information presented in the EIS, as measured against the Generic Guidelines for the Preparation of an Environmental Impact Statement pursuant to the Canadian Environmental Assessment Act, 2012 (the Guidelines), and on the technical merit of the information presented. The Guidelines provide direction to the proponent and identify the information that is required in the EIS.

Written comments must be submitted by **February 18, 2023** to:

Jes Way

Environmental Assessment Officer

Email: wheelerriver@cnsccsn.gc.ca

All comments on the draft EIS will be posted on the Canadian Impact Assessment Registry in the language in which they were received.

Document reference number: 18

Date modified: 2023-03-14



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Wheeler River Project

Public Notice - CNSC Completes Initial Review of Denison's Draft Environmental Impact Statement for the Proposed Wheeler River Project

The Federal Indigenous Review Team (FIRT) has completed a technical review of Denison Mines Corp.'s draft environmental impact statement (EIS) submission and has found that the information provided does not fully address the regulatory requirements for the environmental assessment (EA). The technical review resulted in 238 information requests (IRs), found in Annex 1, as well as 49 Advice to Proponent comments, found in Annex 2.

The following documents have been posted:

- Letter from CNSC staff to Denison with outcome of draft EIS review
- Annex 1 - FIRT - Information Requirements for the Wheeler River Environmental Impact Statement
- Annex 2 - FIRT - Advice to the Proponent for the Wheeler River Environmental Impact Statement

CNSC staff expects Denison to submit complete responses to all IRs and Advice to Proponent comments, along with a revised EIS and supporting documentation. Denison's responses may be reviewed several times to ensure the responses meet requirements. Once the draft EIS meets regulatory requirements, CNSC staff will proceed with developing an EA report.

Document reference number: 80

Date modified: 2023-03-28



e-Doc: 6991467

March 20, 2023

Ms. Janna Switzer
Director, HSE Regulatory Compliance
Denison Mines Corp.
jswitzer@denisonmines.com

Subject: Results of the Federal-Indigenous Review Team technical review of the October 21st, 2022 Draft Environmental Impact Statement Submission for the proposed Wheeler River Project

Dear Mrs. Switzer,

On October 21, 2022, Denison Mines Corp. (Denison) submitted a draft Environmental Impact Statement (EIS), Executive Summary, as well as Technical Support Documents (in the form of Appendices) for the proposed Wheeler River Project [1]. On November 18, 2022, CNSC staff found the submission [1] to contain the required information to proceed with the Federal-Indigenous Review Team (FIRT) technical review of the draft EIS [2].

Outcome of the EIS Technical Review

The FIRT has completed the technical review of the submission and has found that the information provided does not fully address the regulatory requirements for the environmental assessment (EA). The technical review of the submission [1] has resulted in 238 information requests (IRs) [3], found in Annex 1 attached, as well as 49 advice to proponent comments [4], found in Annex 2, also attached. Comments in the advice to proponent table contain additional guidance and advice that Denison should take into consideration when responding to IRs and when revising the draft EIS.

Expectations and Next Steps

On March 21, 2023 or shortly thereafter, CNSC staff will post information request tables and advice to proponent comments on the Canadian Impact Assessment Registry for the [Wheeler River Project](#) (Reference number: 80178).

CNSC staff expect Denison to submit complete responses to all IRs and advice to proponent comments and to re-submit a revised EIS. CNSC staff also request that Denison provide a document revision history with the revised EIS, in order for reviewers to locate the changes that have been made to revised documents. It is expected that Denison clearly indicate how the revised EIS incorporated changes that take into account the responses to the IRs. CNSC staff as well as members of the FIRT are available and willing to meet with Denison to discuss the path forward and to clarify expectations for the IR responses.

Commitments Report

At this time, CNSC staff are also formally requesting that Denison submit, as part of its revised EIS documentation, a Commitments Report in order to capture all the mitigation measures, follow-up program measures and commitments that have been referenced in the EA documentation in a single location for completeness and traceability. This report should include a listing of all commitments made by Denison based on all of the documentation submitted to date including:

- the EIS
- correspondence with the public and Indigenous Nations and communities
- responses to IRs
- additional commitments Denison has made in any documentation to members of the public and Indigenous Nations and communities and to whom these commitments apply

These commitments should be triaged based on whether they are within the scope of regulatory requirements or beyond (e.g., good governance, social responsibility), and indicate how each of these commitments will be tracked into Denison programs, for example, environmental monitoring programs.

It would be helpful if Denison could organize this information in tabular format providing the following information:

- details of the commitment
- which phase(s) of the project will the commitment be carried out (e.g., all phases)
- where the commitment is referenced (which document, table, etc. and where it can be found)
- how this commitment will be tracked (project EA follow-up program, site-wide programs, etc.)

This report would remain an evergreen document that would continue to be updated, during the remainder of the regulatory review process, as well as if the project is approved, after the public hearings and Commission decisions, to capture any additional commitments made by Denison staff during public hearings and any actions directed by the Commission to Denison.

Should you have any questions, please do not hesitate to contact me, directly by phone at 343-540-6213 or by email at Jessica.Way@cnsccsn.gc.ca.

Sincerely,

Jessica Way
Environmental Assessment Officer
Environmental Assessment Division

c.c.: CNSC: N. Kwamena, P. Burton, K. Gorzkowski, W. Yen
Denison: K. Himbeault, C. Inglis-McQuay, R. Nagel

References:

- [1] Letter, K. Himbeault and J. Switzer (Denison) to J. Way (CNSC), Wheeler River Project - Submission of Draft Environmental Impact Statement, October 21, 2022 (e-doc 6991484)
- [2] Letter, J. Way (CNSC) to J. Switzer (Denison), CNSC Conclusions: Outcome of the Wheeler River Conformity Review, November 18, 2022 (e-doc 6943662)
- [3] Annex 1, Federal and Indigenous Review Team, Wheeler River Project – Information Requests, March 20, 2022 (e-doc 6858049)
- [4] Annex 2, Federal and Indigenous Review Team, Wheeler River Project – Advice to Proponent, March 20, 2022 (e-doc 6858048)

Annex 1

Federal Indigenous Review Team (FIRT) - Information Requirements for the Wheeler River Environmental Impact Statement

| Ref. # | Department | Project Effects Link | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Information Requirement (IR) ² | Denison Response |
|--------|---|---|--|--|---|------------------|
| IR-01 | English River First Nation (ERFN) | Current use of lands and resources for traditional purposes | General | <p>Context: Denison has not gone far enough in terms of learning from and incorporating information from ERFN provided in the <i>Traditional Knowledge Study and Health and Socio-Economic Study Report</i>. It appears Denison put a disproportionate amount of reliance on the views and interests of one ERFN land user. While we applaud the efforts of Denison to seek feedback from ERFN land users directly and to work closely with such land users, ERFN’s rights and interests in the region of the Project (and the potential of the Project to adversely impact such rights and interests) extend well beyond that of just one land user.</p> <p>Rationale: It is important for the proponent and regulators to understand that while the rights and interests of individual ERFN members are important to consider, the Elders and elected leaders of ERFN represent the collective rights and interests of ERFN as a Nation. The results of the scoping study indicated that ERFN holds firmly established rights to the area where the planned project is located. Numerous studies conducted over several decades have examined ERFN's relationship and connection to land use and occupancy of the region where the proposed mine is located from traditional land use, subsistence harvesting, ecological, and sociocultural and economic perspective.</p> | <p>The draft EIS should be revised to reflect the totality of ERFN TK and land use information.</p> <p>Denison and CNSC must continue to work with ERFN to ensure that impacts on ERFN rights are appropriately and fully considered, mitigated, and accommodated.</p> | |
| IR-02 | Canadian Nuclear Safety Commission (CNSC) | Mitigation Measures | General Appendix 16-C | <p>Context: Denison’s 2019 Wheeler River Terms of Reference states: “The EIA will also discuss the monitoring programs required to demonstrate regulatory compliance and compliance with the commitments Denison has made to its Indigenous and non-Indigenous Stakeholders.”</p> <p>The CNSC’s Generic Guidelines for the Preparation of an Environmental Impact Statement (EIS), also state: “The EIS will then describe mitigation measures that are specific to each environmental effect identified. Measures will be written as specific commitments that clearly describe how the proponent intends to implement them and the environmental outcome the mitigation is designed to address.</p> <p>Rationale: The EIS and the Summary of Monitoring and Follow-up Programs provided in Appendix 16-C contains very high-level information. It is not clear which monitoring programs will be</p> | <p>CNSC staff expect Denison to provide a comprehensive list of commitments along with the next version of the EIS, including any commitments made to Indigenous Nations and communities and other stakeholders (As committed in the Wheeler River Terms of reference, and as noted in the November 28th, 2022 email from CNSC staff to Denison: <i>Future Submission of a Commitments Table for Wheeler River EIS</i>).</p> | |

¹ Unless otherwise stated, the section noted refers to the draft EIS.
² Where IR contents note “See also related IR(s)”, responses from Denison may be similar or provided in a single detailed response, but it was preferred to keep original IRs distinct.

| Ref. # | Department | Project Effects Link | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Information Requirement (IR) ² | Denison Response |
|--------|--|--|--|--|---|------------------|
| | | | | employed to demonstrate regulatory compliance, and compliance with the commitments Denison has made to its Indigenous and non-Indigenous Stakeholders. | | |
| IR-03 | CNSC | Site preparation | Section 1.3.2 Temporal Boundaries Appendix 10-A (ERA) | Context: The EIS and TSD-ERA provide assessment on the project timeframe, including construction, operation, and decommissioning phases. Rational: The site preparation phase is not included in the timeframe (EIS and TSD-ERA). As per REGDOC 2.9.1, the sub-section 4.1.1 Complexity of the environmental risk assessment requirements states that “The applicant or licensee shall identify facility characteristics and activities that may interact with the environment during the relevant phase of the facility or activity’s lifecycle (for example, site preparation, construction, operation, and decommissioning.” | Please provide an assessment of those facility characteristics and activities that may interact with the environment during the site preparation phase, along with an assessment of their potential effects, in order to reflect the entire lifecycle or provide a rationale for its exclusion. | |
| IR-04 | Environment and Climate Change Canada (ECCC) | Fish and fish habitat | Section 2, Project Description Section: Glossary | Context: The Proponent defines ‘clean waste rock’ as “Waste rock generated as sandstone cuttings and core from drilling activities associated with well and freeze hole development that does not have uranium containing materials”. ECCC notes that the use of the term “Clean Waste Rock” could be misunderstood to mean that the waste rock is devoid of any contaminant. Even when the waste rock referred to as “clean waste rock” does not contain uranium materials, it could contain other metals or contaminants that could have adverse environmental effects. It is also not clear whether the “clean waste rock” is characterized for Acid Rock Drainage/Metal Leaching (ARD/ML) given that some portion of the basement rock is to be drilled out to anchor the freeze walls and may have ARD/ML potential. Rationale: The current definition of ‘clean waste rock’ in the draft EIS could lead to inappropriate handling and disposal if it is assumed to be devoid of any metals or other contaminants that might negatively affect the environment. | Provide a clear and more detailed definition of the term ‘clean waste rock’. | |
| IR-05 | CNSC | Change to an environmental component due to hazardous contaminants | Section 2.2.1.2 | Context: Water volumes for mud/diamond drilling is listed as minimal as the mud will be re-used. The mud is identified as a mixture of water, clay, and environmentally friendly polymers that clean out the cuttings and help to keep the drilling bit cool. Rationale: Although the mud for drilling will be re-used, there could be environmental impacts should there be an accident while drilling. | Please identify the components of the environmentally friendly polymers for the drilling mud and potential environmental impacts should the mud not be recovered. | |
| IR-06 | CNSC | Geology and groundwater | Section 2.2.1.4, Wellfield for In Situ Recovery Mining | Context: This Section of the EIS indicates that a tracer test was completed in 2021 and a feasibility field test was initiated in 2022. No information from these tests is included in the EIS and no reporting | 1. Please provide a summary of the results of field tests (i.e., tracer tests, wellfield leach tests, and remediation trials) in the EIS, or provide a technical supporting | |

| Ref. # | Department | Project Effects Link | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Information Requirement (IR) ² | Denison Response |
|--------|------------|-----------------------|---|--|--|------------------|
| | | | | <p>timelines are provided.</p> <p>Rationale: Guidance from the IAEA (2001) and best practices highlighted by regulatory regimes in other countries such as the United States (IAEA, 2016) and Australia (Geoscience Australia, 2010) indicates that single and multi-well trial (feasibility) testing for mining and remediation techniques should be carried out before a licence for full-scale operations can be granted. This is part of the requirement for proponents to demonstrate to government authorities that all potential risks have been considered during the life of operation and post-remediation of the mine.</p> <p>Additionally, Section 8.5.2 of the Generic EIS Guidelines states: “Units may be characterized as aquifers or aquitards, and unit descriptions should include their geochemical characteristics, vertical and lateral permeabilities, transport mechanism (diffusion versus advection) and the directions of groundwater flow”,</p> <p>And that “The applicant or licensee should present a conceptual and numerical hydrogeological model that discusses the hydrostratigraphy and groundwater flow systems”.</p> <p>Outcomes from the tracer test inform model parameters such as effective porosity (see IR-78), dispersion, and dispersivity (see IR-96). The wellfield leach tests and remediation trails ultimately inform environmental monitoring during site activities, and the source term for the groundwater model. This source term represents the contaminants which flow through the desilicified zone into Whitefish Lake, which represents a source of contamination considered in the ERA.</p> <p>References: [1] International Atomic Energy Agency (IAEA). 2001. Manual of Acid in Site Leach Uranium Mining Technology. IAEA-TECDOC-1239. Vienna. 283 p. [2] International Atomic Energy Agency (IAEA). 2016. In Situ Leach Uranium Mining: An Overview of Operations. IAEA Nuclear Energy Series No. NF-T-1.4. Vienna. 76 p. [3] Commonwealth of Australia (Geoscience Australia). 2010. Australia’s in situ recovery uranium mining best practice guide. ISBN 978-1-921672-95-8. Canberra. 33 p.</p> | <p>document with this information, and ensure the documentation is appropriately referenced in the EIS.</p> <p>2. Please indicate how outcomes from these field tests inform the design of In Situ Recovery. This information should include:</p> <ul style="list-style-type: none">• feasibility of meeting remediation targets.• groundwater flow conditions and validation of flow models.• mobilization of contaminants (e.g., Al, Se or V).• potential for free gas evolution/two-phase flow.• identifying composition of lixiviant and production solutions.• success despite presence of >2% carbonate minerals (siderite, FeCO3) in the ore zone (see Table 4-3 of Appendix 7-A).• site-specific data to parameterize, validate, and refine solute transport models (hydraulic conductivity, effective porosity, dispersivity, diffusion, etc.). <p>3. Please provide further information of proposed operations including % recovery, uranium concentrations, optimal liquid/solid ratios, anticipated reagent consumption, etc.</p> | |
| IR-07 | ECCC | Fish and fish habitat | Section 2.2.1.4.2, Wellfield Operation Section 2.2.1.4.2.2, Secondary Containment of | <p>Context: The description in Sections 2.2.1.4.2 and 2.2.1.4.2.2 refer to the differential rates of injection and withdrawal, which implies that more solution will be withdrawn through the recovery well than volume of mining solution injected. According to the description of the site, a freeze wall will create a barrier between the uranium deposit to be mined and outside the isolated area to prevent inflow of</p> | <p>Clarify where the extra groundwater will come from to sustain this differential rate of injection and withdrawals during operation and if this extra water has been accounted for in the model and the amount of water that ends up in the receiving environment.</p> | |

| Ref. # | Department | Project Effects Link | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Information Requirement (IR) ² | Denison Response |
|--------|------------|---|--|--|--|------------------|
| | | | Mining Solution – Pumping | <p>groundwater from the sandstone outside the freeze wall. Secondly, it was indicated that the basement rock below the uranium deposit will prevent infusion of groundwater from below.</p> <p>The Proponent stated that inward hydraulic gradient will be created by recovering more solution than is being injected. In general, the wellfield will operate to draw a minimum of 1% more solution out of the wellfield compared to solutions injected in. This will help avoid increased subsurface pressures from injection pressure build up within the deposit.</p> <p>Rationale: It is not clear where the extra groundwater will come from that will sustain this differential rate of injection and withdrawals as the freeze wall and bedrock basement will isolate the injection well from groundwater.</p> <p>If it is assumed that there is limited amount of groundwater present in the sandstone layer above the uranium deposit, that amount of groundwater in the sandstone layer is finite and will be exhausted at some point. Therefore, it is not clear where the extra groundwater will come from. If the extra volume of water is not accounted for in the modelling, that would ultimately affect the volume of water that ends up in the receiving environment and likewise the amount of contaminants contained.</p> | | |
| IR-08 | ECCC | Change to an environmental component due to radiological contaminants | Section 2.2.1.4.2.2 Project Description | <p>Context: This section describes how an inward hydraulic gradient will be created within the mining area as a secondary containment method for control of mining solution. While the process is described, there is no information on contingency measures in place for pump failure or system maintenance solutions. There is also no information on how quickly the hydraulic gradient, and therefore secondary containment, would be compromised if any pumps stopped working. It is also unclear how primary containment (i.e., well design) failure, such as physical/mechanical issues compromising casings, would affect the creation of the hydraulic gradient and secondary containment as well.</p> <p>Rationale: It is important to have contingency planning in place in the event that there are any issues with the hydraulic gradient and secondary containment system for control of the acidic mining solution.</p> <p>There is no information in this section on how the hydraulic gradient (i.e., secondary containment) would be maintained if a well or pump (i.e., Primary containment) experienced problems.</p> | Provide further information regarding how the inward hydraulic gradient system functions, with particular focus on how the hydraulic gradient and secondary containment will be maintained if any wells or pumps were compromised. | |

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| IR-09 | CNSC | Geology and Groundwater | Section 2.2.1.4.2.2 | <p>Context: This section indicates that mining solution within the mining area can primarily be controlled by maintaining an inward hydraulic gradient. The inward hydraulic gradient will be created by recovering more solution than is being injected.</p> <p>Rationale: If, for some reason, the recovered solution is much more than that being injected, an excessive drawdown could be created. If, by accident, mining solution is leaking into the upper sandstone aquifer through crack in injection/recovery well casing at the same time, it would be challenging to remediate the upper sandstone aquifer in dry conditions (due to excessive drawdown).</p> | Please clarify if any measure will be implemented to avoid excessive drawdown and develop contingency measures to address such accident. | |
| IR-10 | ECCC | Fish and fish habitat | Section 2.2.1.4.2.3, Tertiary Containment of Mining Solution - Freeze Wall | <p>Context: The Proponent stated that as a tertiary means of containment for the mining area, the uranium deposit is proposed to be surrounded by a freeze wall that extends from the surface to the basement rock, isolating the mining area from regional groundwater. Current plans are for the freeze wall to be a minimum of 10 m thick, be installed 25 m away from the uranium deposit, and extend 30 m into the basement rock (Figure 2.2-6).</p> <p>As explained in Section 2.2.1.4.2.2, mining solution will be injected into the ore zone under pressure and will likely react, not just with the uranium in the ore zone, but also the binding or cementing material in the sandstone. This means that some portion of the sandstone above the uranium layer and perhaps some portions of the freeze wall will dissolve, thereby creating more void than just the thickness of the uranium layer or horizon. The void may affect the integrity of the freeze wall as containment.</p> <p>Rationale: It is not clear how the Proponent will monitor the freeze wall to verify whether portions of the freeze wall are being dissolved in the mining process and how it plans to verify the integrity of the freeze wall as a containment for the mining solution. In addition, if the dissolution reaction of the uranium ore is exothermic, then the heat generated may also affect the integrity of the freeze wall.</p> | <p>1. Explain how the integrity of the freeze wall will be maintained as a means of containment that prevents migration of the mining solution out of the ore zone into the receiving environment.</p> <p>2. Demonstrate that the mining solution injected under pressure will not compromise the integrity of the freeze wall as a containment.</p> <p>3. Demonstrate how both exothermic and chemical reactions of the mining solution used to dissolve the uranium ore will not compromise the integrity of the freeze wall as a containment.</p> <p>Technical Discussion Required: Yes. ECCC would like to better understand the chemical constituents that compose the mining solution and the chemical reactions that it will cause.</p> | |
| IR-11 | ECCC | Change to an environmental component due to hazardous contaminants | Section 2.2.3 Project Description | <p>Context: It is unclear how much contact water may be produced during the drilling of the mine well field during the construction phase of the proposed Project. Figure 2.2-14 indicates that no water will be produced during the drilling process in the construction phase. In Section 2.2.1.2 both mud rotary drilling and diamond drilling are proposed for the creation of wells. Both processes require water, however only mud rotary drilling produces liquid mud that is then reused in the drilling process.</p> <p>Rationale: It is unclear if the liquid mud produced during drilling can be reused indefinitely with further water additions, or if this</p> | Provide further information on potential wastewater produced during the construction phase from drilling processes, and if proposed infrastructure can contain any water produced. | |

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| | | | | eventually becomes the clean sand grain cutting and how it will be disposed of (i.e., liquid or solid waste). If the mud produced from drilling is classified as liquid waste and disposed of as contact water, it is not clear if this is accounted for in the site water management plan and water balance during the construction phase. Contact water from well drilling during the construction phase has not been quantified or accounted for in Figure 2.2-1, and therefore it is unclear if proposed infrastructure during the construction phase has the capacity to contain this waste stream in addition to the waste streams currently outlined in Figure 2.2-1. | | |
| IR-12 | ECCC | Change to an environmental component due to hazardous contaminants | Section 2.2.3, Project Description | <p>Context: There is not enough information provided within the draft EIS and site water infrastructure designs to determine if the infrastructure will sufficiently contain mine site contact and non-contact water runoff. It is unclear how water management will occur during all proposed Project stages at the Project airstrip, which is located away from the main Project site. No information has been provided regarding water that may come into contact with fuels and oils from machinery on the air strip, how and where that contaminated water will be treated, and how surface runoff around the airstrip will be managed. Additionally, it is unclear if contaminants from heavy machinery on roads have been considered during runoff collection plans throughout the mine Project site. Water management at the airstrip and roads can have impacts on surface water quality and sediment quality and contaminants (e.g., Hydrocarbons) from these sources should be considered in overall site water management plans.</p> <p>In Section 2.2.3.1 a site drainage plan for contact and non-contact water has been provided in Figure 2.2-17, and water balances have been provided for the different Project phases in Figures 2.2-14 to 2.2-16. In Section 2.2.3.4 a volume of 30,000m3 for the process water pond is provided, and it is stated that the process water pond has the capacity to contain Probable Maximum Precipitation (PMP) event estimated to be 483.3mm while allowing for 1.0m of freeboard. However, there are no estimates on the total volume of water that may be drained from the overall site infrastructure (i.e., the well field, processing areas, etc.) during a 24-hr PMP event. Additionally, in Figure 2.2.17 culvert locations are provided, however there is no further information on culvert designs, flow ratings and capacity for PMP events.</p> <p>Rationale: In order to be able to understand site water management and flood risk potential, more information needs to be provided regarding the site water infrastructure designs and capture volumes during PMP events. This information will aid ECCC in understanding how contact and non-contact water will be conveyed throughout the</p> | <p>1. Provide information on how contact and non-contact water from the site airstrip will be managed. Include information on potential contaminant characterization and loadings and an assessment of risk to the environment.</p> <p>2. Provide further information on how potential contaminants in runoff from roads have been considered in the site water management. Include information on potential contaminant characterization and loadings and an assessment of risk to the environment.</p> <p>3. Provide estimated volumes of water to be drained from overall site infrastructure (such as the mine terrace, airstrip, camp area etc.), during a 24-hr PMP event.</p> <p>4. Provide additional information on culvert designs and conveyance capacity for PMP events.</p> | |

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| | | | | site. Runoff from roads and the site airstrip will contain contaminants from vehicles, heavy machinery, aircrafts and de-icing practices. Additional information on the runoff collection systems and expected contaminant concentrations for the site airstrip and roads is needed to determine if the receiving environment and aquatic and terrestrial receptors are protected. | | |
| IR-13 | ECCC CNSC | Fish and fish habitat | Section 2.2.4, Waste Management Section 2.2.7.7, Borrow Area Section 2.3.1.3 Site Preparation and Earthworks | <p>Context: The Proponent indicates that a borrow area is planned for an area northeast of the processing plant. The borrow material or overburden will be used during construction for roads, airstrip, pads, and in the batch plant for concrete production needs, during Operation for ongoing maintenance of various Project components and during decommissioning for fill and cover material. Suitable construction fill material will be sourced from the proposed borrow area and any suitable clean sandstone generated during freeze wall and well drilling (Section 2.2.7.7).</p> <p>It was also noted in Sections 2.2.1.3 and 2.2.14 that the freeze wall will be established by drilling over 300 vertical holes from surface to the basement rock. The freeze holes will extend 30 m into the basement rock and will produce waste rock from basement rock (Figure 2.2-6). However, there is no information whether the waste rock from basement rock would potentially be acid generating and/or metal leaching. This means that all the extra 30 m of basement rock should also be characterized for potential ARD/ML to determine use or appropriate disposal.</p> <p>Rationale: ECCC notes that the Proponent did not indicate whether the borrow material and the drill out part of the sandstone layers and basement rock will be tested for Acid rock drainage/metal leaching (ARD/ML) potential before they will be used during construction, operation and decommissioning. ARD/ML is an environmental hazard that will have an adverse effect on waterbodies frequented by fish.</p> <p>Potential acid generating and metal leaching waste rock could pose negative impacts on the environment if they are not managed adequately.</p> | <p>Please provide:</p> <p>1. Information on whether the waste rock from the basement rock is potentially acid generating and metal leaching;</p> <p>a. Confirm that any borrow material to be used for construction will be characterized for potential ARD/ML.</p> <p>b. Confirm that the part of waste rock recovered from the basement rock, will also be tested for potential ARD/ML.</p> <p>2. Criteria for segregating the potential acid generating and metal leaching waste rock, if it exists, from clean waste rock; and,</p> <p>3. A plan to manage the potential acid generating and metal leaching waste rock, if it exists.</p> | |
| IR-14 | CNSC | Wastes and Decommissioning | Section 2.3.3.1.3 Decontamination, Demolition, and Disposal (p. 2-82) Table 4.3-2: Key Issues and Concerns from English River First Nation (p. 4-33) | <p>Context: The EIS states “Concrete foundations will be left in place. Any portions of concrete foundations remaining above grade will be levelled and rebar will be cut-off at grade. Large slabs will be perforated on a 2-m grid to permit drainage. Concrete slabs will be covered with 0.5 m of development rock or locally stockpiled till.” (p. 2-82)</p> <p>Further, Denison notes that “Concern about responsible authority for restoring the environment, including contaminants when mining</p> | How has the proposal to leave these foundations in place been received by the Indigenous Nations and communities during engagement sessions? Have engagement activities influenced Denison’s planned decommissioning approach? Describe in additional detail how the comment from p. 4-33 has been addressed and how this has been received by those who expressed this concern? | |

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| | | | | <p>concludes. How long will it take to have the environment fully restored and, if Denison is no longer the operator, how will this be completed?” (p. 4-33). This comment status is noted as <i>Complete</i>.</p> <p>Rationale: Permanent structures will remain following decommissioning, according to the excerpt above. It’s unclear how engagement activities influenced Denison’s planned decommissioning approach, or how the comment above has been addressed or received.</p> | | |
| IR-15 | ECCC | Fish and fish habitat | Section 2.2.3.4 Project Description Section 8.1.3.4.2, Aquatic Environment | <p>Context: In Section 2.2.3.4 it is stated that the estimated PMP event for Project infrastructure planning is 483.3mm. In Section 8.1.3.4.2 it is stated that the PMP is 489.3 mm.</p> <p>Rationale: It is unclear which value is the correct PMP value and if Project infrastructure has been planned correctly.</p> | Provide the correct PMP value and verify that Project infrastructure has been designed utilizing the correct value. | |
| IR-16 | CNSC | Human health with respect to hazardous contaminants | Section 2.2.3.8 | <p>Context: The EIS and technical supporting documents do not provide sufficient justification for the selection of the proposed wastewater treatment systems for the industrial wastewater treatment plant or the domestic wastewater treatment plant.</p> <p>In addition, it is not clear how the upper bound of the industrial wastewater treatment plant effluent quality was obtained.</p> <p>Rationale: Draft REGDOC-2.9.2 formally documents the CNSC’s expectations to licensees for controlling releases to the environment. For proposed new facilities, these expectations include conducting a best available technology and techniques, economically achievable (BATEA) Assessment, and determining key parameters necessary to support the EIS. These include identifying:</p> <ul style="list-style-type: none">• environmental release targets to inform the design of wastewater treatment systems to constrain the quantity and concentration of contaminants and physical stressors released into the environment,• the best available technology and techniques through an options analysis; and• the anticipated influent characteristics, overall treatment efficiencies, and maximum predicted design release as the output of the assessment. <p>Consideration of the principle of pollution prevention and BATEA is also a requirement of REGDOC-2.9.1.</p> <p>CNSC staff have met with Denison to discuss the expectations in draft REGDOC-2.9.2.</p> | <p>Please provide a summary of the BATEA assessment to justify the selection of the wastewater treatment plant system.</p> <p>As part of the summary, please identify the anticipated environmental release targets used to inform the design, as well as the maximum predicted design release concentrations and loadings to the receiving environment. The maximum predicted design releases should be used in the ERA to demonstrate protection of people and the environment.</p> | |

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| IR-17 | CNSC | Human health with respect to hazardous contaminants | Section 2.2.3.8 | <p>Context: It is also acknowledged that Denison stated in meetings with CNSC staff that Denison intends to propose final release targets to the CNSC as part of the licence application submission.</p> <p>Rationale: It is not clear in the submission whether Denison has considered whether any applicable technology-based performance standards exist in Canada or internationally, and would be relevant as effluent discharge targets, in order to ensure principles of pollution prevention are applied. Consideration of this would help ensure that the proposed effluent discharge targets harmonize with existing federal, provincial/territorial, and/or municipal requirements. For example, there are release limits for radium-226, TSS, and pH outlined in the federal Metal and Diamond Mining Effluent Regulations, which have been demonstrated to be achievable in the uranium mine and mill industry.</p> <p>In addition, countries like the United States, where in-situ recovery has been conducted in the past, have specific technology-based limits. These are known as New Source Performance Standards and are identified in US Code of Federal Regulations (US CFR) 40, Chapter 1, Subchapter N, Part 440 - Ore Mining and Dressing Point Source Category. It is not clear whether these have been considered in Denison’s assessment. These should be considered when identifying suitable achievable technologies.</p> | Denison should harmonize their proposed Effluent Release Targets with the technology-based performance standards that exist in the Metal and Diamond Mining Effluent Regulations where applicable, or other suitable international regulations. | |
| IR-18 | ECCC | Change to an environmental component due to hazardous contaminants | Section 2.2.3.9, Project Description Appendix 8-E | <p>Context: In Table 2.2-1 the upper bound Industrial Wastewater Treatment Plant (IWWTP) effluent quality final discharge targets for Constituents of Potential Concern (COPCs) are provided. General parameters (e.g., temperature, pH, etc.), and several Schedule 4 Substances with maximum authorized concentrations (lead, nickel, suspended solids, and un-ionized ammonia) under the Metal and Diamond Mining Effluent Regulations (MDMER) have not been provided in this table. There are several COPCs (aluminum, mercury, iron, nitrate, thallium, phosphorus and manganese) for effluent characterization under Schedule 5 Section 4 of the MDMER that have not been provided in this table. Additionally, no information on water quality guidelines has been provided in this table.</p> <p>Furthermore, it is stated that the final effluent quality discharge target for uranium is 0.057 mg/L. However, the Canadian Council of Ministers of the Environment (CCME) water short term (acute) water quality guidelines for the protection of aquatic life is 0.033 mg/L. The proposed effluent discharge target for uranium exceeds the acute water quality guidelines, indicating effluent may pose the risk of being acutely lethal to aquatic biota at end-of-pipe.</p> <p>Rationale: ECCC requests the Proponent include the general water</p> | <p>1. Update Table 2.2-1 and Appendix 8-E to include all general parameters required for environmental effects monitoring: pH, temperature, hardness, alkalinity, and conductivity.</p> <p>2. Update Table 2.2-1 and Appendix 8-E to include missing Schedule 4 Substances under the MDMER with maximum authorized concentrations: lead, nickel, suspended solids, and un-ionized ammonia.</p> <p>3. Update Table 2.2-1 and Appendix 8-E to include missing Schedule 5 Section 4 parameters required for effluent characterization under the MDMER: aluminum, mercury, iron, nitrate, thallium, phosphorus and manganese.</p> <p>4. Include all acute and chronic water quality thresholds for each parameter in Table 2.2-1 and Appendix 8-E.</p> <p>5. Describe additional mitigation measures that can be considered to minimize impacts to aquatic biota from uranium concentrations in effluent.</p> | |

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| | | | | <p>quality parameters that influence water quality thresholds, parameters in Schedule 4 and Schedule 5 Section 4 of the MDMER, and their respective water quality guidelines for consideration and transparency.</p> <p>Discharges from the proposed Project will alter water quality in the immediate receiving area, and this may include some sublethal effects on aquatic biota, which must be minimized. It remains the Proponent’s responsibility to adhere to the MDMER to ensure that effluent at the end-of-pipe from all final discharge points be non-acutely lethal and meet requirements for prescribed deleterious substances under Schedule 4 of the regulations.</p> | | |
| IR-19 | ECCC | Change to an environmental component due to radiological contaminants | Section 2.2.4 Project Description | <p>Context: In this section, it is proposed that the IWWTP precipitate pond will have a single geosynthetic composite liner system, which is used for ponds/pads that only store non-radioactive materials.</p> <p>However, from Section 2.2.3.9 on industrial wastewater treatment, it is unclear if the precipitates from the stage three neutralization process that are pumped to the IWWTP precipitates pond will have any residual radioactivity.</p> <p>Rationale: For the protection of the surrounding environment, it is important that any ponds/pads that are expected to store radiological contaminants be designed to have proper controls (i.e., liners with monitoring systems) in place.</p> | <p>1. Confirm the characterization of the precipitates that are to be stored in the IWWTP precipitate pond.</p> <p>2. If radiological constituents are expected within those precipitates, update the draft EIS to ensure the proposed geosynthetic liner system for the IWWTP precipitate pond will be adequate to ensure the protection of the surrounding environment.</p> | |
| IR-20 | NRCan | Fish and fish habitat | Section 2.3.3.1.1 Appendix 7-C | <p>Context: The proponent's objective for mining area remediation is to restore the groundwater within the confines of the freeze wall to an acceptable remediation target (EIS, sec. 2.3.3.1.1). The proponent's acceptable decommissioning objectives for groundwater quality are provided in EIS Table 2.3-3 and in Table 3-5 of Appendix 7-C. These objectives were based on laboratory core flood tests performed by flushing samples of ore with groundwater and groundwater amended with sodium hydroxide or sodium bicarbonate. The composition of the remediated groundwater observed in the core flood tests serves as the source term for the post-decommissioning reactive transport modeling presented in section 4 of Appendix 7-C.</p> <p>Rationale: In NRCan's opinion, it is important for reviewers to be able to assess the level of remediation achieved in order to reach the proponent's decommissioning groundwater quality objectives. Therefore, the proponent should provide complete water quality data for the pregnant lixiviant that remains in the ore zone after the end of mining and prior to any remediation.</p> | NRCan requests that the proponent revise Table 3-5 of Appendix 7-C to show the water quality in lixiviant remaining in the ore zone at the end of mining, prior to remediation activities. | |

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| IR-21 | ECCC | Change to an environmental component due to hazardous contaminants | Section 2.3.3.1.3, Project Description | <p>Context: The decommissioning process for the wellfield and associated infrastructure is discussed, however there is no information provided on the potential risk for subsidence of the ground above the depleted uranium deposit. After the uranium has been dissolved and pumped to the surface, a cavity will be formed in the area where the uranium used to exist. This could destabilize the overlying substrates, causing the ground at the surface to sink in the future. There is currently no information regarding this risk, and how it may alter the overlying environment, surface water features, runoff, or existing nearby waterbodies.</p> <p>Rationale: From a surface water and sediment quality perspective, it is important to understand how potential subsidence in the future post-decommissioning may affect the existing environment. It is currently unclear if there is any risk to the aquatic environment if subsidence were to occur and alter existing waterbodies, create new surface water features, or if there will be any risk to the decommissioned onsite industrial landfill and industrial wastewater treatment plant precipitate pond.</p> | Provide further information on the potential risks from subsidence including the probability of occurrence, how it may affect surface water features, and if there exists any risk to the planned decommissioning of waste management infrastructure. | |
| IR-22 | NRCan | Fish and fish habitat | Section 2.10 Appendix 2-C, section 1.1.1.4 | <p>Context: With respect to the choice of In-Situ Recovery (ISR) mining solution, two alternatives were assessed: alkaline and acidic lixivants (Appendix 2-C, sec. 1.1.1.4). In the consideration of technical and economic feasibility of the alternatives (Table 2, Appendix 2-C), the proponent concludes that: Option 1 (alkaline) is not technically feasible based on the uranium deposit geochemistry. Option 2 (acidic) is technically and economically feasible based on the uranium deposit geochemistry and ability to dissolve uranium. Accordingly, the alkaline alternative was not carried forward into the Environmental Assessment (EIS, Table 2.10-1; Appendix 2-C, Table 3).</p> <p>While acidic ISR solutions are widely used internationally (e.g., Kazakhstan), in the United States, where the environmental regulatory regime is more strict, alkaline solutions have been used exclusively since 1970.</p> <p>Rationale: In NRCan's opinion, the proponent should provide a more thorough technical justification for adopting an acidic ISR lixiviant.</p> | In the Alternative Means Assessment (Appendix 2-C), NRCan requests that the proponent provides a more thorough technical justification for selecting an acidic ISR lixiviant rather than a less environmentally problematic alkaline leach used exclusively in the USA. | |
| IR-23 | CNSC | Alternative Means | Section 2.10.2 Alternative Means Appendix 2-A PD Engagement Tables | <p>Context: There are multiple rows in the Indigenous Tables for Appendix 2-A where comments and concerns raised by Indigenous Nations and communities and other members of the public were taken into consideration in the Alternative Means Assessment. However, it is unclear how these were considered.</p> <p>A few examples:</p> | Please explain how comments and concerns collected during Denison's engagement sessions were considered or influenced the alternative means assessment. Please include this information in the EIS and/or it's appendices. | |

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| | | | Appendix 2-C Alternative Means Assessment (p. 3) | <ul style="list-style-type: none">16-EN-DesNd-101.1: Interested in any future business opportunities that may be available as Denison advances their Wheeler River Project.16-EN-ERFN-100.15: In that territory near the Wheeler River there are a lot of spawning and calving areas for moose, caribou; those creeks are for whitefish spawning. There’s lots of heavy muskeg there. A lot of us have been there, and we’d like to know there’ll still be access to the area.6-EN-ERFN-100.17: Today because of climate change, things are starting to happen that normally didn’t happen. Even the permafrost is now further down. In the Wheeler River area, where there’s some permafrost, have your environment guys seen a change? Will there be a change? These are some of the questions that need to be answered in order to come out with a positive spin. <p>Rationale: Appendix 2-C, Alternative Means assessment, states (p.3): “Engagement with Interested Parties naturally included alternatives means and the engagement input was included in the evaluation of alternative means. Refer to the references list below and <i>Appendix 2-A Engagement Database Summary – Project Description</i> for details of engagement information referenced in this alternative means assessment.”</p> <p>It is unclear in section 2.10.2 of the EIS, Appendix 2-A or Appendix 2C how the comments documented by Denison have been considered or influenced the alternative means assessment.</p> | | |
| IR-24 | CNSC | Alternative Means | Section 2.10.2 Alternative Means | <p>Context: While Appendix 2-C (Alternative Means Assessment) is detailed and includes all aspects of the Alternative means assessment that are required, the summary of the analysis and conclusions in Section 2.10.2 of the EIS lacks the level of detail required to understand the methodology used, and how Denison arrived at these conclusions.</p> <p>Rationale: As noted in the Agency’s Operational Policy Statement on Addressing “Purpose of” and “Alternative Means” under the CEAA 2012: “If a preferred means is selected, the analysis and the rationale for the choice should be explained from the perspective of the proponent, and be documented in the EIS in sufficient detail to provide context for public and technical comment periods during the project EA, and ultimately to allow the decision maker to understand the choice.”</p> | <p>Please summarize the analysis of the alternative means assessment within the body of the EIS, in sufficient detail that a reader of the EIS has adequate information to understand the methodology used, and how Denison arrived at these conclusions.</p> <p>*Note: In addition to the adding text to summarize, Table 6 in Appendix 2-C could be useful to understanding table 2.10.1 in the EIS.</p> | |
| IR-25 | CNSC | Current use of lands and resources for | Section 3, Sections 4, Section 5, | <p>Context: The EIS states that Denison is currently negotiating an agreement with MN-S and no traditional land use information is included throughout the EIS given no agreement was signed or</p> | <p>Please update the revised Draft EIS to reflect the integration of the Métis Use and Knowledge Study in the</p> | |

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| | | traditional purposes | Section 11 (and all other applicable once Métis Knowledge Use Study is completed) | <p>Traditional land use information was shared at the time the EIS was being drafted.</p> <p>As noted in the EIS Denison has committed that: “As information becomes available from the agreed-upon process between the Métis Nation – Saskatchewan and Denison, it will be incorporated into the final EIS.” (p. 11-36)</p> <p>Rationale: More information is required to better understand the issues and concerns, valued components, and current use of lands and resources for traditional purposes by MN-S near the project area.</p> <p>Requirements are detailed in CNSC’s Generic EIS Guidelines, section 8.9: Indigenous land and resource use.</p> | <p>Draft EIS where applicable, when this study is completed and provided to Denison.</p> <p>In addition, please include an updated Issues and Concerns table that includes relevant information from the MN-S as a result of engagement activities and relevant MN-S studies in the next version of the EIS, as appropriate.</p> <p>Should this information not be made available to Denison at the time of revising the draft EIS, the next version of the EIS and the response to this IR should provide a status update on discussions and engagement with MN-S and next steps.</p> | |
| IR-26 | CNSC | Precautionary principle and approach | Section 3.4.8 Lands Taken Up from an Indigenous Perspective (p. 3-14) | <p>Context: Denison states: “Discrepancies among IK and western scientific information provide an opportunity for Denison to take a precautionary approach. Examples of concrete actions to address uncertainty in cases where IK and LK have differing conclusions on predicted Project effects include addressing uncertainty through monitoring and follow-up programs and communicating results of those monitoring and follow-up programs to demonstrate they have been responsive to the IK shared.” (p. 3-14)</p> <p>Rationale: CNSC’s Generic Guidelines for the Preparation of an EIS state: “In documenting the analyses included in the EIS, the proponent will demonstrate that all aspects of the project have been examined and planned in a careful and precautionary manner in order to avoid significant adverse environmental effects.</p> <p>A document by Canada’s Privy Council Office, A Framework for the Application of Precaution in Science-based Decision Making About Risk, sets out guiding principles for the application of precaution to science-based decision making.” (Section 2.5)</p> | <p>Please clarify how the precautionary principle, and the Privy Council Office’s, A Framework for the Application of Precaution in Science-based Decision Making About Risk, sets out guiding principles for the application of precaution to science-based decision making has been considered and incorporated into the EA described in the EIS.</p> | |
| IR-27 | CNSC | Cumulative Effects Analysis | Section 3.4.8 | <p>Context: During an outreach and engagement trip by CNSC in October 2022, an abandoned exploration camp adjacent to the proposed Wheeler River site was observed. This site has not been identified within the EIS as part of the cumulative effects assessment. As noted in section 3.4.8, KML has also raised concerns with Denison related to abandoned camps and industrial waste left with no programs for clean-up.</p> <p>Rationale: Section 9.4.3 of CNSC’s Generic Guidelines for the Preparation of an EIS states that “The applicant shall assess any residual adverse environmental effects of the project in combination</p> | <p>Please specify why abandoned exploration camps and industrial waste aren’t taken into consideration when completing cumulative effects assessment.</p> | |

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| | | | | with other past, present or reasonably foreseeable projects and/or activities within the study area.” | | |
| IR-28 | CNSC | Current use of lands and resources for traditional purposes | Section 4, IER and engagement appendices, including: Appendix 2-A Appendix 6-B Appendix 7-B Appendix 8-A Appendix 9-A Appendix 10-B Appendix 11-A Appendix 12-A Appendix 13-A Appendix 14-B | <p>Context: The summary of issues tables do not appear to include all of the key issues identified by the Indigenous Nations and communities.</p> <p>For example, some Indigenous Nations and communities have shared concerns with respect to accident prevention and overall safety on the Key Lake road (Highway 914) due to increased traffic, impacts on treaty rights and section 35 rights due to cumulative impacts, and decommissioning, that were not captured in the issues and concerns and summary tables in Section 4.3.2 and in the IER.</p> <p>The tables in the engagement appendices include a column titled “Response (From Denison)”. The “Response” column does not include responses, but instead points the reader to where this comment or concern was considered. When navigating to the sections referenced, it is often unclear how this information was considered or influenced the assessment.</p> <p>Rationale: Additional detail is required in order to ensure the key issues are all identified and to understand the status of validation for each issue raised and the response provided.</p> | <p>1. Update the summary of issues and concerns tables to include all relevant issues and concerns raised by each of the Indigenous Nations and communities to date, including concerns raised in the Indigenous Knowledge studies provided, additional engagement, and Draft EIS comments.</p> <p>2. Please include a column in the issues and concerns tables to clearly articulate the specific mitigation/monitoring measures that Denison have committed to, or any other measures, in order to address the concerns raised by each Indigenous Nation and community during the engagement process to date.</p> <p>3. Denison must demonstrate that each Indigenous Nation and community has validated that the summary of issues and concerns table reflects their understanding or agreement, and/or a path forward to complete the validation throughout the EIS and the updated IER.</p> <p>Validation must be complete by the time the technical review is complete, prior to submission of a final EIS. Should Denison not be able to fully address issues, concerns or feedback raised by any Indigenous Nation or community, through mitigation and monitoring measures, this should be documented, and a rationale provided.</p> <p>3. Update the response column of the Engagement tables to describe how these were considered in the sections referenced. Consider renaming this column to reflect the nature of the content (i.e., how the information was considered).</p> | |
| IR-29 | CNSC | Current use of lands and resources for traditional purposes | Section 4.3.2 and IER | <p>Context: In this section, Denison includes the engagement with BNDN and includes a summary of issues and concerns table for the Nation. Within the history of interactions (Section 4.3.3.2.1).</p> <p>Rationale: Denison states that they have been providing information on the project to BNDN in 2019, 2021 and again in 2022 and that Denison and BNDN have not responded to date in order to advance further engagement and dialogue.</p> | Please ensure updated information of any additional engagement activities that Denison has completed with BNDN related to understanding their current and traditional land use and potential interests near the proposed project is provided. | |
| IR-30 | CNSC | Indigenous physical and cultural heritage | Section 4.3.2.1.3, Table 4.3.2 | <p>Context: Concerns were raised during engagement sessions that “Elders are not being consulted as most of the engagement has been through online means and without a translator”.</p> | How has Denison adapted engagement with Elders from the ERFN since receiving this comment on March 31, 2021? | |

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| | | | | Rationale: There’s no indication that a translator has been employed to engage with Elders since 2021 in the engagement Table 4.3.2. | | |
| IR-31 | CNSC | Indigenous Engagement | Section 4.4.2.1.3, Key Engagement Activities (p. 4-88) | Context and Rationale: Regarding the following: “An open house for the general public was planned to be hosted in 2022 on preliminary effects and mitigation, but due to concerns identified by MN-S about hosting a public open house in a community with a significant Métis population, this meeting was postponed by Denison. Denison looks forward to rescheduling the meeting in collaboration with the MN-S.” (p. 4-88) | Please provide an update on the evolution or progress of this engagement with local communities, following collaboration with MN-S (or otherwise). | |
| IR-32 | CNSC | Current use of lands and resources for traditional purposes | Section 5.3 Section 9.0 Terrestrial Environment | Context: Some sections of the EIS (such as Fish and Fish Habitat, Indigenous Lands and resource use) indicate that Indigenous and/or local knowledge was considered when defining the spatial boundaries. However, this is not included in other sections, such as Terrestrial Environment. Rationale: Section 5.2.2 of CNSC’s Generic EIS Guidelines require that spatial boundaries be defined by considering, but not limited to, the following criteria: Community and Indigenous traditional knowledge, ecological and technical considerations. | Please provide any additional details about how any comments or concerns raised were considered in defining the spatial boundaries with Indigenous Nations and communities with respect to spatial boundaries, for the Terrestrial Section and which specific Indigenous Nations and communities were engaged on these topics and how their input and knowledge was incorporated into the EIS. If already presented in the EIS text body, please indicate where this information can be found or link to Section 4 of the EIS or in the IER. | |
| IR-33 | CNSC | Residual Effect Characterization | Section 5.8.1, Definitions for Residual Effects Characterization and Significance Section 5.8.1.1, Residual Effects Characteristics Section 8, Table 8.3-9: Fish and Fish Habitat - Surface Water Quality | Context: Denison uses specific criteria (Residual Effect Characteristics: Direction, magnitude, geographic extent, duration, frequency, reversibility, context and likelihood) and associated ratings (e.g., adverse/positive, low/moderate/high) for the predicted effects assessment. However, it is unclear whether an aggregation method was used in order to determine whether impacts will be significant or not significant, depending on the combination of rating categories (i.e., weightings that were calculated, use of decision rules). For example, medium term and long term are both used to represent the same time category: “Effects are expected to last between 3 to 38 years (i.e., effects expected during Construction through to the end of post-Decommissioning).” (See table 8.4-13 on p. 8-200 compared to table 8.4-12 on p. 8-199 and table 8.5-9 on p. 8-246). Rationale: The Generic Guidelines state: “The method used to describe the level of the adverse effect should be transparent and reproducible.” In Table 8.3-11, duration was moderate, but again uses same rationale. There is no 'moderate' in Table 8.3-8, and by the same rationale, this should be medium-term to be consistent with definitions provided and summary Table 8.3-12. | If an aggregation method was used and ratings (e.g., High, medium, low) were weighted, what weightings were used, how were these calculated? Please also describe any decision rules that informed the determination of significance. If no aggregation was used, how did Denison ensure that results were consistent, given the varying rankings for each of the key criteria, and varying combination? Regarding inconsistencies in ratings, please use consistent terminology for same rating. | |

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| | | | | It was noted that all three tables should be deemed medium-term based on definitions of ratings outlined in Table 8.3-8. Frequency was also showing up as "continuous" and "continuously" in these tables. | | |
| IR-34 | CNSC | Cumulative Effects Analysis | Section 5.9.2.2 (p. 5-41) | <p>Context: Denison identifies the Gryphon deposit as a project that is not reasonably foreseeable. The direct quote from the EIS indicates that the “Development of the Gryphon deposit as an underground mine was evaluated at the prefeasibility level in 2018 but has not advanced to feasibility study or EA. Denison has not announced an intent to proceed with the development of the Gryphon deposit.” (p. 5-41)</p> <p>Rationale: The guidance Assessing Cumulative Environmental Effects under the CEAA, 2012 defines <i>Reasonably Foreseeable</i> as a “physical activity [that] is expected to proceed, e.g. the proponent has publicly disclosed its intention to seek the necessary EA or other authorizations to proceed.”</p> <p>In a press release by Denison Mines (2018: Denison announces decision to advance Wheeler River Project following positive PFS results), Denison publicly disclosed intention to seek the necessary EA for Gryphon to proceed: “After careful consideration of the risks and opportunities associated with permitting and concurrent advancement of project engineering activities, the Company has decided to submit a PD and initiate the EA process in early 2019 for the Phoenix ISR operation, and to bring the Gryphon operation forward, at a later date, as required to achieve the PFS plan of Gryphon first production by 2030.”</p> <p>Further, Denison’s Wheeler River Webpage references a “start of pre-production activities for the Gryphon operation in 2026”</p> | Please update the cumulative effects assessment in the EIS to include the Gryphon deposit as a Present or Reasonably Foreseeable Project. | |
| IR-35 | CNSC | Change to an environmental component due to hazardous contaminants | Section 6, Chemicals of Potential Concern | <p>Context: The use of petroleum products (e.g., propane, gasoline, and diesel) at the Denison Mines Wheeler River site is associated with vehicles and periodic operational testing of emergency generators as well as stationary pumps for emergency power or fire water systems. Thus, the air emissions will contain acrolein.</p> <p>Rationale: This chemical of potential concern (COPC) poses potential risks to human health via inhalation, but acrolein appears to have been missed or deemed insignificant. However, its consideration in the assessment will provide information on the significance of the associated risk.</p> | Please consider acrolein in the assessment or provide a rationale for its exclusion. | |

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| IR-36 | CNSC | Other | Section 6, Table 6.1-11 Baseline External Gamma Monitoring | <p>Context: For one of the exposures in the summary table for baseline external gamma monitoring (Table 6.1-11), the cell states "Destroyed in Field".</p> <p>Rationale: No rationale or indication as to why or how it was destroyed is provided.</p> | Please provide any additional info available as to how equipment was destroyed. | |
| IR-37 | CNSC | Air Quality | Section 6.1.1.1, CALPUFF model | <p>Context: "The Saskatchewan Ministry of Environment (SK MOE) has developed the Saskatchewan Air Quality Modelling Guideline (SK MOE 2012a) to assist proponents in conducting air dispersion modelling assessments in a consistent manner. The guideline defines the recommended approach for dispersion modelling assessments in Saskatchewan, including model selection, emission source characterization, and the determination of compliance criteria to apply."</p> <p>Rationale: Saskatchewan air quality guideline requires consultation on use of CALPUFF model, where it states" The ministry acknowledges that there will be situations where specialized air dispersion models such as CALPUFF, CALQ3HCR and others may be applicable. The use of specialized models requires consultation with the ministry" OR "Pre-consultation with the ministry must be undertaken prior to the facility conducting specialized modelling (p. 3)." It is not clear if Denison Mines consulted with Saskatchewan MOE on use of CALPUFF model.</p> <p>Noted that Section 6.1.4.2 is again referring to Saskatchewan MOE guidance for justification, but no indication that they consulted with them (a requirement).</p> | Please confirm and provide a summary of the consultation with the Saskatchewan MOE on the use of CALPUFF model for the Wheeler River EIS as per provincial air quality guidelines. | |
| IR-38 | ECCC | Change to an environmental component due to hazardous contaminants | Section 6.1.4.1, Potential Interactions Between the Project and Valued Component / Key Indicators | <p>Context: In this section, the Proponent identifies primary interactions between Project activities and air quality valued components and their associated key indicators. These primary interactions may result in an adverse effect on the valued component. Among the primary interactions are the use of emergency generators in a backup role should there be an interruption of the provincial electrical grid. However, it is not evident what is the anticipated frequency and duration of interruption to grid power.</p> <p>Rationale: The Proponent states in the conservative operation scenario that while the site will be powered from the provincial grid at the operations stage, the back-up power generators were assumed to be operating under emergency conditions as a worst-case scenario. ECCC acknowledges the positive impact of extending the electrical grid to the Project site with resultant reduction in generator emissions. The impact of an interruption in grid power would be greatest during the winter months when energy use would be greatest and surface-</p> | Provide an evaluation of a worst-case scenario of grid power interruptions (i.e., average aggregate length of power outages) during the winter months for this section of the electrical power grid. | |

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| | | | | based temperature inversions, which vertically trap emissions, would be strongest. | | |
| IR-39 | ECCC | Change to an environmental component due to hazardous contaminants | Section 6.1.4.2, Potential Project-Related Effects | <p>Context: In this section, the Proponent discusses the approach taken for air dispersion numerical modelling. Using their CALMET data set, the Proponent’s CALPUFF model runs indicated exceedances for 24-hour total suspended particulates, 24-hour particulate matter (PM10), 1-hour nitrogen dioxide, and 24-hour uranium concentrations. However, there is no mention of possible diurnal and seasonal occurrences of the exceedances.</p> <p>Rationale: Adequate assessment of the modelling results requires knowledge of the temporal characteristics for the exceedances. For example, wintertime exceedances may be due to strong temperature inversions, especially during the overnight to morning hours. These strong inversions are challenging for numerical models to capture. Exceedances during warmer months may be due to specific wind directions, which transport emissions directly to downwind receptors.</p> | Provide additional information on any diurnal and seasonal influences of the modelled exceedances. | |
| IR-40 | CNSC | Air Quality | Section 6.1.6.2.1, Air quality significance determination | <p>Context: Significance determination was not conducted for air quality due to interconnectedness with other assessment endpoints.</p> <p>Rationale: It is not clear where and how these air quality assessment endpoints were factored into the assessment.</p> | Please provide additional information to demonstrate where and how these air quality assessment endpoints were factored in. | |
| IR-41 | CNSC | Air Quality | Section 6.1.6.2.2, Background concentrations | <p>Context: The EIS states that "Conservative regional background concentrations from the Saskatchewan Air Quality Modelling Guideline (SK MOE 2012a) and based on the La Loche monitoring station were used for particulate matter, NO2, SO2, and CO. The La Loche monitoring station is located near anthropogenic sources, while the Project is in a remote area removed from anthropogenic sources."</p> <p>Rationale: If La Loche monitoring station is located near anthropogenic sources and the project is not, use of this data is not a conservative or realistic representation of background.</p> <p>For a realistic approach, background data considered should be upper 95th percentile (or max if n<10) from an area representative of project location</p> <p>For a conservative approach, background data from an area located even further from anthropogenic sources (if this exists) should be used, or an upper limit of background less than upper 95th should be applied as the background.</p> <p>Upper limit of background is used to screen out COPCs or often subtracted from total to ascertain relative contribution / impact from</p> | Please provide additional rationale to justify the appropriateness of La Loche monitoring station concentrations as background for project location. | |

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| | | | | source, so using a higher upper limit may result in COPCs screening out or appear to have a lower relative contribution. If background was added to source, then approach used would be conservative. If this is the case, confirmation and reference to where this is discussed in methodology should be provided. | | |
| IR-42 | Health Canada (HC) | Physical stressors (noise and vibration) | Section 6.2.4.2.2, (p. 6-66) Section 6, Section 6.2.9, (p. 6-72) | <p>Nighttime noise impacts are not adequately considered for human receptors.</p> <p>Context: The EIS states in Section 6.2.9 that, “While the predicted sound levels were less than the guideline values, the increase from baseline was predicted to be noticeable” (p. 6-72). No information is provided on individual noise events occurring during the nighttime period.</p> <p>Rationale: While the increase from baseline is predicted to be noticeable, it is important to also consider that changes to the characteristics of the sound from baseline (e.g., a change in frequency, changes in sound modulation, increased impulsiveness or tonality, or a shift in noise from the daytime to being more at night) may cause noise to be even more noticeable. Consult ANSI S12.9-2005/Part 4, clause A.1.3 for further information.</p> <p>In particular, consideration should be given to potential impacts on sleep, where adverse impacts are reported to begin when sound levels inside bedrooms exceed 30 dBA for continuous noise sources and 45 dBA LAmax for discrete noise events (WHO, 1999).</p> | <p>1. Provide a description of the project- related nighttime noise sources that may impact human receptors as well as a qualitative discussion of the resulting potential impacts on perception considering not only changes in sound levels but also sound characteristics (e.g., tonality, impulsivity).</p> <p>2. Confirm whether individual nighttime noise events exceeding 45 dBA LAmax outdoors (or 30 dBA indoors) are expected to occur more than 15 times over the nighttime period at any nearby potentially noise-sensitive human receptor location(s). This may be of particular concern if some construction and/or operations activities occur during sleeping hours.</p> | |
| IR-43 | HC | Physical stressors (noise and vibration) | Section 6.2.5, (p. 6-66) Section 6.2.5, (p. 6-71) | <p>Mitigation measures for project-related noise were not identified for the Construction phase.</p> <p>Context: The mitigation measures provided in Section 6.2.5, including a complaint management system is also to be implemented as part of the EMS, are only proposed for the operations phase.</p> <p>However, construction activities are predicted to last more than one year. Construction noise will involve the use of equipment operating at the site, construction of surface facilities, drilling, and partial operation of the freeze plant. It will also include regular truck trips and air traffic for personnel changes.</p> <p>Rationale: It is unclear if listed mitigation measures also apply to the construction phase (or only to the operations phase).</p> | <p>1. Clarify whether mitigation measures and the proposed EMS apply to the Construction phase. If not, identify mitigation measures for noise impacts related to Construction phase activities, and consider applying the EMS to the Construction phase and implementing the community complaints and response procedure from the beginning of construction activities.</p> <p>2. Health Canada suggests that construction noise lasting longer than 1 year be assessed as operational noise, and that noise mitigation measures be applied also to the construction phase. Special consideration should be given to mitigation measures for construction noise that occurs at night, in order to minimize impacts on sleep (i.e., avoiding tonal or impulsive noise sources at night).</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends use of Appendix H of Health Canada (2017), which identifies additional construction</p> | |

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| | | | | | noise mitigation measures that could also be considered to reduce project- related noise. | |
| IR-44 | HC | Physical stressors (noise and vibration) | Section 6.2.8, (p. 6-71) | <p>The noise complaints resolution and response procedure is not sufficiently described in the EIS.</p> <p>Context: Section 6.2.8 discusses Monitoring and Follow- up. The proponent indicates: “The EMS will also include a community complaints and response procedure” (p. 6-71).</p> <p>Rationale: Details have not been provided regarding how the complaints would be received, addressed or what the timelines will be for providing a response or resolution. It is important to provide information to potentially affected communities in advance of particularly noisy activities. Community consultation and advanced notification of noisy activities has been shown to reduce complaints (see Health Canada, 2017).</p> | <p>1. Provide the details of the noise complaints resolution and response procedure as per Health Canada (2017).</p> <p>2. Consider conducting community consultations and/or implementing an advanced community notification system to pro-actively reduce the probability noise-related impacts and complaints.</p> | |
| IR-45 | HC | Change to an environmental component due to hazardous contaminants | Section 6 Air Quality Technical Supporting Document Section 6.3.1 | <p>The carcinogenic risks of diesel exhaust from the project should be assessed.</p> <p>Context: Section 6.3.1 discusses modelled predictions of exceedances for Particulate Matter (PM). TSD p. 22 states: “concentrations of 24-hour PM2.5 are also elevated around the standby generators at the freeze plant, which emit fine particulate matter from combustion of diesel fuel”. However, diesel particulate matter is not evaluated for the whole project in the air quality model or the air quality assessment.</p> <p>Rationale: Health Canada has determined that diesel exhaust is carcinogenic in humans which is consistent with the conclusion of the International Agency for Research on Cancer (IARC), and that diesel exhaust is associated with significant population health impacts in Canada.</p> <p>To characterize the carcinogenic risk of diesel exhaust from a project, HC has published a report (2022)¹ which provides a quantitative assessment of the relationship between ambient PM2.5 exposure and lung cancer risk. Specifically, this report quantifies the increase in risk of lung cancer mortality (over the baseline rate in the Canadian population) due to PM2.5 exposure.</p> <p>This quantitative assessment is considered appropriate to characterize risks from diesel PM given the contribution of diesel exhaust to ambient PM2.5 in Canada, and that the carcinogenicity of diesel exhaust has generally been evaluated based on the respirable PM fraction^{1,2,3}.</p> | <p>1. Evaluate the carcinogenic risk of all potential diesel exhaust from the project based on the approach proposed by Health Canada (2022). Additional guidance ("Additional Lung Cancer Mortality from PM2.5: Recommended Approach and Sample Calculation") is provided as an appendix to this comment table.ⁱ</p> | |

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| | | | | References: [1] HC. 2022. Lung Cancer and Ambient PM2.5 in Canada: A Systematic Review and Meta-analysis. Available at: https://publications.gc.ca/site/eng/9.907038/publication.html [2] HC. 2016. Human Health Risk Assessment for Diesel Exhaust. Available at: http://publications.gc.ca/collections/collection_2016/sc-hc/H129-60-2016-eng.pdf [3] IARC. 2013. IARC monographs on the evaluation of carcinogenic risks to humans. Volume 109. Outdoor air pollution. https://publications.iarc.fr/Book-And-Report-Series/Iarc-Monographs-On-The-IdentificationOf-Carcinogenic-Hazards-To-Humans/Outdoor-Air-Pollution-2015 | | |
| IR-46 | HC | Physical stressors (noise and vibration) | Appendix 6-A Table A-1 | <p>Low-frequency noise and associated potential human health effects were not assessed.</p> <p>Context: Some equipment that may emit low-frequency noise (LFN) have been listed in Table A-1: Assessment Scenarios and Sound Level Data (Section 6 Appendix A); however, no information describing potential impacts of this type of sound on nearby human receptors are presented.</p> <p>Rationale: Low frequency noise can be associated with the introduction of noticeable vibrations and rattles in nearby structures. Research indicates that annoyance related to noise is greater when low-frequency noise is present (ISO 1996-1:2003). As sound environments are usually characterized using A-weighted decibel levels (dBA) that reflect the frequencies most audible to the human ear, the impacts of low- frequency noise may need to be assessed separately.</p> | 1. Clarify whether any project-related activities (construction, operation and/or decommissioning) may produce LFN that could impact off-site human receptors. Evaluate LFN in the noise assessment, if and where applicable. See Appendix C of Health Canada (2017) for a discussion of LFN. | |
| IR-47 | ECCC | Air Quality | Appendix 6-A, A.1 | <p>Context and Rationale: Verification of the following calculation is required for assessing predicted emissions of dust from general construction. It appears the result of 0.70 ton/acre/month is incorrect and should instead be 0.314 ton/acre/month.</p> <p>Appendix 6-A, Appendix A, A.1 (p. A4) TSP Emission Factor for General Construction:</p> $EF\ (TSP) = 0.11\ \frac{\text{ton}}{\text{acre}} \div \frac{\text{month}}{\text{month}} \times 1.2\ \frac{\text{ton}}{\text{acre}} \div \frac{\text{month}}{\text{month}} + 0.42\ \frac{\text{ton}}{\text{acre}} \div \frac{\text{month}}{\text{month}}$ $= 0.70\ \frac{\text{ton}}{\text{acre}} \div \frac{\text{month}}{\text{month}}$ | Explain how the emission factor total suspended particulates (EF (TSP)) result was obtained or rectify if it is incorrect and update the draft EIS to reflect the correction. | |

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| IR-48 | HC | Physical stressors (noise and vibration) | Appendix 6-E, Figure 6.2.3, p. 6-57 | <p>Noise-sensitive receptors are not included on noise contour maps.</p> <p>Context: Noise-sensitive receptors are identified in the acoustic model report in Section 6 Appendix 6-E but not presented on any maps in the atmospheric and acoustic sections of the main report (Figure 6.2-3).</p> <p>Rationale: The noise assessment typically includes a map illustrating modelled noise levels from the project at receptor locations in the study area.</p> <p>Certainty regarding the presence of human receptors in the regional study area is also recommended in order to assess cumulative impacts.</p> | 1. For more clarity, identify noise-sensitive receptors on Figure 6.2-3: Noise Assessment Study Area as well as on contour maps showing the baseline and predicted noise levels. | |
| IR-49 | HC | Physical stressors (noise and vibration) | Appendix 6-E, 4.0 Table A.1 | <p>The Noise Source Characterization is incomplete.</p> <p>Context: Section 3.0 of the Draft EIS Section 6 Appendix 6- E discusses Source Characterization. There is no detail regarding potential tonal or impulsive noise sources in Section 3.0.</p> <p>Rationale: The draft EIS should include a description of sound source characteristics (e.g., tonal, impulsive, highly impulsive) in order to properly inform the quantitative noise assessment and which assumptions/adjustments need to be applied and to properly evaluate impacts of project noise on health of affected receptors.</p> | 1. Identify any tonal, regularly impulsive, highly impulsive, or high-energy impulsive noises likely to be produced during project activities that could be audible at noise sensitive receptors. Furthermore, describe the timing (e.g., hours of night-time activities), frequency and duration of noise events, and their sound characteristics, including frequency spectrum. See Health Canada (2017) for details. | |
| IR-50 | HC | Physical stressors (noise and vibration) | Appendix 6-E, 4.0 Table A.1 | <p>The description of noise modelling does not document or justify the use of sound level adjustments.</p> <p>Context: ISO Standard 9613-2 has been used for the sound level modelling; however, it is unclear if all applicable adjustments have been considered as per ISO 1996-1:2016 (Table A.1).</p> <p>Rationale: When modelling techniques are used to estimate present (baseline) or future (construction and operational) sound levels, these techniques and any accompanying assumptions, including the use of sound level adjustments, it is important to provide appropriate documentation and justification.</p> <p>Note that in situations where more than one source characteristic adjustment is applicable (e.g., impulsive or tonal), only the higher of the adjustments is used. However, all time-of-day adjustments and the quiet rural area adjustment are to be added to the highest of the applicable source adjustments.</p> | 1. Clarify whether ISO-1996-1:2016 has been considered in the modelling to account for any applicable sound level adjustments. Adjustments should be considered when calculating Ln (night- time sound level) and Ldn (day-night sound level). In addition, if applicable, adjustments can be applied depending on the noise characteristic (impulsive, highly impulsive, etc.), and because the project location is considered to be in a quiet rural area. See: ISO 1996-1:2016 and Health Canada (2017) for details. | |

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| IR-51 | CNSC | Geology and Groundwater | Section 7, Figure 7.8-1 Appendix 7-C | <p>Context: Figure 7.8-1 (p. 7-107, main EIS report) shows monitoring well cluster outside of the freeze wall.</p> <p>Rationale: It is not clear what the targeted hydro-stratigraphic units of each monitoring well cluster are. In addition, it is not clear how the establishment of the freeze wall and any leakage from the brine solution will be monitored. If there is any “window” within the freeze wall (i.e., the freeze wall is not continuous), is there any way to identify that?</p> | <p>Please clarify the targeted hydro-stratigraphic units of each monitoring well cluster in Figure 7.8-1 (p. 7-107, main EIS report).</p> <p>Please clarify how the establishment of a continuous freeze wall will be monitored.</p> | |
| IR-52 | ECCC | Fish and fish habitat | Section 7, Geology and Groundwater Appendix 7 | <p>Context: According to the Proponent, “an acidic or low pH mining solution will be used to leach uranium ores from the ground. Mining solution may be a mixture of sulphuric acid, hydrogen peroxide, ferric sulphate, and freshwater (from shallow groundwater well or surface waterbody) or recycled water.</p> <p>Wellfield will consist of a combination of injection and recovery wells, in the general the arrangement of one recovery well in the centre surrounded by four injection wells (5-spot pattern) with about 5 to 10 m between wells. The final wellfield is expected to include approximately 300 wells over an area measuring 90 m wide x 750 m long”.</p> <p>As the components/contaminants mentioned in the description of the hydrogeologic contaminant transport processes above may be transported to Whitesfish Lake through groundwater, the injection and recovery wells should be included in the model.</p> <p>Rationale: The hydrogeologic contaminant transport processes described above are an important part of the proposed Project and it is not clear why numerical modelling results and a sensitivity analysis for the above processes was not presented.</p> | <p>1. Explain why 3D hydrogeology and contaminant transport numerical modelling of the injection and extraction wells was not presented.</p> <p>2. Alternatively, provide simulation results and a sensitivity analysis for the injection and extraction of the acidic solution in the mining area.</p> | |
| IR-53 | CNSC | Geology and Groundwater | Section 7.3, Table 7.3.-2 Appendix 7-C | <p>Context: The field-based hydraulic conductivity values (referred to as K values hereafter) in Table 7.3-2 (p. 7-32, main EIS report) indicate that the K value ranges of upper and lower sandstone aquifers have a significant overlap with those of the intermediate sandstone aquitard.</p> <p>However, the calibrated K value in Table 2-2 (p. 2.7, Appendix 7-C)) for the intermediate sandstone aquitard is close to the lower end of the field-based K value range, while the calibrated K values for the upper and lower sandstone aquifers are close to the upper end of the field-based K value range.</p> <p>Rationale: It is not clear how representative the calibrated K values are of the field-based K values for each hydro-stratigraphic unit, and if the significant difference between the K values for the upper and</p> | <p>Please provide additional information to support the representativeness of the calibrated K values (for example, use graph to present the measured K values and the calibrated K values).</p> | |

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| | | | | <p>lower sandstone aquifers and those for the intermediate sandstone aquitard is supported by the geological properties of the corresponding stratigraphy units.</p> <p>It is stated in the report (p. 7-36, main EIS report) that “Vertical fracture or fault zones that hydraulically connect the Local (upper) and Semi-Regional (lower) groundwater flow regimes are present throughout the Athabasca Basin”. But fractures and fault zones are not explicitly considered in the model. There is possibility that these features could increase the hydraulic connection between the upper and lower sandstone aquifer.</p> | | |
| IR-54 | CNSC | Geology and Groundwater | Section 7.3.1 | <p>Context: EIS states: “The most important associated topographic features in the region are the northwest to southeast trending drumlins and eskers....” This is not the trend shown on the provided maps, nor described elsewhere in the report, e.g., Section 7.3.2.1</p> <p>Rationale: Inaccurate information in the EIS</p> | Please update the EIS where required to accurately describe the topographical features. | |
| IR-55 | NRCan | Fish and fish habitat | Section 7.3.3.1; Appendix 7-A, sections 3.4, 3.5, 3.8, 4.2; Appendix 7-C, section 2.8 | <p>Context: According to the proponent's conceptual hydrogeological model (EIS, sec 7.3.3, Figure 7.3-7, Table 7.3-2; Appendix 7-A, sec. 3.4, Table 3-4), the horizontal hydraulic conductivity of the Intermediate Sandstone (Iss) aquitard is 8.4 E-09 m/s based on field measurements. The proponent further assumes a 10:1 anisotropy ratio for the unit (Appendix 7-A, sec. 3.5.1) such that its estimated vertical conductivity is 8.4 E- 10 m/s. Based on this information, structural geology and groundwater quality data, the proponent concludes that the connectivity between the Upper sandstone aquifer and the Intermediate Sandstone aquifer (sic) is limited (EIS sec. 7.3.3.3; Appendix 7-A, sec. 4.4). While acknowledging the paucity of conductivity data and the proponent's attempt to mitigate this by leveraging collateral information on fracture frequency and clay content (Appendix 7-A, sec. 3.3.1), NRCan considers that the hydraulic conductivity assigned to the Iss aquitard is unrealistically low and inconsistent with the following lines of evidence: a) The conductivity value for the Iss is based on the geometric mean of 18 field measurements, 12 of which are from the same borehole (WR-695) located in the Gryphon zone, beyond the domain of the numerical model (Appendix 7-A, Appendix C, Table C-1). If the conductivity data were weighted equally, with one value per borehole, the geometric mean would be approximately 1.5 E-07 m/s, or two orders of magnitude higher; b) The proponent notes that vertical fracture or fault zones that hydraulically connect Upper and Lower aquifer systems are present throughout the Athabasca Basin including in the Phoenix area (EIS, sec. 7.3.3.2.2; Appendix 7-A, sec.3.8.1); c) The proponent notes that groundwater chemistry data (major ions) corroborate the presence of structurally controlled vertical hydraulic</p> | In the "Parameter Uncertainty Assessment" for the numerical groundwater flow model (Appendix 7-C, sec. 2.8), NRCan requests that the proponent develop a calibrated numerical model with an alternate conceptualization of the Intermediate sandstone as a "leaky" aquitard with a horizontal hydraulic conductivity on the order of 1 E-07 m/s and a much lower anisotropy ratio. This should involve modifying the model lateral boundary conditions to allow for groundwater inflow/outflow across the entire thickness of the Athabasca Sandstone Group rather than just the Lower Sandstone aquifer. | |

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| | | | | <p>connections between the Upper and Lower aquifer systems (EIS, sec. 7.3.3.2.2, sec. 7.3.3.3; Appendix 7-A, 4.3.3); d) Groundwater chemistry data (Appendix 7-A, sec. 4.2, Table 4-1) also indicate the presence of detectable levels of "bomb" tritium (indicating recharge waters < 50 years old) in the Lower Sandstone Aquifer (GWR-025, GWR-008, GWR-033) and in the Iss (GWR-009, GWR-034), outside the area of U mineralization. This is also evidence of vertical hydraulic connection through the Iss. In summary, whereas the proponent conceptualizes the Iss as a very low-permeability unit with localized vertical hydraulic connection (WS Shear), NRCan interprets the Iss as a "leaky" aquitard with pervasive fracture-controlled and much higher vertical hydraulic conductivity.</p> <p>Rationale: The significance of NRCan's alternative interpretation of the Iss hydrostratigraphic unit is that deep groundwaters, including mining-impacted waters, may represent a greater proportion of baseflow discharge to Whitefish Lake than the 1% currently estimated in the proponent's groundwater flow model (EIS, sec. 7.4.2.1, p.7-51; Appendix 7-C, sec. 2.6.3).</p> | | |
| IR-56 | CNSC | Geology and Groundwater | Section 7.3.3.2 | <p>Context: It is stated in Section 7.3.3.2 (p. 7-37, main EIS report) that “Exploration boreholes drilled in the Phoenix area, where left unplugged, have the potential to provide preferential flow paths between the Overburden and Upper and Lower Sandstone Aquifers. Exploration holes were reportedly grouted approximately 10 to 20 m above and below the ore zone, resulting in open holes remaining throughout the overlying materials. These portions of the open holes may act as open conduits for groundwater flow through the 400 m of Athabasca Group Sandstone.”</p> <p>Rationale: It is not clear why the exploration boreholes have not been decommissioned.</p> | Please clarify why the exploration boreholes have not been decommissioned and the timeline to decommission the boreholes according to appropriate guidelines/procedures. If it is not decommissioned before the ISR operation, what is the potential impact of the unplugged boreholes on the mining solution migration? | |
| IR-57 | NRCan | Fish and fish habitat | Section 7.3.3.2 Appendix 7-A, sections 3.1.2 and 3.7 Appendix 7-C, section 2.5.2 | <p>Context: The proponent's conceptual model of groundwater flow in the Local Study Area (EIS, sec 7.3.3, Figure 7.3-7) involves an unconfined Upper system hosted by overburden and the Upper sandstone aquifer, and a Lower confined system hosted by the Lower Sandstone Aquifer. The Intermediate Sandstone aquitard acts as a confining unit. Vertical heads gradients are directed downwards west of the Phoenix deposit and upwards beneath surface water receptors including Whitefish Lake (EIS, sec. 7.3.3.2).</p> <p>Using head data from nested monitoring wells (Appendix 7-A, sec. 3.1.2, Table 3-1) the proponent calculates upward gradients in cluster WR-607, between the Lower Sandstone aquifer and the Upper Sandstone aquifer. In cluster LA-5, an upward gradient is calculated between the Upper Sandstone and the overburden unit (Appendix 7-</p> | In section 2.5.2 of Appendix 7-C (Calibration Results), the proponent should demonstrate that the numerical groundwater flow model reproduces quantitatively or at least qualitatively the vertical head gradients calculated from observations in the nested monitoring well clusters (Appendix 7-A, Table 3-1). | |

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| | | | | <p>A, Table 3-5). In areas west and south-west of the Phoenix deposit, groundwater is estimated to flow downward under a vertical gradient of approximately 0.015 m/m (Appendix 7-A, p.3-15).</p> <p>Rationale: In NRCan's opinion, the proponent's interpretation of vertical head gradients in the LSA is not fully accurate. For the "Up-Gradient" monitoring well cluster, the tabulated head data (Appendix 7-A, Table 3-1) and data logger hydrographs (Appendix 7-A, Appendix B) indicate a downward gradient (0.014 m/m) from the overburden unit to the Intermediate Sandstone and an upward gradient (0.056 m/m) from the Lower Sandstone to the Intermediate Sandstone. Head data from the "NW" monitoring well cluster indicate a similar pattern of downward (0.016 m/m) and upward (0.014 m/m) gradients converging in the Intermediate Sandstone. In the "Downgradient" and "SE" monitoring well clusters, head observations and data logger hydrographs indicate downward gradients from the shallow aquifer system but essentially equal heads in the Intermediate and Lower Sandstones. This more complex picture of groundwater flow systems in the LSA does not appear to have been captured in the proponent's conceptual model. Given the importance of the baseline hydrogeological regime for predicting the transport and fate of COPCs in the post-decommissioning period, the proponent needs to demonstrate that the numerical groundwater flow model accounts for observed vertical head gradients.</p> | | |
| IR-58 | ECCC | Fish and fish habitat | Section 7.3.2.4, Ore Deposit | <p>Context: The Proponent states that the Phoenix ore bodies are long and narrow (approximately 25 to 50 m wide) and are located within or near a graphitic pelite unit. Hydrothermal alteration associated with the ore zone is a discontinuous envelope of clay alteration and a sulphide-cemented rock zone that extends into the overlying sandstone and the underlying basement (Figure 7.3-3). This black, clay-rich zone is approximately 3 m thick on average and locally hydraulically isolates the ore zone from the overlying sandstones and underlying weathered basement rock.</p> <p>Rationale: As indicated by the Proponent, a 3 m black clay rich zone isolates the ore zone from the overlying sandstones and underlying weathered basement rock. It is, however, unclear whether this discontinuous clay layer will prevent downward migration of uranium-bearing solution into the Paleo-weathered basement rock or horizontal flow along the unconformity surface to escape into the environment. Escape of uranium-bearing solution into the environment will have a negative effect on the receiving environment.</p> | <p>1. Verify that there will be no downward migration of mining solution into the paleo- weathered basement rock or that there is no flow along the unconformity surface.</p> <p>2. If downward migration of the mining solution occurs, explain how it will be mitigated.</p> | |
| IR-59 | CNSC | Fish and fish habitat | Section 7.4 Assessment of Project-related | <p>Context: Figure 7.4-2: Simulated Change in Groundwater Discharge and Flow through Whitefish Lake Over the Life of the Project appears to be missing information.</p> | <p>Please update this Figure to ensure it is complete, and that features are properly indicated in the legend.</p> | |

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| | | | Effects, Figure 7.4-2 (p. 7-56) | Rationale: Legend is included below the image, but the Legend box is blank. The green dotted line is not represented by anything in the legend. | | |
| IR-60 | NRCan | Fish and fish habitat | Section 7.4.2.1 Appendix 7-C, section 5.2.1, Appendix B | Context: In the discussion of the limitations of the numerical groundwater flow model (Appendix 7-C, sec. 5.2.1), the proponent invokes the well known modeling principles of "Occam's razor" and "Parsimony" which guided the parametrization of hydraulic conductivity in model layers. The proponent states that hydrogeologic property values were applied uniformly for, among other units, the Lower Sandstone aquifer beyond the immediate area of desilicified materials. However, in the layer parametrization for the Lower Sandstone aquifer (Appendix 7-C, Appendix B, Figure B-5), NRCan notes a large zone of enhanced conductivity (1 E-05 m/s) extending south from Kratchkowsky Lake, which contrasts with the value (2 E-07 m/s) assigned elsewhere outside the desilicified zone. NRCan also notes the extremely detailed parametrization of hydraulic conductivity in the clay cap overlying the ore zone where borehole control is dense (Appendix 7-C, Appendix B, Figure B-6). Rationale: In NRCan's opinion, these model features appear to violate the principle of "Parsimony" and require greater justification supported by field observations. | NRCan requests that the proponent provide justification based on field evidence for the multiple hydraulic conductivity zones assigned to the Lower Sandstone aquifer and the clay cap above the ore zone. | |
| IR-61 | CNSC | Geology and Groundwater | Section 7.4.2 | Context: There is no discussion of potential induced seismicity from mining processes. Rationale: Induced seismicity may lead to a loss of process as identified for natural seismicity. | Please provide information on the potential mining-induced seismicity. | |
| IR-62 | ECCC | Fish and fish habitat | Section 7.4.2, Potential Project-related Effects | Context: The Proponent indicates that the mining area includes: <ul style="list-style-type: none">the 'active mining area', which is the target ore zone;a zone extending between 11 and 13 m above the active mining area that represents the maximum vertical height over which the injected mining fluids will migrate upwards from the ore zone during active mining; anda zone extending 50 m vertically upwards from the active mining area (that incorporates the active mining area and the 11 to 13 m zone defined in the previous bullet) that was selected to account for potential upset conditions. Rationale: It is not clear to ECCC how the Proponent would be able to limit the mining solution migration within 11 & 13 m above active mining as the maximum vertical height over which the injected mining fluid will migrate. As the mining fluid will be injected under pressure into zones with possible presence of fractures, the pressure may also cause additional fractures and given that the solution is warm/hot will | 1. Explain plans to limit the upward migration of mining solution into the overlying layer to 11 and 13m above the ore zone. 2. Explain what impacts will occur if the mining solution migrates beyond the predicted height. | |

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| | | | | possibly dissolve the other cementing material in the sandstone above, making it difficult to accurately predict where the solution will migrate to. | | |
| IR-63 | CNSC | Geology and groundwater | Section 7.4.2.1, Potential Effect #1: Groundwater Quantity – Construction to Decommissioning Appendix 7-C, Section 2.7, Groundwater Conditions During Mine Operations | <p>Context: The numerical groundwater model described was calibrated to observed water level and stream baseflow data. Table 7.4-3 in the EIS indicates that Denison recognizes the potential for freeze wall operation to impact groundwater quantity. To simulate this impact, the model was adapted to reduce recharge (to 50%) within the freeze wall area, reduce hydraulic conductivity associated with the vertical freeze walls, and simulate pumping within the freeze wall area. Recovery from pumping and effects on discharge to groundwater discharge to Whitefish Lake are discussed in the potential effects section.</p> <p>Rationale: Although this assessment considered drawdown of the water table and discharge to Whitefish Lake, the discussion did not address the potential effects of operating the freeze wall on the local and semi-regional groundwater regimes. What would the pathway be for groundwater to pass around the freeze wall? What is the basis for the parameters selected, e.g., 50% recharge and lower hydraulic conductivity for freeze well? These factors need to be considered when evaluating the potential impacts of freeze well operations on groundwater flow conditions and corresponding receptors.</p> | Please provide a more fulsome discussion on the impact of freeze wall operations on local and semi-regional groundwater regimes and potential receptors. Please provide the rationale for assumptions made for key model parameters (e.g., selection of 50% recharge, hydraulic conductivity value used to represent freeze wall). In addition, please discuss the potential pathways for groundwater flow around the freeze wall, complete with figures demonstrating these pathways. | |
| IR-64 | ECCC CNSC | Fish and fish habitat | Section: 7.4.2.2, Potential Effect #2: Terrain Morphology and Stability – Operation Appendix 7-A, Appendix K (p. 12) | <p>Context: The Proponent stated that the geological assessment predicted maximum vertical displacement in altered sandstone immediately above the mining area (17.5 cm). A very minor change in elevation at ground surface (of less than 7.5 cm) was predicted within a discrete and localized area overlying the ore body. The modelling work is considered to provide a worst-case bounding scenario. If subsidence were to occur over the lifetime of the Project, or in the years following mining, the extent of vertical displacement is not expected to exceed that predicted in the modelling, which is based on an assumed volume extraction.</p> <p>Rationale: ECCC notes that the thickness of the ore zone has an average thickness of 5 m with a range of 2 to 17 m, and is 25-50 m wide and that the overburden rock above the ore zone measures about 400 m. Therefore, it is not clear how the Proponent determined that the surface expression of a subsidence on the surface if it occurs will be limited to 7.5 cm and localized. A subsidence greater than 7.5 cm, implies that the void in the ore zone will be narrower, and will affect the amount of water migrating through the zone.</p> | <p>Explain:</p> <ul style="list-style-type: none">Will this be revisited with updated data based on extraction feasibility results?How will the surface expression of a subsidence will be limited to 7.5 cm and localized? <p>Suggestions for mitigation and follow-up measures: ECCC recommends that the Proponent consider implementing remediation measures immediately after mining to prevent subsidence from occurring in the first place.</p> | |

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| | | | | It was the recommendation of the consultant who conducted the work in Appendix K that more accurate material properties should be used for future modelling. | | |
| IR-65 | CNSC | Geology and Groundwater | Section 7.4.2.2 | <p>Context: It is stated the maximum subsidence is 7.5cm based on modeling with an assumed volume extraction. Has subsidence from dewatering/pumping and from lack of inflow of groundwater due to freeze wall been considered?</p> <p>Rationale: Surface facilities and wells may be impacted if there is unaccounted for subsidence.</p> | Please provide additional details for any dewatering/pumping induced subsidence. | |
| IR-66 | CNSC | Geology and Groundwater | Section 7, Table 7.5-1, Row 1, Column 6 | <p>Context: Column 6 in Table 7.5-1 indicates the mitigation measures for a valued component. For Row 1, Geology, there is no description of mitigation measures but only that contingency plans will be developed if based on monitoring.</p> <p>Rationale: Subsidence may impact wells and surface infrastructure.</p> | Please provide additional details on monitoring and contingency plans related to the geological environment (e.g., subsidence), including triggers for implementing such plans. | |
| IR-67 | CNSC | Geology and groundwater | Section 7.6.2.1 (Remediation Objectives) | <p>Context: Metallurgical testing, including batch reaction, coreflood testing and column tests are mentioned frequently throughout Sections 2 and 7 of the EIS. Outside of the composition of restored solutions from coreflood tests #2B and 3C, results from these various tests are not reported in the EIS or any associated Appendices.</p> <p>Rationale: The results from metallurgical testing are important to a number of items discussed in the EIS, including (but not limited to): evolution of hydrochemistry during remediation, source of salts in Lower Sandstone Aquifer porewaters, process plans, industrial wastewater treatment, estimating composition and volume of process precipitates, and composition of mining fluids and leachate. In particular, the EIS posits that mining area decommissioning objectives are achievable based on metallurgical testing and provides these objectives in Table 2.3-3. CNSC staff need to understand the specifics of this metallurgical testing, given its importance for the development and justification for mining and remediation activities. Denison must also provide information demonstrating that the proposed restoration actions and remediation targets are As Low As Reasonably Achievable (ALARA).</p> | <p>1. Please provide a summary of the results and the analysis of results of the metallurgical tests within the EIS, or provide the technical supporting document with this information, and ensure the documentation is appropriately referenced in the EIS. This should include sample information for cores (e.g., mineralogy, location, U content, depth), test conditions (e.g., duration, # of iterations, column length, flow rate, temperature, pressure, sample frequency, influent/effluent composition), as well as results and how they are pertinent to the development of ISR activities.</p> <p>2. Please provide further clarification/justification on how results from two singular coreflood tests (i.e., Coreflood #2B and Coreflood #3C) can justify large-scale remediation activities and targets following solution mining.</p> <p>3. Please provide material demonstrating that the proposed restoration actions and remediation targets are ALARA.</p> | |
| IR-68 | NRCan | Fish and fish habitat | Section 7.6.2.2.3 Appendix 7-C, sections 3.3, 4.1, 4.4.4 and 4.7 | <p>Context: Sources terms for the COPCs considered in 3D reactive transport modeling are given by the composition of "Restoration Solution #1", which the proponent believes is representative of groundwater quality in the ore zone after remediation at decommissioning (Appendix 7-C, sec. 3.3, Table 3-5; sec 4.0). The proponent considers COPC source terms as "initial conditions" for groundwater quality in the ore zone at the start of the model simulation period. During the simulation, no</p> | NRCan requests that the proponent's reactive transport prediction uncertainty analysis (Appendix 7-C, sec. 4.7) consider extended source release periods for additional COPCs. | |

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| | | | | <p>additional mass of COPCs is transferred to groundwater in the ore zone.</p> <p>Rationale: In NRCan's opinion, this representation of COPC sources is not conservative as it fails to account for various long-term slow mass release processes. These processes could include redissolution of secondary phases formed during ISR mining (e.g., radium-bearing gypsum or barite, jarosite, alunite) and migration of unrecovered lixiviant or restored solution from low-permeability regions or stagnant zones that were not fully swept during mining or remediation. NRCan notes that scenario #2 in the proponent's transport prediction uncertainty analysis (Appendix 7-C, sec. 4.7) does consider an extended source release period for protons (desorption from chlorite). However, in NRCan's opinion, additional modeling scenarios should consider extended-release periods for other COPCs as well.</p> | | |
| IR-69 | NRCan | Fish and fish habitat | Section 7.6.2.2.3 Appendix 7-C, sections 3.1 and 3.2 | <p>Context: For hydrogeological and geochemical assessments in support of ISR projects, the proponent identifies two aspects of primary importance (Appendix 7-C, sec. 3.1). These are a) groundwater remediation (Appendix 7-C, sec. 3.1.1); and b) the assimilative capacity of host rocks downgradient from the ore zone (Appendix 7-C, sec. 3.1.2). According to the proponent, the objective of groundwater remediation at decommissioning is to achieve water quality in the mined zone that does not pose a risk to receptors at the point of exposure. Assimilative capacity refers to the ability of groundwater-rock reactions to naturally sequester or attenuate COPCs migrating from the ore zone during the post-decommissioning period.</p> <p>Rationale: However, in NRCan's opinion, the proponent has neglected to mention the most fundamental aspect for hydrogeological and geochemical assessments in support of ISR projects. That aspect is the choice of ISR lixiviant and its effects on the mineralogy and hydrogeochemistry of the ore zone during mining operations. The proponent provides information on the pre-mining mineralogy (Appendix 7-C, sec. 3.2.1) and hydrogeochemistry (Appendix 7-C, sec. 3.2.2) but no information on their expected changes as a result of ISR mining. This Information is important when considering source terms in reactive transport modeling.</p> | NRCan requests that the proponent provide a detailed description of the expected mineralogical and hydrogeochemical changes occurring within the ore and barrier zones as a result of the injection of acidic lixiviant. | |
| IR-70 | CNSC ECCC | Fish and fish habitat Geology and groundwater | Section 7.6.2.2.3, Evaluation of Geochemical Reactive Transport Appendix 7-C, Section 4.4.2, Sub-Domain | <p>Context: The EIS indicates that “changes to hydrogeological conditions within the mining area were considered during development of the 3D sub-domain model. Dissolution of ore within the active mining area is expected to enhance ... hydraulic conductivity”.</p> <p>In Section 4.7 (Prediction Uncertainty Analysis), predictive uncertainty scenarios are provided. For scenario 7, the hydraulic conductivity (K)</p> | Please provide a more fulsome discussion on the anticipated impacts of mining on permeability of the ore zone due to mining activities in the EIS or in an Appendix. The value used for scenario 7 of the prediction uncertainty analysis should be provided. The scientific rationale for the use of a K value only a factor of five greater than the value assumed for the ore zone in the 3D regional model should | |

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| | | | Model Hydrogeologic Parameters | <p>of the ore zone was increased even further than initial model assumptions. The value used is not indicated in the text.</p> <p>Rationale: A hydraulic conductivity (K) value of 5x10-6 m/s, which is a factor of five (5) greater than the value assumed for the ore zone, was applied in the base case numerical model to account for this impact. It is unclear from the information provided in Section 7 of the EIS or associated Appendices what the basis of this five-fold increase in K value for the ore zone, and how this was judged to be conservative, or to adequately represent anticipated conditions. This parameter is important as it impacts the rate at which contaminants flow from the ore zone following mining activities. Due to the dissolution of uranium, larger voids will likely be created, and the hydraulic conductivity may increase by more than a factor of 5 compared to pre-project material. Therefore, a variation of at least one or two orders of magnitude for hydraulic conductivity should be used in the sensitivity analysis. Having a representative, conservative value for hydraulic conductivity is essential for understanding groundwater as a pathway of contaminant transport to Whitefish Lake and potential impacts to aquatic life. The K value used in the predictive uncertainty analysis should be reported.</p> | be provided, alternatively, provide simulation results for a more conservative scenario. Specifically, this discussion should address the potential effects of mechanical permeability enhancement with tools, dissolution of ore, gas plugging, chemical plugging, plugging due to ion exchange, and mechanical plugging. | |
| IR-71 | CNSC | Geology and groundwater | Section 7.7.1, Climate Change Considerations | <p>Context: The report states that in a scenario of increased precipitation and decreased/constant evaporation, climate change may result in greater flows in the Wheeler River drainage system and increased recharge to groundwater, which would correspond to increased groundwater discharge to Whitefish Lake. Additionally, it is also stated that climate change was evaluated qualitatively.</p> <p>Rationale: It is not clear why the impacts of increased evapotranspiration associated with higher average temperatures were not considered, even though these are likely outcomes of temperature increases due to climate change in areas such as the Prairies (Climate trends and projections - Canada.ca). It is also not clear why climate change considerations were not assessed quantitatively.</p> | Please provide a discussion on potential effects of increased evapotranspiration, as well as decreased groundwater recharge for the study area. Provide justification for performing qualitative assessment of impacts of climate change rather than a quantitative one. | |
| IR-72 | CNSC | Geology and groundwater | Section 7.8.2, Groundwater Monitoring | <p>Context: Monitoring seems to consider COPCs from surface facilities, and excursion of pumped mine fluid in the Lower Sandstone Aquifer. There does not appear any discussion on how the proposed monitoring program considers potential excursions of brine from freeze wells.</p> <p>Rationale: It is unclear how potential excursions of brine from freeze wells will be monitored. Would this be through the fiber optic cables installed within the freeze well network? Or would it be achieved in the monitoring well clusters? If this is the case, how would an</p> | Please provide further information regarding how potential excursions of brine from freeze wells will be monitored as part of the proposed groundwater monitoring program. | |

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| | | | | excursion of brine from a freeze well be differentiated from an excursion of mining solution? | | |
| IR-73 | CNSC | Geology and groundwater | Section 7.8.2.2, In Situ Recovery Mining Area Appendix 7-A, Appendix C | <p>Context: The EIS recommends that a follow-up study be carried out to supplement available data on hydraulic conductivity in the Desilicified Zone (DSZ).</p> <p>Rationale: Appendix C (Summary of Hydraulic Testing Data and Conductivity Values) of Appendix 7A indicates that only n = 6 hydraulic conductivity values are available for the DSZ, one of which appears unreliable due to a problem with packer sealing. This is relatively few values compared to the Intermediate and Lower Sandstones. Additionally, limited hydraulic head data from boreholes screened in the DSZ is available (GWR-037, GWR-012 and GWR-014; See Figures 16/17 in Appendix 7-A) – most information appears to originate from open core holes. The information presented in its current form is insufficient considering the importance of this zone as a preferential pathway for contaminants following remediation activities, and the heterogeneity of the unit due to intense hydrothermal alteration and fracturing. Further information regarding hydrogeological properties and groundwater flow would aid greatly in validating and refining the numerical groundwater model.</p> | As per the EIS recommendations, please provide additional information to supplement available data on hydraulic conductivity in the DSZ. Please provide the following information as part of the follow-up study: | |
| IR-74 | CNSC | Geology and Groundwater | Section 7.8.2.3 | <p>Context: It is stated in Section 7.8.2.3 (p. 7-113, main EIS report) that, at the Post-Decommissioning Stage, “Excursion are signaled by a change in water quality that is outside of that bounded by modelling predictions”, and “The model predictions spatiotemporally bound COPC concentrations in the subsurface that do not pose a risk to the receiving environment. Water quality that is outside of this bounding is defined as representing a material increase over a meaningful period compared to the predicted values either in rate of change or magnitude of change of COPC concentrations.”</p> <p>Rationale: It is not clear in which locations (e.g., is it in the mining area, or downstream of the mining area, or anywhere else?) the water quality is used to compare with the model predictions to determine if excursion occurs.</p> | Please clarify in which locations the water quality data is used to compare with the model predictions to determine if excursion occurs. | |
| IR-75 | CNSC | Geology and Groundwater | Appendix 7-A, Appendix K | <p>Context: The geomechanical study showed that the stability of the remnant ore zone and surrounding rock mass is highly sensitive to the magnitude of the material properties. To quantify this risk, the proponent conducted a sensitivity analysis to assess the influence that material properties have on the stability of key stratigraphic layers. The results of the sensitivity analyses suggest that small variations in the cohesion magnitude and angle of internal friction may significantly influence the stability of the altered sandstone, ore zone, and upper and lower clays.</p> | Please provide a plan to implement recommendations for further detailed geomechanical studies to reduce the uncertainties and risks in association with the stability and deformation analyses of ore zone rock matrix and its overlying rock mass formations and assess their impacts on the mine operation. | |

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| | | | | Rationale: By considering the potential uncertainties and risks in association with the geomechanical study and the empirically derived rock mass strength parameters and the non-site specific physical parameters of different rock formations used for the modeling, the proponent’s consultant suggests to define a laboratory testing program to address data gaps in the current geotechnical data and increase confidence in the material properties, and use more accurate material properties to model the phased extraction of uranium-enriched rock and assess the associated risks for cavity collapse and failure in the steel casing. CNSC staff concurs with these suggestions. | | |
| IR-76 | CNSC | Geology and Groundwater | Appendix 7-A, Appendix K (p. 12) | Context: Based on the consultant’s report, the modeled vertical strain is approaching or exceeding the tensile and compressive yield limits for steel casing. Rationale: Failure of steel casing may result in process loss or alter groundwater flow and quality. | Please provide additional details on how casing integrity will be monitored and potential effects mitigated. | |
| IR-77 | CNSC | Geology and Groundwater | Appendix 7-A, Appendix K Results of a Geomechanical Study Investigating the Influence of Uranium Extraction on Mining-Cavity Stability for the Wheeler River Uranium Project (Revision 1) | Context: It is reported in the appendix K report, within Appendix 7-A, that both phase I scoping analysis and phase II detailed strip model were investigated by numerical modelling. The analysis discussed influence on host rock stability as a result of incremental increase in volumetric extraction and graded conservative treatment of material properties. Rationale: As critical components of a numerical geomechanical simulation, initial and boundary conditions are crucially important to the confidence and reliability of the modelling results. However, this information is absent from the current report. In-situ principal stresses largely affects the stability of the excavated host rock, and the vertical strain and surface subsidence. This information is also absent in current form. | Please provide details on the boundary and initial conditions applied on stress loading and strain for the numerical analysis. In particular, the in-situ principal stresses, which are critical to correct understanding of the excavation disturbance to the host rock, should be provided and justified as appropriate. | |
| IR-78 | CNSC ECCC | Fish and fish habitat Geology and groundwater | Appendix 7-A, Section 3.5.2, Porosity Appendix 7-C, Section 2.3.2.1, Porosity Values | Context: This section of the report outlines the estimated/assumed effective porosity values. The only reference provided is for permeameter testing on rock core samples (Scibek, 2019). Additionally, the report states that “As tracer test results to estimate effective porosity were unavailable at the time of modelling, effective porosity values for the sandstone bedrock and basement units were sourced from literature values”, where literature values are effective porosities from the Cigar Lake study (AECL, 1994), situated approximately 40 km NE of Wheeler River. No on-site Wheeler River field data was used to justify this value. Additionally,, in the Cigar Lake study, the authors reported that, because results from tracer tests and pumping tests were unavailable, “a practical approach was adopted, | 1. Please provide the reference for the data substantiating the assumed effective porosity values reported in Appendix 7-A, and used in the numerical model in Appendix 7-C. 2. Please provide information on how the site-specific effective porosity values from tracer tests or pumping tests, were considered in the numerical models. Section 2.2.1.4 of the EIS asserts that tracer tests were carried out in 2021 – this information should thus be available for improving/updating models. Alternatively, provide a sensitivity analysis for the effective porosity in the | |

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| | | | | <p>i.e., to use the porosity values obtained from laboratory measurements made on core samples, and to assume that those numbers were close to the average field kinematic (effective) porosity values”.</p> <p>Rationale: The source of reported effective porosity values is unclear from Section 3.5.2 in Appendix A (e.g. literature review, field work, laboratory work).</p> <p>In Section 2.3.2.1 of Appendix 7-C, there is a lack of clarity regarding the effective porosity data used in the numerical model. It appears that no site-specific data derived from tracer tests or pumping tests is used in the numerical model. Given the that effective porosity directly correlates to seepage velocity and by extension transport time and distribution of COPCs in groundwater, it is an important parameter. Given its relative importance for contaminant fate and transport, effective porosity should be based on field measurements, or at the very least accounted for in the sensitivity analysis.</p> | Desilicified Zone, or contaminant transport simulation results with more conservative effective porosity values. | |
| IR-79 | CNSC | Geology and groundwater | Appendix 7-A, Section 4, Groundwater Chemistry | <p>Context: Table 4-1 in Section 4 of Appendix 7-A provides groundwater monitoring results from sampling activities carried out at 26 monitoring wells in 2019, 2020, and 2021. The majority of these wells were only sampled once (n = 8) or twice (n = 17). In some cases (Lower Sandstone Aquifer/Intermediate Sandstone Aquitard), the variability of results between sampling events is quite high. Data for the Paleoweathered Zone is sparse.</p> <p>Rationale: Insufficient information is presented in the EIS and associated Appendices to concretely define baseline groundwater chemistry for the different hydrostratigraphic units. As defined in the CNSC’s Generic Guidelines for the Preparation of an EIS: “Based on the scope of the project, the EIS will present sufficiently detailed baseline information to determine the effects the project could have on the VCs and analyze those effects”. This is particularly important given certain features of the study area (i.e., presence of zones of thermal alteration/desilicification, as well as hydraulically active fractures/faults), and the need to adequately characterize baseline conditions in the Desilicified Zone downgradient from the proposed mining area. As an example, the US Nuclear Regulatory Commission (NRC) typically requires a minimum of four (4) quarterly samples from (i) surficial aquifers, (ii) production aquifers, (iii) overlying aquifers, and (iv) underlying aquifers to characterize preoperational groundwater quality (E. Striz, pers. comm.).</p> | Please provide the statistical basis (number of samples and variability) by which “baseline” is defined and the justification that the current information is sufficient to adequately characterize groundwater quality. In order to ensure sufficient baseline information is collected, further iterations of sample collection for groundwater monitoring wells in all defined hydrostratigraphic units may be required. In addition, groundwater quality downgradient from the proposed mining area should be further characterized to assess spatial influence of alteration and hydraulically active features, | |
| IR-80 | CNSC | Geology and groundwater | Appendix 7-A, Section 4.3.3, Hydrochemistry | <p>Context: This section provides data for groundwater samples collected during the Cigar Lake analogue study and Millennium Project for further regional context. The previous studies are heavily referenced</p> | Please provide additional clarity to and interpretation of Figure 26 in Appendix 7-A, including a revision to the Figure to allow for easier interpretation. This could include | |

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| | | | by Hydrostratigraphic Unit | <p>to support interpretations made for the conceptual site model.</p> <p>Rationale: The Piper Plots in Figure 26 are difficult to interpret (many overlapping circles with variegated colors), and Cigar Lake samples plot predominantly as Na/K-Cl/SO4 groundwater facies. Conversely, samples collected as part of the Phoenix Project (current), plot either as Ca-HCO3 or Ca-SO4/Cl groundwater facies. No explanation is provided for the observed hydrogeochemical differences between groundwater from the Phoenix project and the Cigar Lake analogue study/Millennium Project.</p> | clear identification of end members, as well as arrows indicating proposed evolution of groundwater chemistry. Further discussion should be provided describing observed differences between groundwater chemistry at the Phoenix project compared to Millennium/Cigar Lake. | |
| IR-81 | CNSC | Geology and groundwater | Appendix 7-A, Section 4.3.3, Hydrochemistry by Hydrostratigraphic Unit | <p>Context: The report states in the description of hydrochemistry of the Lower Sandstone Aquifer that, “On the basis of groundwater chemistry and tritium values in that groundwater, the authors (of the Cigar Lake analogue study in 1994) concluded that the groundwater reflected a younger water component that had penetrated to depth along hydraulically active fractures/faults. The same conclusion is made here (in the Wheeler River EIS) for the Phoenix study area – meaning that fracture/fault conditions are such that some areas of the MFa are characterized by younger/recharge groundwaters”.</p> <p>Rationale: Tritium results for most wells in the Lower Sandstone Aquifer (MFa) reported in Table 4-1 of Appendix 7-A exhibit tritium concentrations <15 Bq/L for the 2020 sample, and 0.1 or <0.1 Bq/L for the 2021 sample. Tritium in modern precipitation typically varies from 1 – 3 Bq/L. Conclusions made in the text are not supported by data, especially given that tritium values are not reported in the EIS for local precipitation or surface water. This is important in reinforcing the assumption from the conceptual model that modern meteoric water circulates at depth in the Lower Sandstone Aquifer.</p> | Provide a further discussion on the interpretation of tritium in groundwater, rather than echoing conclusions from the Cigar Lake analogue study. Consideration should be given to the assertion that modern meteoric water circulates at depth in the Lower Sandstone Aquifer. Collection and analysis of stable isotope (e.g., δ2H, δ18O) samples is a cost-effective solution which would greatly improve understanding of groundwater hydrology and support the development of a conceptual model. | |
| IR-82 | CNSC | Geology and groundwater | Appendix 7-A, Section 4.3.3, Hydrochemistry by Hydrostratigraphic Unit Appendix 7-C, Section 3.5 | <p>Context: A. In-field measurements of Oxidation-Reduction Potential (ORP) for three (3) out of twenty-six (26) groundwater samples are presented in Table 4-1 of Appendix 7-A. Although sparse, these values are also used to characterize redox conditions for representative groundwaters in Table 3-5 of Appendix 7-C.</p> <p>B. In Section 3.5.5 of Appendix 7-C it is stated that groundwaters in the PHREEQC model were allowed to equilibrate with atmospheric concentrations of oxygen, resulting in oxidizing subsurface conditions. In Section 3.7 of Appendix 7-C it states that input files for 3D reactive transport were generated based on outcomes for PHREEQC modelling. However, in reading Section 4 of Appendix 7-C, it is unclear whether this assumption (equilibration with atmospheric oxygen) was carried forward for the 3D model.</p> <p>C. As per p. 3.49 of Appendix 7-C, “A small amount of reactive pyrite</p> | <p>1. Provide further discussions and information (i.e., ORP measurements or analytical data for redox couples) on redox conditions at the Phoenix site. Particular focus should be given to the spatial heterogeneity of redox processes. Tools such as the reference provided [2] below provide an example of simplified framework for characterizing redox conditions in aquifers.</p> <p>2. Clarify assumptions regarding initial redox conditions for the 3D solute transport model.</p> <p>3. Provide the % reactive pyrite by weight assumed for models in the text. Justification for proportions used, such as analytical data, should also be provided.</p> | |

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| | | | | <p>was assumed for the first 500 m of transport away from the ore zone in the model, primarily in the desilicified sediments of the Lower Sandstone Aquifer, and deeper portion of the Intermediate Sandstone Aquitard”.</p> <p>Rationale: A. Given the importance of redox conditions for U mobilization and precipitation/dissolution of minerals (e.g., pyrite/metal oxyhydroxides) and the corresponding influence on contaminant transport from both a modelling and monitoring perspective, these should be further characterized. It should also be noted that the measurement of Oxidative-Reductive Potential (ORP) in natural waters can be complex and difficult due to the variability and disequilibrium of natural systems and issues inherent to electrode calibration (e.g., Schuring et al., 2000). Measurements of redox couples (e.g., As(III)/As(V); Fe(II)/Fe(III); S(-II)/S(VI)) are typically recommended to accurately characterize redox conditions in natural waters (Schuring et al., 2000).</p> <p>B. The assumptions regarding redox conditions for the 3D solute transport model should be clarified.</p> <p>C. The amount of pyrite (e.g., % by weight) assumed for the purposes of modelling should be clarified, given the potential role of pyrite as a reducing agent in limiting the transport of COPCs.</p> <p>Reference: [1] Schuring J.; Schulz, H. D.; Fischer, W.R.; Bottcher, J.; and Duijnisveld, M.H.W. 2000. Redox: Fundamentals, Processes and Applications. Springer: Berlin.</p> | <p>Reference: [2] Jurgens, B.C., McMahon, P.B., Chapelle, F.H., and Eberts, S.M., 2009, An Excel workbook for identifying redox processes in ground water: U.S. Geological Survey Open-File Report 2009–1004 8 p.</p> | |
| IR-83 | CNSC | Geology and Groundwater | Appendix 7-A, Section 7.4.2.2 and Appendix K | <p>Context: Leaching of uranium from the ore zone will generate voids within the ore zone, which could fail and collapse. Failure of the voids would cause displacement in overlying rocks, which will lead to the eventual ground subsidence. Based on the developed geological model, a geomechanical study was conducted to assess potential maximum vertical displacement in the overlying rock formations and predict the ground subsidence. While a layer of altered sandstone is modeled above the ore zone, the desilicified zone, a zone that is comprised of completely to partially unconsolidated sands and has very low rock quality, high fracture intensity, and high friability, and low strength in the area overlying and east of the Phoenix deposit, appears not to have been included in the model for geomechanical modeling. The evaluated displacement/deformation in the overlying rock formation and the resulted ground subsidence would not be conservative without including the desilicified zone.</p> <p>Rationale: Stability of the ore zone rock matrix and the potential</p> | <p>Please provide details whether and how the desilicified zone is considered in the geomechanical modeling of the detailed strip model. Such details should include figures and the linkage between the geomechanical model including the determination of strength parameters of the desilicified zone and the geological model including information on the core delineation of the desilicified zone.</p> | |

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| | | | | displacement/deformation in the overlying rock formations when voids in the extracted ore zone collapse are critical for protecting the overlying aquifers, preventing substantial ground subsidence, safeguarding casing integrity, and mitigating plug-off of the remaining ore as well as efficiently mining extraction. The deformed zone in the overlying rock formations will change in hydraulic conductivity that will impact on the assessment of potential effects on groundwater flow and contaminant transport in the zone. Therefore, the rock mass behavior including and above the ore zone should be adequately understood and the potential displacement/deformation should be assessed and quantified with adequately defined geological model. | | |
| IR-84 | CNSC | Geology and Groundwater | Appendix 7-C | <p>Context: It is stated in Section 2.5.2.4 (p. 2.35, Appendix 7-C) that “In addition to calibrating to water level elevations targets, the model was calibrated to estimates of groundwater discharge to Whitefish Lake. A match between simulated and observed flows helps to support that groundwater recharge rates are reasonable, and to provide validation for water budget assessments. Baseflow calibration targets were developed using point streamflow measurements collected upstream and downstream of Whitefish Lake. Figure 2-10 (p. 2.26, Appendix 7-C) shows the locations of the baseflow calibration targets, and Table 2-7 (p. 2.35, Appendix 7-C) illustrates the model-simulated groundwater discharge rates in relation to the estimated range of baseflow from stream measurements. The simulated baseflow to Whitefish Lake is in good agreement with the estimated representative baseflow”.</p> <p>Rationale: It is not clear in Figure 2-10 (p. 2.26, Appendix 7-C) where the point streamflow measurements were conducted upstream and downstream of Whitefish Lake. Additionally, it is not clear how the groundwater discharge to Whitefish Lake is simulated, since the model domain does not cover the whole Whitefish Lake.</p> | 1) Please clarify in Figure 2-10 where the point streamflow measurements were conducted upstream and downstream of Whitefish Lake. 2) Please clarify how the groundwater discharge to Whitefish Lake is simulated considering that the model domain does not cover the whole Whitefish Lake. | |
| IR-85 | CNSC | Geology and Groundwater | Appendix 7-C | <p>Context: Section 2.7.3 (Appendix 7-C) mentions Wells A, B and C, and Figure 2-17 (p. 2.43, Appendix 7-C) illustrates the predicted drawdown ranges at Well B and Well C.</p> <p>Rationale: It is not clear where Well A, Well B and Well C are located.</p> | Please provide the locations of Well A, Well B and Well C illustrated in a Figure. | |
| IR-86 | CNSC | Geology and Groundwater | Appendix 7-C | <p>Context: It is stated in Section 2.7.3 (p. 2.41, Appendix 7-C) that “Both the pumping demand and the recharge changes were incorporated into a transient simulation performed using the calibrated groundwater flow model. The model simulation was started at the beginning of mine construction, with initial conditions taken from the calibrated model. The simulation period was extended for 40 years to include the entire period of construction, operation, and decommissioning, and extending through 17 years post decommissioning”.</p> | Please clarify the parameters, boundary conditions and any other aspects as used in the transient model that are different from the calibrated model. | |

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| | | | | Rationale: It is not clear what is the difference between the calibrated model and transient model in terms of parameters (such as the K values for the mining zone), boundary conditions, etc. | | |
| IR-87 | CNSC | Geology and Groundwater | Appendix 7-C | <p>Context: In Section 2.8 (p. 2.45, Appendix 7-C) Parameter uncertainty assessment, only parameters for certain zones (part of each specific hydro-stratigraphic unit as shown in Figure 2-19, p. 2.46, Appendix 7-C) related to the pathway from the ore zone toward Whitefish Lake were allowed to vary in order to find combinations of parameter values that met statistical calibration criteria. If each hydro-stratigraphic units within the whole model domain were treated as parameter zones that can have varied hydraulic conductivity values, a different combination of parameter values could be obtained that meet statistical calibration criteria too.</p> <p>Rationale: The parameter values for parameter zones between the mining area and Whitefish Lake is important in determining the hydraulic connection between the mining area and Whitefish Lake. Parameter values in other parameter zones could also be important. For example, if the K values for the intermediate sandstone aquitard are significantly larger than in the current calibration results, the interaction between the upper sandstone aquifer and the lower sandstone aquifer could be more active, and the mined-out zone could be more active hydraulically and groundwater in the minded-out zone could have a shorter residence time than in the current calibrated model.</p> <p>Additionally, it is noted that Figure 2.19 (p. 2.46, Appendix 7-C) illustrates the parameter zone for the intermediate sandstone aquitard. However, Figure 2.20 (p. 2.49, Appendix 7-C) did not include the intermediate sandstone aquitard in the results.</p> | It is recommended that the parameter zones in the Parameter uncertainty assessment include hydro-stratigraphic units in the whole model domain to investigate the possible combination of parameter values that could make the groundwater in the mined-out zone more active hydraulically. | |
| IR-88 | CNSC | Geology and Groundwater | Appendix 7-C | <p>Context: The conceptual hydrogeological model includes upper sandstone aquifer, intermediate sandstone aquitard, and lower sandstone aquifer. The desilicified zone above the ore zone have enhanced hydraulic conductivity. The boundary condition for the lower sandstone aquifer on the west (upstream) side was assigned to have specified head, which provide source of water for the lower sandstone aquifer.</p> <p>As a result of the conceptual model setup, the upper sandstone aquifer is hydraulically active and the groundwater residence time within the upper sandstone aquifer is relative short. In contrast, the lower sandstone aquifer (and the ore zone) is hydraulically inactive, and the groundwater residence time in the lower sandstone aquifer is relatively long (as shown in the particle tracking results in Figure 7.6-2</p> | It is recommended to conduct the following work to demonstrate if the mined-out zone is hydraulically active: <ol style="list-style-type: none">Determine the groundwater residence time in the lower sandstone aquifer and compare it with the simulated residence time in the numerical model.Conduct additional particle tracking to demonstrate where groundwater originating from the mined-out zone flow towards (forward tracking) and where groundwater flowing towards the mined-out zone originates from. This would help determine why groundwater in the mined-out zone is not hydraulically active. | |

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| | | | | <p>(p. 7-71, main EIS report), and the simulated plume for chloride in Figure 7.6-7(p. 7-86, main EIS report)).</p> <p>It is stated in Section 2.6.4 (Appendix 7-C) that “As noted above in section 2.6.3, it is estimated that 99% of the groundwater discharge to Whitefish Lake is derived from groundwater that has only flowed through shallow deposits (i.e., Overburden and Upper Sandstone Aquifers). Contribution of deep groundwater flow through the Desilicified Zone within the Intermediate Sandstone Aquitard is estimated to be < 1% of the groundwater discharging to Whitefish Lake”. This simulation result is reflective of the conceptual model.</p> <p>Section 7.3.3.3 (p. 7-42) states that “The Lower Sandstone Aquifer is characterized spatially by two types of groundwater. The first groundwater type is most like that observed in the Local Flow System. This reflects hydraulically active fractures and fault systems that allow fresh recharge water to penetrate and mix with deeper waters in the aquifer. The second type of groundwater is within the zone of thermal alteration around the ore zone”.</p> <p>The hydraulic connectivity of the ore zone with the upper sandstone aquifer has important implication on the groundwater restoration. The ore zone is not hydraulically active locally because it is enclosed by a clay zone before the mining operation. But if it is located within a hydraulically active area, or on a groundwater flow pathway that is hydraulically active, the mined-out zone (with much larger porosity and hydraulic conductivity) could become active hydraulically after mining operation is finished.</p> <p>Figure 7.6-7 (p. 7-86, main EIS report) shows that the chloride plume is most persistent within the mined-out mining area. This seems to indicate the mined-out zone is hydraulically inactive after the mining operation is finished.</p> <p>It is stated in Section 7.3.3.2 (p. 7-37, main EIS report) that “Exploration boreholes drilled in the Phoenix area, where left unplugged, have the potential to provide preferential flow paths between the Overburden and Upper and Lower Sandstone Aquifers. Exploration holes were reportedly grouted approximately 10 to 20 m above and below the ore zone, resulting in open holes remaining throughout the overlying materials. These portions of the open holes may act as open conduits for groundwater flow through the 400 m of Athabasca Group Sandstone.” So, there is possibility that the unplugged borehole could increase the hydraulic connection between the upper and lower sandstone aquifer.</p> <p>Rationale: It is important to understand if the larger area containing</p> | <p>3. Conduct sensitivity analysis to investigate the effect of higher K values for the intermediate sandstone aquitard and the K and porosity values of the mined-out zone on the plume migration.</p> | |

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| | | | | <p>ore zone is hydraulically active. Additional confidence would be gained if there is any other evidence that support that the area containing the ore zone is not hydraulically active, and groundwater residence time in the lower sandstone aquifer surrounding the ore zone is comparable with the simulated results.</p> <p>Table 2-4 (p. 2.16, Appendix 7-C) shows the effective porosity (0.01-0.05) of the ore body. Figure B7 (p. B.8, Appendix 7-C) shows that the calibrated K values for the mined-out zone is 1x10-6 m/s. Section 3.5.2 (p. 3.24, Appendix 7-C) states that “The same average linear velocity was assumed for the mining area (source zone), following from the discussion in Section 4.4.2, where the hydraulic conductivity value in this zone following mining was set to 5x10-6 m/s, and a porosity of 0.2 is assumed for the ore zone (Table 4-2)”. It is not clear what the justification is for the selection of the porosity and K values for the mined-out area, and whether they are conservative. It is also not clear, what the potential impact on the groundwater flow and COPCs transport would be If the mined-out zones collapse.</p> | | |
| IR-89 | ECCC | Fish and fish habitat | Appendix 7-C, Numerical Modelling: Post- Decommissioning Evaluation, Section 2.3.1.4, Desilicified Zone | <p>Context: The Proponent states that a hydraulic conductivity value of 5x10-6 m/s was uniformly assigned to the model layers representing the Desilicified Zone. They additionally state that this value is consistent with packer and pumping tests screened in this unit that have interpreted hydraulic conductivity values ranging from 1x10-6 to 3x10-5 m/s (Appendix C), with a geomean of 6.0x10-6 m/s.</p> <p>Considering that the Desilicified Zone is of particular interest because it is the main pathway for the COPC to reach Whitefish lake, and that hydraulic conductivities are not entirely understood, ECCC recommends that a larger range of hydraulic conductivities be simulated to understand potential effects on fish and fish habitat.</p> <p>Rationale: The Desilicified Zone is a critical layer in the hydrogeological model as it represents a key potential pathway of contaminants to Whitefish Lake. The base case hydraulic conductivity value (5x10-6 m/s) is even lower than the geometric mean, not to mention the highest value found. When simulating geochemical processes and contaminant transport within this important pathway a more conservative approach should be employed. Modifying this parameter will affect travel times and distribution of COPC in the subsurface.</p> | <p>1. Provide an in-depth rationale for choosing a value of 5x10-6 m/s as the base case for the hydraulic conductivity, in both the PH REDox EQUilibrium (PHREEQC) and Finite-Element Ground Water Flow (FEFLOW) models.</p> <p>2. Provide a rationale for keeping the sensitivity analysis within one order of magnitude considering the lack of physical data on the Desilicified Zone. Alternatively, provide contaminant transport simulation results with more conservative hydraulic conductivity (e.g., more than 3x10-5 m/s) values in the Desilicified Zone.</p> <p>See also related: IR-96.</p> | |
| IR-90 | ECCC | Fish and fish habitat | Appendix 7-C, Section 2.4 and 2.6 | <p>Context: Hydraulic conductivities and hydraulic gradients play an important role in groundwater flow, geochemical modeling, and contaminant transport for the PHREEQC and FEFLOW models. Although there is an important vertical component to the</p> | <p>1. Explain if the vertical and lateral hydraulic gradients and hydraulic conductivities are assumed to be equivalent.</p> <p>2. Provide a rationale for not distinguishing between vertical and lateral hydraulic gradients.</p> | |

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| | | | | <p>contaminant transport, there is no distinction made between lateral and vertical hydraulic conductivities of hydraulic gradients.</p> <p>Rationale: According to the conceptual model, there is an important vertical aspect to the groundwater flow thus incorporating any vertical hydraulic gradient or hydraulic conductivity information into the calibration would increase confidence in the results.</p> <p>Providing a distinct value for vertical hydraulic conductivity will improve the accuracy of the model in regards to the transport of contaminants to Whitefish Lake through the Desilicified zone, which is important to understand potential impacts to aquatic life.</p> | <p>3. Alternatively, provide both lateral and vertical hydraulic gradient estimates and the implications on contaminant transport.</p> | |
| IR-91 | NRCan | Fish and fish habitat | Appendix 7-C, section 2.5.2 | <p>Context: The numerical model calibration quality plot (Appendix 7-C, sec. 2.5.2.1, Figure 2-13) contains a small error. The vertical (simulated heads) and horizontal (observed heads) axes do not have the same scales (499 to 521 masl versus 499 to 522 masl). Therefore, the line of ideal fit is offset.</p> <p>Rationale: As a result, NRCan notes that observed heads in the 510-512 masl range are underpredicted by the model. NRCan also notes that the calibration statistics (Appendix 7-C, sec.2.5.2.3) are highly leveraged by two data points from open boreholes south of Kratchkowsky Lake where simulated values are largely controlled by the nearby constant-head boundary in the Lower Sandstone aquifer (520 masl).</p> | <p>The proponent should correct the scales on the axes of Figure 2-13 in Appendix 7-C. The proponent should also comment on the effect on calibration of the clustering of most observation wells in the ore zone.</p> | |
| IR-92 | CNSC | Geology and groundwater | Appendix 7-C, Section 3.2.1, Mineralogical Composition | <p>Context: Table 3-2 summarizes the clay content of the Athabasca Group sandstones and the Paleoweathered Zone. Although minimum, maximum and median values are provided, the number of samples and variability of the dataset are not. Rationale for incorporating illite into reactive transport modelling and excluding kaolinite/dichlorite is provided in the text.</p> <p>From p. 3.29 in Appendix 7-C: “The illite content was based on the normative clay composition determined from site-specific corehole elemental analysis (median illite by mass is 7.68%; Table 3-2) and using portable infra-red mineral analysis indicating median illite content by mass is 13.1% (data not shown)”</p> <p>From p. 3.30 in Appendix 7-C: “Using the minor amount of illite compared to the more dominant chlorite is conservative in that not all sorptive capacity of the clays is accounted for in the simulated paleoweathered zone”. This conservative assumption appears contrary to assumptions for the desilicified zone (DSZ) and Athabasca Group sandstones “Illite was used to represent the total clay content,</p> | <p>1. Please provide in Table 3- the number of samples and variability of the datasets used to estimate the clay content of hydrostratigraphic units for the model. Include results from infrared mineral analysis in the text if the information is used to support assumptions for modelling.</p> <p>2. Please provide further information/discussion within the EIS relating to the assumptions of clay content in hydrostratigraphic units for modelling. Provide further justification and rationale as to why total clay content in the Athabasca Group sandstones and Desilicified Zone is assumed to be illite, and how this assumption is conservative. This discussion could include a comparison of the properties (cation exchange capacity, surface area) of illite vs. kaolinite vs. dichlorite for the anticipated range of subsurface conditions (pH, redox, U concentrations, etc.).</p> | |

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| | | | | <p>which varies from 1.74% to 5.85% by mass in the hydrostratigraphic units within the Athabasca Group sandstones and Desilicified Zone”.</p> <p>Rationale: Information is missing in the EIS regarding the clay composition of hydrostratigraphic units. Results from infrared mineral analysis are not reported.</p> <p>The assumption for the solute transport model is that all clays in the downgradient DSZ are illite. However, clay content in the Read Formation (Lower Sandstone Aquifer) downgradient of the ore zone is low in illite (0.42%) compared to kaolinite (0.52%) and dichlorite (1.18%). A value of 3.9% illite clay by weight is used for the DSZ, but Table 3-2 indicates median content is 2.42% illite. It is not clear why illite was used to represent total clay content for the DSZ, as opposed to the conservative assumptions used for the Paleoweathered Zone, nor has any basis or justification been given.</p> | | |
| IR-93 | CNSC | Geology and Groundwater | Appendix 7-C, Table 3-10: Properties of Adsorbing Mineral Phases | <p>Context: In Appendix 7-C, section 3.5.6.2.2 Ion Exchange and Surface Complexation, the consideration of ion exchange and surface complexation and the corresponding parameters and chemical reaction are discussed.</p> <p>Rationale: The site density of sorbent Goethite was reported in Table 3-10 to be 1.6E3 mol/kg. Taking into account the specific surface area of 60 m2/g, this equals to 1600/6E4 mol/m2, or 0.0266 mol/m2, 1.6e4 sites/nm2.</p> <p>This value largely overestimates the site density of goethite, which is reported to be in the range of 2~6 sites/nm2. The reference used in the EIS report indicates the similar range of variation for this specific parameter.</p> <p>There are plenty of similar studies on SCM of iron oxides in literature. It is suggested to consult with more than one single study to enhance the reliability of model parameters.</p> <p>The overestimation of sorption site density will directly result in underestimation of the affected COPCs’ concentrations in pore fluid. This will result in underestimation of COPC transport plume in the affected underground space, and potentially the dissolved concentrations in the hydrogeological sink.</p> | Please provide additional evidence to justify the model parameter of site density for goethite, applied to the numerical model. If necessary, the reactive transport modelling should be re-run to update the contents presented in the EIS report. | |
| IR-94 | CNSC | Geology and Groundwater | Appendix 7-C, Numerical modelling: post-decommissioning evaluation, Section | <p>Context: It is reported in this section the assumed subsurface conditions that were applied in the geochemical site conceptual models. Critical phenomenon of pH tail was mentioned. Inclusion and exclusion of corresponding geochemical reactions were discussed briefly.</p> | Please provide additional evidence to justify the approach for excluding uraninite and pyrite from the analysis of remediated mining area. This may require the results from additional modelling. | |

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| | | | 3.5.5, Subsurface Conditions Incorporated | Rationale: It was reported that the residual reduced minerals of uraninite and pyrite were not included in the modelling of the remediated mining area. The argument was based on consideration of the upstream groundwater, passing through the mined zone, will not be oxidizing and groundwater conditions are expected to be similar to pre-mine conditions. However, this ignores the pH tail effect that releases proton H+ sorbed to solid surface during ISR flooding. By ignoring this process, there is a potential risk of underestimating the source terms for some key COPCs. Exclusion of uraninite and pyrite in remediated mining area modelling is contradictory to pH-tail effect. The justification is not sufficient in the current form. | | |
| IR-95 | CNSC | Geology and Groundwater | Appendix 7-C, Table 3-11 | <p>Context: The Table 3-11 reported the Solid-Phase Concentrations and Partitioning Constants for COPCs. Data were both measured and simulated.</p> <p>Rationale: It is unclear how the partition coefficients of various COPCs upon desilicified and paleoweathered rocks were obtained. It was not reported at what pH were these Kd analyzed. Sorption of chemicals on solid phase is known to be pH dependent. It is unclear whether pH influence was considered in the measurement and analysis of apparent partition coefficients.</p> <p>In addition, uptake of metals on clay is highly nonlinear, and always has a maximum capacity. Even with a very strong affinity towards specific metal ions, the sorption will be saturated at elevated concentrations. Therefore, assuming a linear correlation needs to be cautious of the concentration range of target COPC species, and the applicable sorption capacity of the clay mineral.</p> <p>In the current model, only the linear form of sorption is considered, although with discussion of Kd value selection. Additional rationale is needed to justify if the applied methodology is sufficient for assessment.</p> | Please justify the choice of applying a linear form partition coefficient for the modelling and assessment, and whether it provides a conservative approach to the assessment results. Clarity around the experimental conditions during the measurement of partitioning coefficient of various COPCs on the target rocks may help support this assumption. | |
| IR-96 | CNSC | Geology and groundwater | Appendix 7-C, Section 4.4.4, Sub-Domain Model Transport Boundary Conditions | <p>Context: From the text, “Transport parameters were specified for diffusion (1x10-9 m2/s), longitudinal dispersivity (10 m along the plume trajectory), and transverse dispersivity (5 m)”. The source of this information is not provided in Appendix 7-C. It is unclear if the values used are defaults in the modelling software, from literature, from small-scale laboratory tests, or are site-specific values determined through tracer tests.</p> <p>Rationale: The use of a calibrated flow model does not imply that the solute transport model is calibrated. The transport parameters (such as effective porosity, dispersivity and reactive transport parameters)</p> | <p>1. Please provide the source of the numerical value used for diffusion and longitudinal and transverse dispersivity, and provide justification if default values by the model code were used.</p> <p>2. Please provide a discussion on the influence of large-scale heterogeneity on dispersion and solute transport predictions in the modelling report.</p> <p>See also related: IR-89.</p> | |

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| | | | | <p>can only be calibrated by matching simulated and observed spatial and/or temporal distributions of a solute. Sensitivity analysis indicates that decreasing longitudinal and transverse dispersivities by a factor of two resulted in exceedances of groundwater criteria for both selenium (Se) and cobalt (Co). Given the clear influence of these values on contaminant transport, it is important that transfer parameter values are justified in the solute transport model. In addition, the influence of large-scale heterogeneity on dispersion and solute transport predictions should be discussed, to identify any uncertainty in the model predictions, and provide confidence that the applied model is adequately representing groundwater flow and solute transport.</p> <p>Further guidance on solute transport modelling can be found in BC MOE (2012) [1].</p> <p>Reference: [1] British Columbia Ministry of the Environment (BC MOE). 2012. Guidelines for Groundwater Modelling to Assess Impacts of Proposed Natural Resource Development Activities. Report no. 194001, 385 p.</p> | | |
| IR-97 | ECCC | Fish and fish habitat | Appendix 7-C, Figures 4-6, 4-7a, 4-7b, 4-8a, 4-8b, 4-9a, 4-9b | <p>Context: Appendix 7, Figures 4-6, 4-7a, 4-7b, 4-8a, 4-8b, 4-9a, 4-9b present contaminant transport simulations of chloride, selenium, cadmium, and uranium. All simulations use initial condition concentrations at t=0 (or end of mining operations. In the 3D FEFLOW contaminant transport model it is not clear why initial condition concentrations were chosen rather than a constant concentration boundary.</p> <p>It is also unclear if mining activities will cause mobilization of the contaminants beyond the end of operations.</p> <p>Rationale: The choice of boundary conditions may impact the predicted transport of contaminants that reach Whitefish Lake through groundwater, which may have impacts to aquatic life.</p> | <p>1. Explain and clarify if mining operations will mobilize contaminants beyond operations?</p> <p>2. Clarify if the source of contamination, (e.g., uranium, selenium) will cease after operations?</p> <p>3. For the 3D model please provide the rationale for using initial concentrations rather than constant concentration boundary conditions for contaminant concentrations.</p> | |
| IR-98 | CNSC | Change to an environmental component due to hazardous contaminants | Section 8, Aquatic Environment | <p>Context: It states in EIS in Section 8.3.7.1 (p. 8-151) that "Cameco's Key Lake Operation will overlap spatially and temporally with the Project".</p> <p>Rationale: It is not clear whether there is the possibility that planned Denison discharges would eventually flow into and influence a background reference lake used by Key Lake operation.</p> | Please provide supporting information to demonstrate whether discharges from the proposed operation will not eventually flow into a reference lake used by another existing operation. | |
| IR-99 | CNSC | Aquatic environment | Section 8, Water Quality, Table 8.2-13 | <p>Context: Table 8.2-13 shows the maximum concentration of hazardous and radiological COPC's in surface water throughout the local study area. However, the concentration for all constituents is stated as mg/L.</p> | Please use Bq/L when displaying concentration of radiological COPC's. If this was a typographical error in the table, please indicate as such and revise the table to indicate values are indeed in Bq/L. Please also review other | |

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| | | | | Rationale: It is unusual for radiological COPC's to be displayed in mg/L, radiological constituents are typically displayed in Bq/L | tables displaying concentrations of radiological constituents to ensure this error is not repeated in other tables. | |
| IR-100 | HC | Indigenous Peoples' health / Socio- economic conditions | Section 8, (p. 8-195) Section 8.5.3, Table 8.5-2, (p. 8-226) | <p>Mercury is excluded as a COPC in the assessment. Inadequate consideration of mercury and methylmercury in fish and other country foods, and use of incorrect Hg-related health guideline values can underestimate the risks to human health among country food consumers.</p> <p>Context: Section 8 states “Mercury has not been identified as a COPC for the Project as it is currently not present in the receiving environment (i.e., background condition) at detectable concentrations and will not be produced as part of the mine process; therefore, it will not be discharged to the aquatic environment.</p> <p>However, it is understood that potential nutrient enrichment-related effects are possible and can be linked to increases in mercury in the environment” (p. 8-195).</p> <p>Table 8.5-2 shows that there is mercury present in the tissues of Northern Pike and White Sucker sampled in the waterbodies within the local study area and in Russell Lake. These fish are regularly consumed by nearby communities according to the ERFN 2017 dietary survey.</p> <p>In Section 8.5.3, fish tissue concentrations are compared to Health Canada’s human health risk- based maximum permissible mercury concentration (0.5 µg/g wet weight), which is applicable to most species of commercially sold fish rather than country foods.</p> <p>Rationale: It is recommended that mercury be listed as a COPC considering it is in fact present in fish tissue under existing conditions, the significant consumption of fish by the local Indigenous communities, and its toxicological significance to human health.</p> <p>Further, the Health Canada provisional tolerable daily intake (pTDI) value of 0.2 µg/kg/bw/day (Health Canada, 2007) is a more appropriate reference level when evaluating consumption of mercury in fish by Indigenous people, as it allows for the consideration of food consumption patterns in the risk assessment that differ from the general population and is protective of the most sensitive sub-group (i.e., developing foetus).</p> <p>It is important to note that methylmercury, rather than inorganic mercury, is generally the predominant mercury species present in fish</p> | <p>1. Include mercury (including methylmercury) as a COPC in the assessment given the baseline presence of mercury in sampled fish, the potential increase of methylmercury in receiving waters due to nutrient enrichment resulting from the project, the significant fish consumption by the local population and that country foods, particularly fish, are an important source of dietary exposure to mercury.</p> <p>2. Assess health risks from fish consumption by calculating hazard quotients for baseline and predicted methylmercury levels in country foods using Health Canada’s pTDI for methylmercury (Health Canada, 2007).</p> <p>3. Clarify whether mercury data represented throughout the EIS represents total mercury, inorganic mercury or methylmercury.</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends including methylmercury in the list of COPCs to be monitored in fish throughout all project phases.</p> <p>See also related Advice to the Proponent: AD-31.</p> | |

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| | | | | and is also the most toxicologically significant form. The assumption of 100% of mercury in fish and other country food items being present as methylmercury ensures that the potential health risks are not underestimated. It is unclear, however, if the mercury data presented throughout the EIS represent total mercury, inorganic mercury or methylmercury. | | |
| IR-101 | ECCC | Fish and fish habitat | Section 8.1.1.3, Section 8.2.1.3 Aquatic Environment | <p>Context: In Section 8.1.1.3 Spatial and Temporal Boundaries the Project Area, Local Study Area (LSA) and Regional Study Area (RSA) are established as they pertain to surface water quantity. The same is done in Section 8.2.1.3 for surface water quality. In Section 8.1.1.3 Figure 8.1-4, the locations of the Project Area, LSA, RSA and surface water features and monitoring stations are provided.</p> <p>However, the locations of wetlands located near the Project area and within the LSA and RSA have not been provided. The location of wetlands within or near the Project footprint, as well as the other wetlands existing within the LSA can be confirmed from Part II_S9 Terrestrial Environment, Section 9.2.3.3 Figure 9.2.-8, including the wetland classifications. There appears to be at least one shallow open water wetland and several bogs located within the Project Area. There is no consideration of wetlands or potential effects to wetland hydrology, surface water or sediment quality throughout the aquatic environment assessments. There is no baseline information regarding wetlands and their status as fish habitat and ecological function, or assessment of potential effects to flow rates, water levels, water quality, sediment quality, or biota.</p> <p>Rationale: There is currently not enough information provided for ECCC to provide advice on the potential risks of the proposed Project to wetland hydrology, surface water and sediment quality within the LSA. This pathway of effects is important to assess in terms of potential effects to wetland habitat availability and quality due to changes in flow rates, water levels, water quality, sediment transport, sediment quality and potential effects to terrestrial and aquatic receptors. It is necessary to evaluate if changes in groundwater and surface water runoff flows and routing will affect water levels and habitat availability within wetlands. Potential effects from COPCs and radionuclides to surface water and sediment, or potential effects to ecological receptors within wetlands have not been evaluated.</p> | <p>1. Provide baseline information regarding wetland characterization within the Project Area and LSA, including: locations, wetland type, size, water surface elevation, depth, water flow pathways, and the presence of wildlife receptors including presence of fish/fish habitat within the Aquatic Environment section of the draft EIS. If this information is available in annexes or baseline studies, summarize it within the main body of the Aquatic Environment section of the draft EIS with references to respective documents for review.</p> <p>2. Provide baseline information on wetland surface water and sediment quality characterization for wetlands within the Project footprint.</p> <p>3. Provide an assessment of potential effects to wetlands within the LSA and potential effects to ecological receptors during all phases of the proposed Project.</p> <p>4. Provide further information on mitigation measures and monitoring that would be applied for the protection of wetlands.</p> | |
| IR-102 | ECCC | Fish and fish habitat | Section 8.1.3.1 Appendix 8-C, including Appendix II, Table 1 (p. 2) | <p>Context: Only one measured-results dataset for baseline stream flow exists that is relevant to the Project data from the Water Survey of Canada (WSC) station for Wheeler River (06DA005), and the Proponent used constructed records. The Proponent states that data from 06DA005 was used to extend local hydrometric station records and calculate baseline water quantity metrics. However, this was done</p> | <p>1. Provide more information on the extension of Project hydrometric station data using WSC station 06DA005.</p> <p>2. Discuss the accuracy of any correlations/relationships and justify any deviations from simple unit area runoff relationships in the estimation of baseline water quantity</p> | |

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| | | | | <p>through a complex combination of daily data correlation or monthly unit area runoff relationship, with or without offset, where some stations were based off constructed records instead of the real long-term dataset at 06DA005 (see Section 8.1.3.1 and Appendix II of Appendix 8-C, Table 1, p.2 (PDF p. 569)). Appendix 8-C references previous reports in its own appendices, but no equations are shown and there is no description of the accuracy of the fit, or explanation for not referring back to the one dataset (WSC station). Subsequent statistics calculated from these constructed records (e.g., 7Q10 needed for SK water licenses) would be affected by this uncertainty.</p> <p>Rationale: Fish habitat can be altered by changes to depositional and erosional patterns in streams. Confidence in the Proponent’s estimate of baseline water quantity, and by extension Project effects to fish habitat, cannot be established without a complete description of the method applied, as well as a discussion of its accuracy.</p> | <p>values for the Project hydrometric stations. Constructing records from records that are themselves constructed is not recommended.</p> <p>3. If baseline water quantity metrics need to be revised, discuss (if any) resulting changes to the effects assessment.</p> | |
| IR-103 | ECCC | Fish and fish habitat | Section 8.1.3.4 Climate Change Influenced Extreme Events | <p>Context: The Proponent notes that Intensity duration frequency (IDF) curves are used to estimate the size of water management structures around a site and that the IDF curves are often specific to climate monitoring stations.</p> <p>The Proponent used the IDF_CC Tool 5.0 developed by the Institute for Catastrophic Loss Reduction (2021) which generates Intensity Duration Frequency (IDF) curves at ungauged locations in order to estimate future IDF curve values under influences of climate change. This tool generates sub-daily values at ungauged locations by interpolation and distance weighing from gauged locations.</p> <p>Rationale: IDF trends exhibit random behavior at some locations and correlated behavior at other locations. The choice of gauged locations will infer the statistics for the ungauged locations, including the IDF trends. Without identification of the gauged locations, it is not possible to assess if the modelled data is realistic or not. If the modelled data is not accurate the design of water management structures on the site may not be sufficient resulting in the potential for impacts to the Project from flooding or extreme weather events.</p> | <p>Provide the gauged stations used to generate the sub daily duration values found in Table 8.1-6: Baseline of Intensity Duration Frequency data.</p> <p>Technical Discussion Required: Yes</p> | |
| IR-104 | ECCC | Fish and fish habitat | Section 8.1.3.4.2 Probable Maximum Precipitation (PMP) Events Appendix 8C | <p>Context and Rationale: The Proponent notes: “The probable maximum precipitation (PMP) event is a design standard value for an extreme rainfall event. The PMP event does not have an estimated return period but is instead based on the theoretical maximum amount of water that a storm could produce based on the maximum persisting dew point.”</p> <p>The Proponent provides a PMP value of 489.3 mm, which is based on data and methodologies available in 1999, taken from the</p> | <p>1. Provide a revised PMP value (using up to date data) or justify the use of a PMP that is based on data and methodologies from 1999 as opposed to a more recent time series analysis.</p> <p>2. Describe the alternative methods for determining PMP values that were considered. Include descriptions of both “statistical” outcomes and “rational” outcomes as applicable.</p> | |

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| | | | | <p>Atmospheric Environment Branch Report (1999), Report Number AHSD-R99-01. The Proponent references Appendix 8C for details. Appendix 8C contains no supplementary information other than what is already provided in Section 8.1.3.4.2.</p> <p>The assumptions and methodologies presented in the report are the results of time series analyses available in 1999. As time series evolve so do the derived statistics. In order to assess potential flood risks and impacts to the Project from flooding, data that is current and representative of the changing climate is needed. The Proponent should explain why they've used data from 1999 rather than using up to date data, describe what alternative methods for determining PMP they have considered, and describe how they will support their use of 489.3 mm as a PMP, or describe how they will generate a refreshed PMP. The main factor that influences the statistical data output is the length of the time series hence the reason to keep the statistical data. The PMP values can be substantially (>10%) different if two decades of data is used in the statistical analysis.</p> | Technical Discussion Required: Yes | |
| IR-105 | Directorate of Fisheries and Oceans (DFO) | Fish and fish habitat | Section 8.1.4.1, Potential interactions between project and valued component/key indicators Surface Water Quantity Section 8.1.4.2.2, Surface Water Taking 8.3.4.1, Potential interactions between project and valued component/key indicators | <p>Context: Table 8.1-8 and Table 8.3-6 in the EIS indicates a potential for freeze wall operation to influence groundwater interactions and surface water quantity and as a result, impact fish and fish habitat. Section 8.1.4.2.2 references Section 7 Geology and Groundwater for details on potential impacts. In addition, IR-63 notes the groundwater model does not describe the pathway in which groundwater would pass around the freeze wall during operation and any resulting potential effects on groundwater discharge to Whitefish Lake.</p> <p>Rationale: As per IR-63, the groundwater model analysis is insufficient to make conclusions on the potential effects of the freeze wall on groundwater discharge into Whitefish Lake. DFO requires this information to fully understand if altered groundwater regimes will result in changes to Whitefish Lake water levels and any potential impacts to fish and fish habitat as a result of changing water levels.</p> | <p>1. Provide a more fulsome analysis of the potential impact of freeze wall operations on local and semi-regional groundwater regimes, and subsequently to fish and fish habitat within Whitefish Lake. The analysis should provide a rationale of how the scope of the groundwater model is relevant to and able to detect changes at the scale of fish and fish habitat.</p> <p>2. If impacts to fish and fish habitat in Whitefish Lake are predicted to occur due to changes in the groundwater regime, describe any mitigation measures that could be used to avoid these impacts.</p> <p>3. If impacts are predicted that cannot be avoided, characterize residual effects on fish and fish habitat.</p> | |
| IR-106 | CNSC | Change to an environmental component due to hazardous contaminants | Section 8.1.4.2.3, Surface Water Discharge | <p>Context: It is stated in this section under construction that all site contact water will be held in the Clean Waste Rock Pond.</p> <p>Rationale: It is unclear from this section what will happen to the contact water held in the Clean Waste Rock Pond, and whether it will be removed from site or released at a later time. What is the contingency plan if more contact water is produced during construction than the Clean Waste Rock Pond has capacity for.</p> | Please indicate what will happen to the contact water stored in the Clean Waste Rock Pond during construction activities, will it be released after the wastewater treatment plant is installed? Further, please describe the contingency plan if contact water produced exceeds estimates and will exceed the volume of the clean waste rock pond? | |
| IR-107 | CNSC ECCC | Aquatic environment | Section 8.2.3.3, Existing Surface Water Quality | <p>Context: Under the methodology and metrics section (8.2.3.1) it is stated baseline water quality was sampled in 2016, 2018, and 2019. Looking at the data in Appendix A of Appendix 8D it seems that some</p> | Please clarify what data quality objectives were used for the baseline characterization data. Please provide justification whether the number of datapoints collected | |

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| | | | | <p>waterbodies have little data available for baseline characterization. For example, Whitefish Lake only has 3 and 5 samples taken between its two sample stations, with sampling frequency seeming intermittent.</p> <p>Rationale: The amount of data available for baseline water quality characterization does not seem sufficient to adequately characterize the baseline and the variation it would experience. An effective baseline characterization is vital to ensure water quality is indeed not being affected by the project. In addition, it is not clear if data quality objectives were applied to determine baseline information was adequate.</p> <p>To meet CEAA 2012 requirements, and CNSC expectations outlined in REGDOC 2.9.1, Environmental Principles Assessments and Protection Measures, the applicant is required to complete a characterization of the baseline environment.</p> <p>As described in REGDOC 2.9.1 Appendix B.2, Characterization of the Baseline Environment for Environmental Assessment Under CEAA 2012, the “baseline information should be sufficient to support the use of an aquatic dispersion model to conduct the site-specific ERA and to support an assessment of the effects of the environment on the facility or activity”</p> <p>In addition, the “applicant or licensee should include an assessment of any limitations or gaps in the quality and extent of baseline data and methods, as well as the method(s) by which they have been addressed.”</p> | <p>with inconsistent frequency in baseline surface water characterization is sufficient to meet data quality objectives and to adequately characterize the baseline, and whether Denison is confident that the data collected is enough for a robust water quality baseline characterization.</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends that additional water samples are collected and analyzed at a consistent frequency to ensure a robust baseline</p> | |
| IR-108 | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.3.3 Aquatic Environment | <p>Context: Tables 8.2-2 and 8.2-3 provide summaries of the baseline surface water quality in the LSA. No justifications for the selection of water quality guidelines have been provided. COPCs that require calculations based on other parameters such as hardness, pH, or temperature to derive guidelines (i.e., ammonia, cobalt, zinc, etc.) should be indicated within the table, with a note specifying the parameter values used in the calculations, so that thresholds may be confirmed. No baseline data for un-ionized ammonia has been provided, which is a Schedule 4 substance requiring monitoring under the MDMER. For cobalt, manganese, and vanadium, Federal Environmental Quality Guidelines (FEQGs) and/or CCME Canadian Water Quality Guidelines (CWQGs) for the Protection of Aquatic Life have not been included. A guideline of 26 mg/L has been provided for molybdenum as a Saskatchewan Environmental Quality Guidelines (SEQG), however the actual SEQG is 31 mg/L and the CCME CWQG is 0.073 mg/L.</p> | <p>1. Update Tables 8.2-2 and 8.2-3 to include all COPCs that require effluent characterization and receiving environment monitoring under the MDMER.</p> <p>2. Update Tables 8.2-2 and 8.2-3 to include missing or corrected water quality guidance thresholds, and information on values used to derive thresholds for COPCs that are dependent on general parameters.</p> | |

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| | | | | Rationale: In order to assess potential changes to surface water quality from Project related activities, ECCC requires that data on all parameters that require MDMER effluent and receiving environment monitoring be provided for assessment, including accurate water quality guidelines where available. | | |
| IR-109 | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.1.1 Aquatic Environment | <p>Context: In this section it is stated “Treated water from the IWWTP will be pumped to the three Effluent Monitoring and Release Ponds (each 3,300 m3). These ponds will be designed to hold effluent for 72 hours for testing before discharge to the environment” (p. 8-75). It is unclear what procedure will be followed if effluent in monitoring ponds does not meet discharge requirements following testing.</p> <p>Additionally, it is also stated that “Treated water in the Effluent Monitoring and Release Ponds will be monitored prior to release to a surface waterbody or injected into groundwater via deep well injection.” However, the MDMER pursuant to the Fisheries Act requires all mine effluent and seep. from the mine site that contain deleterious substances be discharged through a final discharge point.</p> <p>Rationale: In order to fully understand effluent management, more information is required regarding the procedure for managing effluent in monitoring ponds that does not meet discharge requirements. It is unclear how effluent that does not meet discharge requirements will be managed if it needs re-treatment and re-testing prior to discharge.</p> <p>ECCC reminds the Proponent that Project effluent from all final discharge points must meet federal legislation requirements.</p> | Provide further information regarding management of effluent in monitoring ponds that does not meet the requirements for discharge under the MDMER. | |
| IR-110 | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.1.1 Aquatic Environment Appendix 8-E, Section 2.1 | <p>Context: It is stated that the diffuser at the final effluent discharge point will be located in approximately 3m of water. However, in Figure 8.2-5 displaying the location of the proposed diffuser and lake bathymetry, the diffuser location seems to be located in 2-2.5m of water. A similar image in Figure 1 Section 2.0 of Appendix 8-E also indicates that the diffuser seems to be located in 2-2.5m of water. Additionally, while thermal effects are unlikely, this cannot be confirmed until a more detailed diffuser design is provided for review.</p> <p>Rationale: The Proponent should confirm the location and depth of the proposed diffuser in order to confirm that modelling predictions for effluent discharged into the receiving environment are accurate.</p> | Provide confirmation of the diffuser depth and location. ECCC requests the opportunity to review the finalized diffuser design once it is available. | |
| IR-111 | CNSC | Fish and fish habitat | Section 8.2.4.2.2, Controlled Discharge | <p>Context: This section of the EIS indicated that the scenario was assessed using a conservative assumption of a continuous freshwater withdrawal rate of 40.5 m3/hr, and a continuous effluent discharge rate of 81.0 m3/hr.</p> | Please clarify where the other half of the total volume of effluent discharged is from in the water balance between water intake and effluent. | |

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| | | | | Rationale: The withdrawal rate assessed is half of the effluent rate, it is unclear from the text where the other half of the volume of effluent is coming from, if not drawn from the lake. | | |
| IR-112 | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.2.2, Aquatic Environment Appendix 8-E, Section 1.2.1 Appendix 10-A (ERA), Section 3.1 | <p>Context: This section of the EIS states that, “for the purpose of assessing the scenario of greatest potential effects, the Project was assessed as having a continuous freshwater withdrawal rate of 40.5 m³/hr and a continuous effluent discharge rate of 81.0 m³/hr.” (p. 8-21)</p> <p>However, several sentences later it is stated that, “The approach to assessing Project-related effects on the Surface Water Quality VC was conservative for the following reasons: The assessment was based on a continuous (year-round) discharge rate at an expected average effluent discharge of 0.0101 m³/s (or 36.5 m³/hr) throughout Construction, Operation, and Decommissioning...”</p> <p>This is a continuous theme throughout Section 8, Aquatic Environment, where the discharge rate for the surface water quality assessment changes between 36.5 m³/hr and 81.0 m³/hr. However, in Appendix 10-A (ERA) the 36.5 m³/hr discharge rate is the only value used for the near and far-field modelling.</p> <p>It should be made clear in the main body of the draft EIS that the average effluent discharge rate of 36.5 m³/hr has been used as the input for the near- and far-field modelling for effluent, surface water and sediment quality predictions. The maximum upper bound discharge rate is 81 m³/hr; however, modelling for effluent, surface water and sediment quality was not completed for this discharge rate.</p> <p>Rationale: It remains unclear throughout the draft EIS that all predictions of COPC concentrations in effluent, and receiving environment surface water and sediment are based upon the effluent discharge rate of 36.5 m³/hr, and not the maximum upper bound discharge rate of 81 m³/hr. All conclusions about risk to the environment and aquatic and terrestrial biota must make this clear. If the Proponent wishes to make conclusions based on the maximum upper bound discharge rate of 81 m³/hr, modelling needs to be conducted using this rate of discharge.</p> | <p>1. Confirm that the surface water quantity, quality, and aquatic biota risk assessments and modelling, were conducted using the discharge rate for 36.5 m³/hr within the draft EIS.</p> <p>2. Revise any statements or conclusions in the draft EIS to improve clarity about the usage of the maximum upper bound discharge rate of 81 m³/hr. Remove statements regarding use of the discharge rate of 81 m³/hr during modelling and risk assessments to the receiving environment as needed.</p> | |
| IR-113 | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.2.3 and Section 8.4.7.6, Aquatic Environment | <p>Context: No quantitative assessment of climate change has been conducted. Representative concentration pathways (RPC) projections for climate change have not been integrated with near-and far-field modelling to assess impacts to surface water quality or sediment quality in the future.</p> <p>Rationale: Changes in air and water temperatures, precipitation, snow</p> | Provide a quantitative analysis of the potential impacts of predicted COPCs from mine effluent to surface water and sediment quality with climate change scenarios for the Project lifespan incorporated into modelling. Include modelling predictions regarding the influence of changes to air and water temperatures, precipitation, snow melt, | |

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| | | | | melt, ice formation, etc., due to climate change can all influence COPC concentrations in surface water and sediment. It is not possible to assess the potential impacts from climate change on predicted surface water and sediment COPC concentrations with the current information. | ice formation, etc., on COPC concentrations in surface water and sediment. | |
| IR-114 | ECCC CNSC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.2.3 and Section 8.2.4.2.4 | <p>Context: Tables 8.2-9, 8.2-10 and 8.2-13 demonstrate predicted maximum effluent concentrations of COPCs and maximum predicted receiving environment concentrations in the near- and far-field. General parameters such as temperature, pH, conductivity, etc. that would require Project thresholds and monitoring under the MDMER have not been provided in this table. Lead, nickel, TSS and un-ionized ammonia were not provided, despite all being Schedule 4 substances with maximum monthly concentrations under the MDMER. Aluminum, iron, nitrate, thallium, and manganese have not been provided despite being required parameters under Schedule 5 Section 4 of the MDMER for effluent characterization.</p> <p>For zinc, it is unclear how guidelines have been calculated when CCME thresholds can only be derived with hardness values <250 mg/L. Additionally, water quality thresholds appear to have been calculated using estimated effluent concentrations rather than receiving environment baseline concentrations.</p> <p>Mercury has been identified as a COPC of interest to Indigenous groups for the proposed Project. Table 8.2-8 indicates that background concentrations of mercury in LA-5 are low, and predicted effluent concentrations are also low. However, no information has been provided on background methylmercury concentrations or expected atmospheric deposition of mercury from Project related emissions. Predicted effluent concentrations of 3915 mg/L of sulphate are quite high, and sulphate is known to increase mercury methylation rates in aquatic environments.</p> <p>Rationale: A review of all modelling results for all COPCs under the MDMER will assist ECCC in understanding the potential risks to the receiving environment. ECCC recommends the use of the most stringent guidelines for the protection of aquatic biota. All water quality thresholds should be derived from receiving environment parameters to determine any baseline receiving environment and effluent COPC exceedances of water quality thresholds.</p> <p>Increased sulphate availability can lead to increased methylation rates of mercury and methylmercury in sediment and surface water. Methylmercury is a toxin that can bioaccumulate within the food chain and present risks to aquatic biota and wildlife consuming aquatic biota. Potential changes to methylmercury concentrations in</p> | <p>1. Update all tables to include all COPCs with required monitoring under the MDMER including acute and chronic thresholds.</p> <p>2. Ensure all selected water quality thresholds are derived using baseline receiving environment concentrations and use water quality guidelines that are protective of aquatic biota.</p> <p>3. Provide baseline data on the concentrations of methylmercury in surface water, sediment and fish tissues (i.e., large-bodied sports fish and small-bodied forage fish) in the LSA and RSA receiving environment to establish a baseline prior to potential Project impacts.</p> <p>4. Provide an assessment of risk from methylmercury to ecological receptors due to changes in sulphate concentrations in effluent, and potential deposition of mercury from Project related atmospheric emissions in the receiving environment.</p> | |

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| | | | | <p>water quality, sediment and fish tissues should be assessed due to the proposed sulphate loadings in effluent.</p> <p>Additionally, in accordance with the MDMERs, Denison will be required to demonstrate that their effluent quality meets the limits in the MDMER. Denison is expected to provide the predicted effluent quality for lead, nickel, and un-ionized ammonia to demonstrate compliance with the MDMERs.</p> | | |
| IR-115 | ECCC | Fish and fish habitat | Section 8.2.4.2.3 Aquatic Environment Appendix 10-A (ERA), Section 3.1.1.1 | <p>Context: Table 8.2-8 demonstrates baseline concentrations of COPCs in LA-5 South Whitefish Lake, their respective water quality guidelines from applicable sources, and proposed Project thresholds. General parameters such as temperature, pH, conductivity, etc. that would require Project thresholds and monitoring under the MDMER have not been provided in this table. Lead, nickel, Total Suspended Solids (TSS) and un-ionized ammonia were not provided, despite all being Schedule 4 substances with maximum monthly concentrations under the MDMER. Aluminum, iron, nitrate, thallium, and manganese have not been provided despite being required parameters under Schedule 5 Section 4 of the MDMER for effluent characterization. Water quality thresholds appear to have been calculated using estimated effluent concentrations rather than receiving environment baseline concentrations. The water quality objective selected for molybdenum is the 31 mg/L SEQG rather than the CCME guideline of 0.073 mg/L.</p> <p>Rationale: ECCC recommends the use of guidelines that will ensure the protection of aquatic biota. All water quality thresholds should be derived from receiving environment parameters to determine any baseline receiving environment and effluent COPC exceedances of water quality thresholds.</p> | <p>1. Update Table 8.2-8 to include all COPCs with required monitoring under the MDMER.</p> <p>2. Ensure all selected water quality thresholds are derived using baseline receiving environment concentrations and are at levels protective of aquatic life.</p> <p>3. Provide additional information to justify the use of the selected water quality guideline for molybdenum.</p> | |
| IR-116 | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.2.5, Section 8.4.4.2.5 and Section 8.5.4.2.3 | <p>Context: Tables 8.2-14, 8.4-9 and 8.5-5 demonstrate predicted mass flux (in mg/s) of COPCs in groundwater during the future centuries scenario. The table does not provide any information on actual surface water concentrations of COPCs or accumulation in concentrations over time. It is not possible to determine what the COPC concentrations in surface water and sediment will be during the future centuries scenario with the current information.</p> <p>Additionally, only a subset of parameters have been provided in this table based on parameters that were elevated in effluent after treatment. Groundwater may have a variety of different COPCs with elevated concentrations as it will migrate directly from the ore body area and not receive treatment.</p> <p>Rationale: It is not possible for ECCC to assess the predicted concentrations of COPCs in surface water and sediment, and therefore</p> | <p>1. Provide the predicted water and sediment quality concentrations of COPCs in the receiving environment for the future centuries scenario.</p> <p>2. Include data for a greater suite of COPCs that were assessed as having potential to be at elevated concentrations in groundwater.</p> | |

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| | | | | risk to aquatic biota during the future centuries scenario with the provided information. | | |
| IR-117 | CNSC | Human health with respect to hazardous contaminants | Section 8.2.4, Table 8.2-9 | <p>Context: CNSC staff note that some of the effluent quality predictions in the EIS are quite high for a uranium mine and mill facility compared to the existing facilities.</p> <p>For example, the upper bound effluent quality of molybdenum is 2.5 mg/L. In 2021, the highest monthly mean concentration at the existing uranium mine and mill facilities is 0.213 mg/L.</p> <p>Also, the upper bound effluent quality of copper is 0.022 mg/L. In 2021, the highest monthly mean concentration at the existing uranium mine and mill facilities is 0.002 mg/L.</p> <p>Rationale: Surface water quality models should be based on the anticipated effluent quality. From discussions with Denison, it appears that the effluent quality predictions may change based on the results of more bench scale tests that are still being conducted and continued optimization of the design of the water treatment plant.</p> | <p>Please provide the anticipated effluent quality of the constituents of potential concern during normal operations.</p> <p>Once Denison has refined the effluent quality predictions, Denison is expected to update the inputs into the surface water quality model.</p> | |
| IR-118 | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.6.1, Section 8.4.6.1 and Section 8.5.6.1, Aquatic Environment | <p>Context: It is unclear if Tables 8.2-16, 8.4-12, 8.5-7 and 8.5-8 take into consideration potential effects from groundwater seepages of COPCS to surface water and sediment quality in the future centuries scenario. No information regarding the future centuries scenario has been provided in the rationale summary for ratings.</p> <p>Rationale: Groundwater seepage of COPCs may have future impacts to surface water quality, sediment quality and aquatic receptors; however, the extent of residual effects is unclear without further information.</p> | Provide further information regarding how groundwater seep. of COPCs may have future impacts to surface water quality, sediment quality, and aquatic receptors, and any residual effects that may persist. | |
| IR-119 | CNSC | Fish and fish habitat | Section 8.3.1.2, Table 8.3-1, Sediment quality | <p>Context: Sediment quality isn't considered a key indicator for fish and fish habitat, but the accumulation of contaminants in sediment porewater without habitat alteration is similar to the key indicator 'change in surface water quality from baseline conditions' that is considered.</p> <p>Rationale: It is not clear whether sediment was just considered for physical disturbance, and why chemical changes are missing from key indicator list for fish and fish habitat.</p> | Please provide the rationale for exclusion of sediment quality from the key indicator list for fish and fish habitat. | |
| IR-120 | CNSC | Aquatic species | Section 8.3.3 and 8.5, Aquatic Environment | <p>Context: Although downstream impacts are not predicted by Denison it is important from an ecosystem perspective to establish baseline locations to monitor for potential cumulative effects to the aquatic environment due to the Key Lake and Wheeler River Operations to ensure the aquatic environment is being protected from cumulative impacts.</p> | <p>If Denison has not collected baseline aquatic studies in the far-field downstream receiving environment of Russell Lake, please provide a rationale for why.</p> <p>If a far-field Russell Lake location was sampled as part of baseline data collection, more information about the</p> | |

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| | | | | <p>Denison should consider adding a far-field exposure location and collecting baseline aquatic ecosystem baseline data in Russell Lake including:</p> <ul style="list-style-type: none">• Water quality/chemistry• Sediment chemistry/quality• Benthic invertebrate chemistry /community• Large-bodied fish tissue/chemistry <p>Rationale: Russell Lake is identified as part of the RSA for the aquatic environment, but it appears that no detailed aquatic baseline data was completed in far-field location in Russell Lake. In addition, several Indigenous Nations and communities and local resource users have indicated that Russell Lake is an important body of water both culturally for traditional use and was once used as commercial fishery.</p> | <p>process and results with regards to sampling at Russell Lake should be included in the EIS. This information would be valuable to help determine potential cumulative effects downstream in the Russell Lake drainage system (due to the Key Lake Operation) which has been identified as a key concern and area of interest by several Indigenous Nations and communities.</p> | |
| IR-121 | CNSC | Fish and fish habitat | Section 8.3.3.1, Methodology and Metrics | <p>Context: In the description of methodology for fish communities and spawning surveys, there's no mention that could be found for an any evaluation of fish condition, other than sexual condition.</p> <p>Rationale: Exposure to other pre-existing stressors could result in abnormal conditions or deformation(s) in existing population, but the extent of existing conditions should be evaluated to ascertain whether the rate is increasing as a result of proposed activities once in operation.</p> | <p>Please provide reference to where fish condition is considered or provide a justification for its exclusion.</p> | |
| IR-122 | CNSC | Fish and fish habitat | Section 8.3.8, Monitoring and Follow-up | <p>Context: Section 8.3.8 of the EIS states: "Changes in fish communities/populations will be assessed through comparison of Construction, Operation, and Decommissioning results to pre-development."</p> <p>Rationale: Tracking changes in fish communities / populations in reference lakes over time should be conducted, as reference lakes can be used to differentiate natural temporal variation with potential project impacts.</p> | <p>Please include reference lakes, and if it is provided, please reference where in the EIS these are discussed. If there are no reference lakes, these should be included in the monitoring program.</p> | |
| IR-123 | ECCC | Change to an environmental component due to radiological contaminants | Section 8.4.3.2.3, Aquatic Environment Appendix 8-D, Table 3-5 | <p>Context: Table 8.4-3 provides a summary of the baseline concentrations of COPCs in sediments in the LSA. Sediment quality thresholds and justification for the selection of those thresholds have not been provided. Table 3-5 in Appendix 8-D does provide benchmarks but the selection of benchmarks is not discussed, and the most stringent guidelines are not used for some COPCs. Additionally, there is no data provided for sediment concentrations of mercury, which is a COPC that requires surface water quality monitoring and effluent characterization under the MDMER.</p> <p>Rationale: Further information should be provided regarding any</p> | <p>1. Provide sediment quality thresholds and justification for the selection of those thresholds for comparison against measured baseline COPC concentrations in the LSA.</p> <p>2. Provide data on baseline concentrations of mercury in sediment.</p> <p>3. Identify any COPCs with baseline concentrations that exceed sediment quality thresholds in the LSA.</p> | |

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| | | | | exceedances of sediment quality thresholds in baseline concentrations of COPCs, which should be recommended for further assessment of risk due to effluent discharges. | | |
| IR-124 | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.4.4.2.3, Aquatic Environment | <p>Context: Table 8.4-7 provides maximum concentrations of surface water COPCs in sediment. The following COPCs, which are required to evaluate the risk from effluent to sediment quality, were not evaluated:</p> <ol style="list-style-type: none">1. COPCs that have monitoring requirements in receiving environment surface water and effluent under the MDMER,2. COPCs that exceed water quality guidelines in effluent, and,3. COPCs that have baseline concentrations that exceed sediment quality thresholds in the receiving environment. <p>Rationale: Due to the lack of information on COPCs with baseline concentrations that exceed sediment quality guidelines, and COPCs that require monitoring under the MDMER, a determination on risk to sediment quality and aquatic biota cannot be made.</p> | <ol style="list-style-type: none">1. Provide the information on baseline exceedances of COPCs in sediment.2. Provide an assessment of risk for any COPCs that have baseline exceedances of sediment quality thresholds in the receiving environment.3. Provide an assessment of risk from any COPCs that require monitoring in the receiving environment and effluent under the MDMER. Please include any COPCs in effluent that will exceed water quality guidelines. | |
| IR-125 | CNSC | Fish and fish habitat | Section 8.5, Aquatic Environment and Fish health | <p>Context: Indigenous Knowledge studies and information collected in relation to the Project clearly identified the importance of water quality and fish health to local Indigenous peoples and is discussed throughout the Draft EIS. For example:</p> <ul style="list-style-type: none">• “Russell is one lake where I commercially fish. How will this effluent impact the water quality, fish health? Will I be able to sell fish from here? If there is going to water” pollution, I just want to know” (19-LK-ERFNTrip-134.255) “• “How are you going to protect the water quality? We are concerned about mercury in fish, other animals, etc. Is there mercury or arsenic in the uranium solution?” (p. 8-53) <p>Rationale: Several Indigenous Nations and communities and local resources users have indicated Russell Lake is an important body of water both culturally for traditional use and was used as commercial fishery in the past and from an aquatic ecosystem perspective.</p> | <p>One of the many mitigation measures mentioned throughout the aquatic environment section states:</p> <p>“Denison will work with the associated communities to develop and implement the Project-specific monitoring programs and a framework to share the results for the purpose of assessing the performance of the water management system.” (p.10-32)</p> <p>Has Denison considered the collection of additional baseline fish tissue species that are of importance to Indigenous Nations and communities and local cabin owners from Russell Lake? Assuming the species would be walleye (commercially and recreationally) and lake white whitefish that is traditionally an important species consumed.</p> <p>Please provide more information on the engagement to date on the development of the Surface Water Management Program and Monitoring program that Denison is developing and engagement to date with interested Indigenous Nations and communities in the region on fish and fish health.</p> | |
| IR-126 | ECCC | Aquatic species | Section 8.5.3 Appendix 10-A (ERA), Section 5.3.1.1.8 | <p>Context: The Proponent has used the US Environmental Protection Agency (US EPA) guidelines for the assessment of selenium fish tissue concentrations in Section 8.5.3 of the draft EIS and in the</p> | Update the selenium fish tissue assessment in the draft EIS and the Wheeler River ERA (Appendix 10-A (ERA) in Section 10) as needed using ECCC’s FEQG. | |

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| | | | | Environmental Risk Assessment (ERA) in Appendix 10-A (ERA) of Section 10. Rationale: ECCC’s Federal Environmental Quality Guidelines of 6.7 ug/g dry weight fish whole body tissue for selenium should be used, as it is more protective than the US EPA guidelines. | | |
| IR-127 | CNSC | Aquatic environment | Appendix 8-E, Section 1.2.1, Hydrological Inputs | Context: Within this section it states that the 7Q10 low flow rate used in the mixing assessment “was provided verbally to Ecometrix by NewFields Canada during a project meeting on 26 April 2022” Rationale: The statement that this value was provided verbally is not an infallible method of communicating data, as the value could have been misheard, misremembered, or recorded improperly. | Please verify that the 7Q10 value used in the assessment is the correct value determined by NewFields. | |
| IR-128 | CNSC | Current use of lands and resources for traditional purposes | Section 9 Various pages in section 11.1, Land and Indigenous Resource Use Section 12 Section 14 | Context: The increased road traffic (14-18 trucks per day during construction/operations) may have indirect impact on ungulates, furbearers and wood land caribou presence/absence for traditional and subsistence hunting have been raised to CNSC staff when meeting with Indigenous Nations and communities and are presented in the EIS. Rationale: The increased traffic and therefore dispersal of game (moose, woodland caribou) due to increased traffic has been raised as a concern with respect to increased mortality on wildlife and decreased ability to practice traditional rights. | How have the potential residual impacts with respect to increased traffic and noise (due to current and future operations) been communicated to Indigenous Nations and communities who use the road #914 for cultural and traditional activities (such as moose harvesting, berry picking and small game and birds)? Please provide any additional information on the engagement that has taken place to date with Indigenous Nations and communities with respect to concerns and potential impacts on current use of lands and resources due to increased road traffic, and any mitigation measures proposed by Indigenous Nations and communities to minimize the potential impacts. | |
| IR-129 | CNSC | Current use of lands and resources for traditional purposes | Section 9 Section 10 Section 11, including Section 11.1.4.3.1 (p. 11-46) Section 12 Section 16 | Context: ERFN indicated they are concerned about declining moose populations from an influx of hunters; more people may be accessing the area year after year, and worried populations may be affected by the Project (21-EN-ERFN-473.13). Further, the EIS highlights that: “Vehicle collisions are the most likely source of direct mortality for moose. Effective mitigation measures (e.g., breaks in snowbanks; speed limits; and exclusion fencing around contaminated waste pads and ponds) will be implemented to reduce moose mortality.” (p. 11-46) Rationale: The Technical Guidance for Assessing the Current Use of Lands and Resources for Traditional Purposes under CEAA 2012 notes: “The views of affected Aboriginal groups on mitigation be considered and included in the EIS. This could assist in ensuring that the environmental effects on the current use of land and resources for traditional purposes are at an acceptable level for the community.” | Please provide additional information on the discussions Denison has had with Indigenous Nations and communities on how to mitigate any residual project impacts on their traditional harvesting activities of large game such as moose. More information is required to determine if Denison has engaged directly with ERFN/KML and other Indigenous Nations who utilize the area to harvest moose to determine current baseline harvest numbers that provide subsistence, continued cultural identity and community well-being, as well as discussions on how the project could potentially impact moose populations and the harvesting of moose for traditional practices. | |

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| | | | | <p>Sources for indirect moose mortality (e.g., increased hunter access, changes to health due to sensory disturbances, changes to predator-prey dynamics) may result in mortality outside the Wildlife LSA. The residual effect of change in moose mortality is likely to occur. Although mitigation measures are expected to reduce, but not fully eliminate, the residual effect on moose.</p> <p>The potential residual impact on the moose and other large game populations in the broader regional study area may potentially impact Indigenous treaty rights, culture, and community well-being if the harvesting of moose and large game declines due to increased traffic, noise, and vehicle mortality or increased outside hunting pressure.</p> | | |
| IR-130 | CNSC | Physical stressors (noise and vibration) on wildlife | Section 9, Terrestrial Environment | <p>Context: Sensory disturbances such as noise have been identified as stressors for selected wildlife (Ungulates, Furbearers, and Woodland Caribou), birds and amphibians in the project area. However, there is no consideration of impacts from vibrations on these species. Also, impacts of noise and vibration on reptiles have not been assessed in the project area.</p> <p>Rationale: While noise has been qualitatively assessed for selected wildlife, birds, and amphibians, there is no consideration of project-related vibrations as a sensory disturbance/physical stressor. Sensitive terrestrial species (specifically, herpetofauna, amphibians, invertebrates, and caribou) can be impacted by vibrations emanating from the operation of heavy machinery, blasting activities, and other anthropogenic activities at the project site.</p> <p>Also, impacts of physical stressors (noise and vibration) on reptiles were not assessed. These species should be included in this assessment due to their sensitivity to noise and vibrations.</p> | <p>Please provide a discussion of impacts of physical stressors (specifically vibrations) on wildlife, birds, and amphibians in the project area. Specific mitigation measures and/or monitoring for impacts from project-related vibrations should be considered, as appropriate.</p> <p>Also, include reptiles in the assessment of project-related noise and vibrations as sensory disturbance/physical stressor, or a justification for their exclusion.</p> | |
| IR-131 | CNSC | Migratory birds, Wildlife and Wildlife Habitat | Section 9, Terrestrial Environment | <p>Context and Rationale: As per the requirement outlined in Section 79 of the Species at Risk Act (SARA): <i>The person must identify the adverse effects of the project on the listed wildlife species and its critical habitat and, if the project is carried out, must ensure that measures are taken to avoid or lessen those effects and to monitor them. The measures must be taken in a way that is consistent with any applicable recovery strategy and action plans. This is accomplished by ensuring that the Proponent has identified, avoided, lessened and will monitor effects to species at risk.</i></p> <p>As per the CNSC’s Generic Guidelines for the Preparation of an EIS pursuant to the Canadian Environmental Assessment Act, 2012: “The EIS will then describe mitigation measures that are specific to each environmental effect identified. Measures will be written as specific commitments that clearly describe how the proponent intends to</p> | <p>Identify all species at risk listed on Schedule 1 of the Species at Risk Act and their critical habitat that are likely to be affected by the Project and describe how they may be adversely affected by the Project. Describe what measures will be taken to avoid or lessen the effects of each Project activity and stage, and how these effects will be monitored to ensure they are avoided or minimized.</p> | |

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| | | | | <p><i>implement them and the environmental outcome the mitigation is designed to address. The EIS will describe mitigation measures in relation to species and/or critical habitat listed under the Species at Risk Act (SARA). These mitigation measures will be consistent with any SARA permit, applicable recovery strategy and/or action plan”.</i></p> <p>The draft EIS neither lists the adverse effects to all listed schedule 1 SARA species, nor outlines the measures that will be taken to avoid or lessen these effects. The Proponent references that additional species-specific mitigations will be detailed in environmental management plans but has not provided those plans for review.</p> | | |
| IR-132 | ECCC | Wildlife and Wildlife habitat | Section 9, Terrestrial Environment | Context and Rationale: ECCC has identified that three species at risk arthropods (yellow banded bumble bee, transverse lady beetle, and nine-spotted lady beetle) have ranges overlapping the Project area and these were not mentioned in the draft EIS. | <p>1. Conduct an effects assessment for arthropod species at risk.</p> <p>2. Explain what mitigation measures will be used to minimize potential effects.</p> | |
| IR-133 | ECCC | | Section 9, Terrestrial Environment | Context and Rationale: There is potential for some species at risk (e.g., myotis species, barn or bank swallows, common nighthawk) to be attracted to and use mine infrastructure (buildings, roads etc.) once constructed for nesting, roosting, or foraging. | For all Project phases, describe the mitigation measures and adaptive management to prevent and minimize effects on species at risk that may utilize mine infrastructure. | |
| | | | | <p>Details on mitigation measures and adaptive management with respect to attraction to Project components should be identified to assess residual and cumulative impacts to species at risk.</p> | | |
| IR-134 | ECCC | Wildlife and Wildlife habitat | Section 9, Terrestrial Environment | Context and Rationale: The draft EIS states in multiple places that vegetation clearing may occur year-round. | Provide important roosting dates for bat species at risk in the Project area. | |
| | | | | <p>In order to correspond with the timing of emergence from hibernation, tree clearing should not be conducted during the bat roosting period. If maternity roost trees are removed after pregnant females have established a roost area, there is a higher likelihood of abortion than there would be otherwise.</p> <p>Species-specific mitigations are required to protect bat SAR.</p> | | |
| IR-135 | ECCC | Migratory birds, Wildlife and Wildlife Habitat | Section 9, Terrestrial Environment | Context and Rationale: The mitigation measures for birds and wildlife presented in the draft EIS are very general. Additional detail is required for a complete assessment of residual and cumulative Project effects to birds and wildlife. | The following information should be included in the various plans and should be provided for review during the environmental assessment: | |
| | | | | <p>The Proponent has committed to providing a number of plans including, a Decommissioning Plan, a Spill Response Plan, a Waste Management Plan, a Surface Water Monitoring Plan, a Remediation and Closure Plan, a Radiation Protection Plan, a Soil and Vegetation Monitoring Plan, a Wildlife Monitoring Plan, and a Woodland Caribou</p> | <p>1. For all Project phases, describe the species-specific mitigation measures and responses to prevent and minimize effects on migratory birds or species at risk (SAR) birds and mammals that may utilize mine infrastructure.</p> | |

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| | | | | Management Plan. In order to assess potential affects to migratory birds and wildlife from Project related activities, ECCC requires details on species-specific mitigation measures, and monitoring plans. | <p>2. Explain how light pollution will be managed and what specific mitigation measures will be used to minimize effects to migratory birds and SAR birds and mammals.</p> <p>3. Provide details on what methods will be used for erosion control and how they will prevent sediment from entering waters frequented by migratory birds or SAR. Explain what actions will be taken if the erosion control measures are not successful.</p> <p>4. Provide details on noise and other sensory disturbance monitoring and mitigations if noise levels surpass thresholds.</p> <p>5. Describe time windows and species- specific mitigations related to maintenance activities such as vegetation management, road or building repair and stream crossing replacements.</p> | |
| IR-136 | CNSC | Soil Salvage Monitoring | Section 9.1.8.2 | <p>Context: The proponent plans to salvage and stockpile soil and organic matter/peat in order to use it in reclamation activities during decommissioning. Periodic monitoring of the stockpiles is proposed to be conducted to verify that soil and organic matter/peat are delineated, stripped, handled, and stockpiled as recommended, and to evaluate the stability of salvaged soil, e.g., in relation to potential erosion and/or degradation. It is unclear whether monitoring includes soil quality in terms of concentrations of COPCs.</p> <p>Rationale: It is expected that project-related activities (road and airport traffic, drilling) can result in open-source (i.e., fugitive) dust and process-source dust (incl. radionuclides), which can accumulate and result in changes in soil quality of the stockpiled soil and organic matter/peat as described in Sections 9.1.4.2.2 and 9.1.4.2.3).</p> | Please clarify if COPC concentrations monitoring is planned to be performed for stockpiled soil and organic matter/peat. | |
| IR-137 | ECCC | Migratory birds, Wildlife and Wildlife Habitat, Vegetation and Wetlands | <p>Section 9.2.1.3, Spatial and Temporal Boundaries for Vegetation and Ecosystems, Listed Plant Species and Wetlands</p> <p>Section 9.3.1.3.1, Spatial Boundaries for Ungulates, Furbearers and Woodland Caribou</p> | <p>Context and Rationale: The CNSC’s Generic Guidelines for the Preparation of an EIS Pursuant to the Canadian Environmental Assessment Act, 2012 states that: “The EIS will describe the spatial boundaries, including local and regional study areas, for each VC to be used to assess the potential adverse environmental effects of the Project and provide a rationale for each boundary.</p> <p>Spatial boundaries will be defined taking into account the appropriate scale and spatial extent of potential environmental effects, community knowledge and Indigenous knowledge, current or traditional land and resource use by Indigenous groups, ecological, technical, social and cultural considerations.”</p> | <p>Provide a biologically relevant rationale for the delineated study boundaries (LSA and RSA) for all different valued components. Include the following information:</p> <ul style="list-style-type: none">• Descriptions of how the RSA and LSA boundaries were derived for all VCs. <p>Specific to boreal caribou:</p> <p><u>Project Footprint:</u></p> <ul style="list-style-type: none">• Include a 500-m buffer of area of maximum physical disturbance to represent functional habitat loss for boreal caribou <p><u>LSA:</u></p> | |

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| | | | 9.4.1.3.1, Spatial Boundaries for Raptors, Migratory Breeding Birds, and Bird Species at Risk | <p>The information provided in the EIS does not enable a biologically relevant assessment of the Project's effects.</p> <p>The Proponent did not provide rationale for the selection of study areas for individual vegetation, wildlife or migratory bird valued components (VC). Different VCs may have different spatial boundaries for the LSA and/or RSA. For wildlife and bird VCs, the LSA is defined as a 1.7-km buffer from the Project area, and the RSA is defined as a 6.6-km buffer around the LSA. There is no information on how the spatial boundaries were derived.</p> <p>Specific to Woodland Caribou, boreal population (hereafter referred to as boreal caribou):</p> <p><u>Project Footprint</u>: In a scientific assessment of critical habitat (Environment Canada, 2011) [1] ECCC demonstrated that the application of a 500-m buffer to mapped anthropogenic features best represents the combined effects of increased predation and avoidance on caribou population trends at the national scale. Adding a 500-m buffer to the Project footprint is required to represent functional habitat loss.</p> <p>The draft EIS does not appear to use a buffer for their Project area. The draft EIS (Section 9.3.1.3.1) states: “Project Area: the area within which the Project and all components/activities are located (i.e., the area of maximum physical disturbance). The Project Area covers 169.6 ha and is not VC-specific, but consistent throughout the EA.” (p. 9-168)</p> <p><u>LSA</u>: The defined LSA for boreal caribou has to consider avoidance of disturbed areas, predator access to undisturbed areas, reduction in connectivity and sensory disturbance. This required information is not detailed in the draft EIS.</p> <p>Adverse effects of Projects including predator and prey access to undisturbed areas, reduction in connectivity, and sensory disturbance to individual boreal caribou can vary and extend several kilometers depending on Project activities and ecological context. At minimum, the LSA should capture the above- mentioned effects. For boreal caribou, the Project footprint should be defined as the immediate area to be cleared, plus a 500-m buffer to represent functional habitat loss. Following this guidance, the LSA should be defined as a buffer of the Project footprint with the 500-m buffer.</p> <p><u>RSA</u>: The Amended Recovery Strategy for Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada states: <i>Mitigation of adverse effects from individual projects/activities will</i></p> | <ul style="list-style-type: none">• Include a description of how the LSA takes into account boreal caribou avoidance of disturbed areas, predator access to undisturbed areas, reduction in connectivity and sensory disturbance to individuals. <p><u>RSA</u>:</p> <ul style="list-style-type: none">• Include a description of how the RSA used in the draft EIS is an accurate representation of the SK1 boreal caribou range; or• Re-do the assessment with the RSA at the scale of the range <p>See also related IRs: IR-154 and IR-156.</p> | |

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| | | | | <p><i>require a coordinated approach and management of cumulative effects within and among ranges. A cumulative effects assessment is essential to position the proposed project/activity in the context of all current and future development activities. The cumulative effects assessment will:</i></p> <ul style="list-style-type: none">• <i>Assess the impact of all disturbances (anthropogenic and natural) at the range-scale;</i>• <i>Monitor habitat conditions, including the amount of current disturbed and undisturbed habitat, and amount of habitat being restored;</i>• <i>Account for planned disturbances; and</i>• <i>Assess the distribution of disturbance in large ranges for risk of range retraction in parts of the range.</i> <p>The proposed Project’s cumulative effects for boreal caribou are possible at the scale of the SK1 boreal caribou range. The RSA used for boreal caribou for this Project is only 40,173.6 ha, compared to the SK1 range, which is 18,034,870 ha. As such, it is too small to capture cumulative effects to this species and does not follow the Scientific Assessment to Support the Identification of Critical Habitat for Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada (Environment Canada, 2011) or the Amended Recovery Strategy for Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada.</p> <p>Reference: [1] Scientific Assessment to Support the Identification of Critical Habitat for Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada (Environment Canada, 2011).</p> | | |
| IR-138 | CNSC | COPC in Lichen | Section 9.2.4.2.2 Appendix 10-A (ERA) | <p>Context: A quantitative assessment using modelling dispersion and uptake of COPCs in the environment was completed for the Project as part of the ERA, to support conclusions drawn in the EIS. In Appendix 10-A (ERA), COPCs in plant tissue was estimated for lichen. Table 5-5 of the ERA (p. 5.24) named “Complete Exposure Pathways for All Selected Ecological Receptors to be Assessed using the IMPACT Model” lists the exposure pathway for lichen as direct contact on soil.</p> <p>Rationale: Airborne COPC can deposition on lichen and subsequently enter the food chain; therefore, the “contact with air” pathway should be considered. In fact, lichen species are frequently used to monitor the deposition and accumulation of airborne contaminants (e.g., dust, metals). It is also noted that based on sampling results of the 2017 baseline studies, lichen frequently contain higher concentrations of COPC than blueberry (compare Table 9.2-6 and Table 9.2-7 in the EIS), especially at sampling sites with elevated concentrations (e.g., RSV9 and RSV10).</p> | <p>Please include the exposure pathway of direct deposition (dry and wet) of airborne contaminants on lichen in the quantitative ERA, or justify why this exposure pathway was not considered.</p> <p>See also related: IR-189.</p> | |

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| IR-139 | ECCC | Change to an environmental component due to hazardous contaminants | Section 9.2.5.2.7, Waste and Hazardous Materials Management | <p>Context: In this section, the Proponent outlines various measures to mitigate air emissions, including implementation of the air quality programs within the Environmental Management System, regular maintenance and inspection of equipment, and elimination of unnecessary idling of equipment. However, the intention to use industry-standard emission control systems has not been substantiated.</p> <p>Rationale: For the protection of air quality, it is important to specify the emission standards that equipment will have (e.g., Tier 3 or Tier 4 engines). Vehicles and equipment with Tier 4 engines have much lower emissions of contaminants than those with Tier 3 engines. If non-Tier 4 engines are used, ECCC recommends that best management practices are followed, including proper maintenance of the engine and anti-idling measures.</p> | Confirm if vehicles and equipment will be equipped with Tier 4 engines where feasible. | |
| IR-140 | CNSC | Change in the Areal Extent of Wetlands | Section 9.2.6.4 | <p>Context: Predicted residual effects on the areal extent of wetlands include the direct effect of loss of wetlands and several indirect effects of alteration of wetlands. As stated in the EIS, wetlands can exhibit low resilience and high susceptibility to disturbance. At the same time, wetlands tend to support a high species diversity, and are considered to have a moderate to high potential to support listed plant species. Lastly, wetlands are rare on the landscape compared to terrestrial ecosites (see Table 9.2-5).</p> <p>Rationale: Several wetland ecosites (BS19/24, BS25, BS27) occur only in small areas (< 30 ha) in the RSA but are predicted to experience disturbance of 6-64%, most notably the ecosite BS19/24 where 0.8 of 1.2 ha are predicted to be disturbed. It is noted that wetlands are scattered throughout the landscape as shown in Figure 9.2-8. More information is requested regarding the ecological impact of this disturbance.</p> | <p>1. Please provide a discussion on the ecological impact of disturbance to rare wetland ecosites.</p> <p>2. Please provide information on whether adequate other habitat is available for species impacted in these disturbed sites in close proximity, taking into account the home ranges of susceptible species.</p> <p>3. Please provide additional information on whether wetland connectivity is maintained through the landscape within the LSA/RSA.</p> <p>See also related: IR-141.</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends that Denison conduct monitoring of species present in wetlands before and after disturbance, with a focus on listed plant species.</p> | Verify text changes |
| IR-141 | ECCC | Wetlands | Section 9.2.6.4.1 | <p>Context and Rationale: The Proponent states that: “Direct loss of wetlands has been mitigated by reducing the size of the Project Area to the extent practicable during Project design.</p> <p>However, up to 0.5 ha (less than 0.1%) of all wetlands within the Terrestrial RSA are anticipated to be removed from the Project Area during Construction (Table 9.2-16).”</p> <p>Information is not provided on whether wetlands in the terrestrial RSA are considered ecologically, economically or socially important to the region. Information on the regional importance of the wetlands that will be lost is needed in order to assess effects, including a wetland</p> | <p>1. Provide information that accounts for whether wetlands are considered ecologically, economically and socially important to the region.</p> <p>2. If the above is affirmative provide a wetland compensation plan to offset the loss. Consistent with the Operational Framework For Use of Conservation Allowance [1] a minimum ratio of 2:1 should be the starting point when determining the amount to be offset.</p> <p>[1] Available at : https://publications.gc.ca/site/eng/9.696852/publication.html</p> | |

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| | | | | compensation plan if the wetlands are considered regionally important. | See also related: IR-138. | |
| IR-142 | ECCC CNSC | Wildlife and Wildlife habitat | Section 9.3.3.2.1 Scientific Literature Review – Wolverine Section 9.3.5 Mitigation Measures Section 9.3.6 Residual Effects Evaluation | <p>Context: The Proponent did not conduct any field work to identify potential wolverine dens in the Project area and therefore did not present any mitigations for the potential impacts to wolverine dens.</p> <p>In Section 9.3.3.2.1, the Proponent states: “Denning females are sensitive to disturbance during denning season in February to April and may abandon their dens and, in some cases, their litter, which may decrease their reproductive success. “</p> <p>In Section 9.3.6, the Proponent states: “In the Project Area, 145.0 ha or 100% of available wolverine habitat is assumed to be removed and will not be available to wolverine for the duration of the Project (Table 9.3-13). Similarly, 145.0 ha (3.4%) of available wolverine habitat within the Wildlife LSA is anticipated to be removed, all from the Project Area, during site clearing in Construction. In the Terrestrial RSA, up to 0.5% (145.0 ha; from the Project Area) of available wolverine habitat is anticipated to be removed during site clearing in Construction.”</p> <p>The residual effect assessment estimates that 8.2% of available wolverine habitat within the Terrestrial RSA may be altered or lost (Table 9.3-20).</p> <p>Rationale: As Wolverine is a Species at Risk Act Schedule 1 listed species, effects need to be identified, avoided, lessened and monitored. Mitigations, such as setback distances, should be used to protect important habitat features, such as dens.</p> <p>Wolverine occupy large home ranges and, therefore, need vast tracts of undisturbed land to maintain viable populations. The species avoids most human footprint types and linear features.</p> | <p>1. Please provide additional information on whether the lost and/or altered wolverine habitat overlaps with wolverine home ranges.</p> <p>2. Describe any important wolverine habitat feature (i.e., dens) that may be lost as a result of the Project.</p> <p>3. Assess the need for pre- construction/pre-clearing surveys to identify any wolverine denning sites.</p> <p>4. Please provide additional information on whether the remaining, available, undisturbed wolverine habitat size is suitable to maintain populations.</p> | |
| IR-143 | ECCC | Wildlife and Wildlife habitat | Section 9.3.3.3, Baseline Studies | <p>Context and Rationale: The baseline caribou data is insufficient to understand potential Project impacts to this species. Presence/absence detection was provided by camera traps, incidental observations, winter track and pellet survey.</p> <p>Additional information and analyses on caribou use of the landscape during all life stages of the Project area is required to assess impacts and to determine significance of impact from the Project to caribou.</p> | <p>Provide details on the baseline caribou data including:</p> <ul style="list-style-type: none">• Revision of map 9.3-8 to include all observations, categorized by type, season and year (see also IR-145); and• Description of seasonal use of the LSA, RSA and caribou range.• Description of Project areas used by caribou.• Description of future studies planned to assess habitat use by caribou. Include specific details on how many additional years of aerial surveys will be completed to assess the caribou baseline conditions. <p>Utilizing additional data noted above and specified in IR-</p> | |

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| | | | | | 145, explain how caribou use of the area could be affected by the Project throughout all seasons and life stages (e.g., calving, post-calving, rutting, wintering). See also related: IR-152. | |
| IR-144 | ECCC | Wildlife and Wildlife habitat | Section 9.3.3.3, Baseline Studies – map 9.3-8 | <p>Context and Rationale: The mapping of caribou observations during baseline studies provided in Figure 9.3-8, “Caribou Sign Observations in the Wildlife Study Areas,” is insufficient to enable conclusions to be drawn.</p> <p>ECCC is not able to review the spatial aspect of caribou observations without a map of all available observations. Additional information is available, as stated in Section 9.3.3.3.3:</p> <p><i>“A total of 200 observations were made between 2017 and 2019 and recorded as either caribou sign (i.e., tracks, pellets, and evidence of feeding activity based on ground feeding craters and arboreal feeding evidence) or photographs (collected through the wildlife camera study) to document caribou presence in the LSA and RSA. Most observations occurred in the Terrestrial RSA, with observations concentrated in the north and southeast portions.</i></p> <p><i>Three observations occurred in the southeast portion of the Wildlife LSA, and no caribou sign was observed in the Project Area. Figure 9.3-8 provides an overview of some caribou sign observed during the baseline studies.”</i></p> | Update map 9.3-8 to show all caribou observations during baseline studies, broken down by type of observation (camera, incidental, pellet, track) and season/year when the observation was made. Include additional data from the Province of Saskatchewan (see also IR-145) to help characterize caribou use on a spatial map. | |
| IR-145 | ECCC | Wildlife and Wildlife habitat | Section 9.3.3.3, Woodland Caribou | <p>Context and Rationale: The Proponent has not provided sufficient information on how caribou use the landscape, including identification of areas for different life stages of caribou (calving, post-calving, rutting and wintering).</p> <p>The University of Saskatchewan published a report entitled Population and habitat ecology of boreal caribou and their predators in the Saskatchewan Boreal Shield. This report contains information on habitat types that are used during different life stages. Additionally, Appendix H of the Amended Recovery Strategy for the Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada 20202 [1] details habitat characteristics required by boreal caribou to carry out life processes necessary for survival and recovery.</p> <p>The scientific literature review (Section 9.3.3.3.1) on Woodland Caribou states: “While calving areas have not been documented within the SK1 range, it is recognized that caribou may use open fen and treed bog habitat types for calving during the spring/summer period. In Saskatchewan, caribou habitat used during the calving season in the SK2 range demonstrated a strong selection for treed</p> | <p>1. Provide, based off existing literature or available data and the Amended Recovery Strategy for Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada:</p> <ul style="list-style-type: none">information on known important habitat features or biophysical attributes in Project areas for different caribou life stages (calving, post-calving, rutting, wintering),a map(s) of the type and spatial extent of important caribou habitat features or biophysical attributes of the study areas as defined in Appendix H of the Recovery Strategy,<ul style="list-style-type: none">mapping should be at the RSA/LSA level as well as larger-scale mapping at the scale of the Project footprint. <p>2. Assess the potential direct and indirect effects based on additional information on caribou from bullet A above.</p> <p>See also related IRs: IR-143 and IR-152.</p> | |

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| | | | | <p>muskegs, but avoidance of jack pine, mixed hardwood stands, and roads (Dyke 2008).”</p> <p>ECCC is not able to verify the Proponent’s effects assessment without sufficient information on important habitat or biophysical attributes for caribou within the study areas.</p> <p>[1] https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/recovery-strategies/woodland-caribou-boreal-2020.html#toc0</p> | <p>Suggestions for mitigation and follow-up measures: ECCC recommends that the Proponent contact the Province of Saskatchewan to enquire about obtaining caribou telemetry data in the Project area. The data can be analyzed to determine important habitat features in the Project area.</p> | |
| IR-146 | ECCC | Wildlife and Wildlife habitat | Section 9.3.3.3.1, Woodland Caribou, Scientific Literature Review - Predation | <p>Context and Rationale: The information on impacts of predation and apparent competition for caribou in relation to the proposed Project are insufficient.</p> <p>In the section on caribou predators (9.3.3.3.1), the Proponent provided details on densities of wolves and their overlap with caribou and speaks of apparent competition. The Proponent did not examine other predators, such as black bear.</p> <p>The analysis on impacts of predation and apparent competition is insufficient since known predators have been omitted without explanation from the assessment of effects. ECCC is not able to verify the Proponent’s effects assessment since important species have not been considered in the assessment.</p> | <p>Provide further information and analyses on all potential predators of caribou, including impacts from apparent competition.</p> | |
| IR-147 | ECCC | SAR - Boreal Caribou | Section 9.3.4.2.1, Alteration and/or Loss of Habitat | <p>Context and Rationale: The process of in-situ recovery mining will likely create changes to the surface topography and potential ground subsidence as well as changes to groundwater elevations. These changes can affect the plant communities and ecosite types.</p> <p>In Section 9.3.4.2.1 the Proponent states that: “Following decommissioning and reclamation, wildlife habitat is expected to recover to baseline conditions.”</p> <p>A more thorough explanation regarding post-decommissioning landscape is required to assess Project impacts.</p> | <p>1. Provide further rationale and/or analysis regarding the return of wildlife habitat to baseline conditions post-decommissioning. Incorporate other environmental impacts including:</p> <ul style="list-style-type: none">• Ground subsidence and impacts on wildlife habitat• Changes to aquifers and impacts on wildlife habitat <p>2. Describe reclamation activities/measures, including temporal information that will be implemented to help in the recovery to baseline conditions.</p> | |
| IR-148 | ECCC | Wildlife and Wildlife habitat | Section 9.3.4.2.1, Alteration and/or Loss of Habitat | <p>Context and Rationale: ECCC analyzes disturbance for caribou at the range level, in this case within the SK1 range. However, the Proponent did not provide an adequate assessment of total disturbance at the range level. The draft EIS (Section 9.3.4.2.1 p. 9-211) reads: “The SK1 Boreal Shield Woodland Caribou Management Unit has relatively low levels of anthropogenic disturbance and was exposed to large fire disturbances in the past 40 years (ECCC 2019). Environment and Climate Change Canada (2019) identified this caribou population as</p> | <p>Provide the following in order to support analysis of habitat disturbance:</p> <ol style="list-style-type: none">1. Calculation of total disturbance including natural and anthropogenic disturbance at the range level.2. Description of effects on existing habitat at the scale of the range (for < 40% undisturbed habitat in the SK1). Include: | |

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| | | | | <p>being self-sustaining at a threshold of 40% undisturbed habitat with the total anthropogenic disturbance not exceeding 5% of their habitat. The current anthropogenic disturbance levels (without areas burnt by past forest fires) for the study areas are below this threshold (with the exception of the already disturbed Project Area) and are estimated as: 24.8 ha (14.6%) for the Project Area, 168 ha (3.5%) for the Wildlife LSA, and 599 ha (1.5%) for the Terrestrial RSA.”</p> <p>Analysis of habitat disturbance should be calculated at the range level in order to assess impacts and determine significance.</p> <p>Analysis should be consistent with the methodology described in the document Scientific Assessment to Support the Identification of Critical Habitat for Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada (Environment Canada, 2011) [1].</p> <p>[1]https://publications.gc.ca/site/eng/401605/publication.html, p. 28/41</p> | <ul style="list-style-type: none">an account (and GIS file if available) of existing habitat affected, using the following formula: (Project footprint + 500m buffer) - overlapping (permanent alteration(s) + 500m buffer) <ol style="list-style-type: none">A map of the SK1 range showing all disturbed and undisturbed habitat, including predicted disturbance (direct and indirect) resulting from the Project.Description of whether the Project is expected to compromise the ability of the range to be restored to the undisturbed habitat threshold, and provide a rationale for the conclusion. <p>See also related: IR-154.</p> | |
| IR-149 | ECCC CNSC | Wildlife and Wildlife habitat | Section 9.3.5.2, Additional Wildlife-specific Mitigation Measures | <p>Context: The EIS describes that ongoing research is performed to inform the development of a Woodland Caribou Management Plan. This includes studies on the effectiveness of linear disruption features on predator/prey movements, and a field program for long-term reclamation planning. Moreover, it is stated that the Plan will include a detailed assessment of the need for habitat offsets.</p> <p>The draft EIS Section 9.3.5.2 states: “A wildlife monitoring plan and a Woodland Caribou Management Plan will be developed to address wildlife-specific mitigation measures based on proven and accepted mitigation following standard industry guidelines and BMPs. The plans will provide guidance to avoid or minimize potential adverse effects of the Project on wildlife and wildlife habitat, including monitoring and follow-up programs, as appropriate. It will be in place during all phases of the Project and will be subject to ongoing review and revision as required. If monitoring identifies a need for additional or revised mitigation measures, a process of adaptive management (as described in the plan) will be triggered.”</p> <p>Rationale: The draft EIS does not present sufficient species-specific mitigation measures for boreal caribou. ECCC is not able to assess potential residual impacts to caribou without specific mitigations.</p> <p>Since the Woodland Caribou Management Plan is still under development, it is difficult to judge whether the measures will be adequate to mitigate and/or offset potential project effects on Woodland caribou and its critical habitat.</p> | <p>Provide the Woodland Caribou Management Plan, to demonstrate effective mitigation of potential project effects, along with wildlife-specific mitigation measures for review.</p> <p>The Plan should be informed by and consistent with the Boreal Caribou Recovery Strategy and demonstrate that avoidance and minimization measures will be applied to mitigate for predicted Project effects to boreal caribou and its critical habitat prior to considering offsetting measures. That is, the Plan should follow the mitigation hierarchy and information should be provided as outlined below:</p> <ol style="list-style-type: none">AVOID: Describe all measures that will be taken to avoid effects to boreal caribou and avoid the destruction or alteration boreal caribou critical habitat.MINIMIZE: Describe all measures that will be taken to minimize the effects to boreal caribou and minimize the destruction of boreal caribou critical habitat.RESTORE ON-SITE: describe the measures that will be taken to restore disturbed areas of the project, related to construction, operation and maintenance, on boreal caribou critical habitat, remaining after considering the avoidance and minimization measures.Characterize the risk of the adverse effects that are likely to result from the project on boreal | |

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| | | | | | <p>caribou and its critical habitat after avoidance minimization, and onsite restoration measures have been considered.</p> <p>5. OFFSET: Describe the measures that will be implemented outside the Designated Project area to mitigate adverse effects, destruction or alteration of boreal caribou critical habitat by the Designated Project during construction and operation.</p> <p>6. Characterize the risk of the adverse effects that are likely to result from the project on boreal caribou and its critical habitat after avoidance, minimization, onsite restoration, and offset measures have been considered.</p> <p>Describe all relevant uncertainties on the effectiveness of the measures to address adverse effects on boreal caribou and the rationale for the selected measure, in light of the mitigation hierarchy.</p> <p>See also related IRs: IR-149 and IR-157.</p> | |
| IR-150 | ECCC | Wildlife and Wildlife habitat | Section 9.3.5.2.1, Best Management Practices for working in Boreal Woodland Caribou Range in Saskatchewan | <p>Context and Rationale: In the draft EIS Section 9.3.5.2.1, the Proponent states: “Denison proactively initiated research to provide field-based findings on the effectiveness of linear disruption features on predator/prey movements.”</p> <p>“Results will help the development of proactive and meaningful restoration strategies as an ongoing part of the overall Project (Omnia 2022). Additionally, the 2023 field program will support a program that uses the results from the 2021/2022 Caribou Trail Study in long-term reclamation planning. The program will be led by the University of Saskatchewan and is funded by Denison, an Indigenous-owned environmental company, the Northwest Communities Environmental Services (Métis owned), Mitacs, and the Natural Science and Engineering Research Council of Canada through an alliance grant. The Caribou Trail Study and the reclamation plan will culminate with the development of a Woodland Caribou Management Plan.”</p> <p>ECCC is available to support the Proponent through review of study programs should those programs be made available during the review process.</p> <p>ECCC requests to see the 2021/2022 study to further our review of caribou use in the Project area.</p> | Provide the report for 2021/2022 Caribou Trail study for long-term reclamation planning for ECCC review. | |

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| IR-151 | ECCC | Wildlife and Wildlife habitat | Section 9.3.6.4 | Context and Rationale: In the analysis of residual and cumulative effects for woodland caribou, information and analyses on impacts to connectivity and movement across the landscape is lacking. | 1. Using available reports and data, provide an analysis of impacts to landscape connectivity for woodland caribou at the LSA and Range scales. 2. Determine whether the Project is expected to result in a reduction of connectivity within or between the ranges and provide a rationale for the conclusion. Describe how movement corridor(s) may be affected by Project activities and infrastructure. | |
| IR-152 | CNSC | Woodland Caribou Residual Effects Evaluation | Section 9.3.6.4, Appendix 9-B | Context: Baseline studies for Woodland caribou include: <ul style="list-style-type: none">• Winter Track Count Survey to assess presence, abundance, feeding activity, and ecosite affiliation;• Pellet Group/Browse Availability Survey to detect presence and abundance of caribou, and frequency of occurrence and abundance of lichen;• Covert Camera Survey to determine presence and use of linear features (roads, trails, and hand-cut lines). The Saskatchewan Conservation Strategy for Boreal Woodland caribou [1] states that caribou are very susceptible to predation during the calf-rearing period, and populations are extremely sensitive to even minor changes in mortality rates. Rationale: It is unclear if, or how, any data on seasonal and spatial use of habitat was considered in the residual effect analysis, for example summer/winter home ranges, sensitive life stages including calving (e.g., location of calving sites). It should be noted that the English River First Nation have identified caribou calving areas in the vicinity of the project footprint. Reference: [1] Saskatchewan Ministry of Environment. 2013. Conservation Strategy For Boreal Woodland Caribou (Rangifer tarandus caribou) in Saskatchewan. Saskatchewan Ministry of Environment. Fish and Wildlife Technical Report 2014. | Please provide a summary of available baseline data on habitat use during all seasons and life stages, in particular sensitive stages such as calving, and how habitat use during all seasons and life stages was considered in the residual effect analysis. See also IR-145 and IR-143. | |
| IR-153 | CNSC | Woodland Caribou Residual Effects Evaluation | Section 9.3.6.4.1 | Context: According to ECCC (2020), forest fires can directly alter habitat, making it unsuitable for boreal caribou (e.g., through loss of mature conifer stands, loss of lichens and other forage plants, barriers to movement). Boreal caribou generally do not return to burned areas for several decades until the forest is old enough to support lichens and other food sources, although they may make limited use of burned areas to feed on new growth. The residual effects evaluation of alteration and/or habitat loss lists ecosites BS3 and BS7 (regenerating forest types) as available habitat in | 1. Please provide further information on the suitability of ecosites BS3 and BS7 for Woodland caribou in different life stages. 2. Please provide the results of a residual effect analysis not including ecosites BS3 and BS7 for conservatism. 3. If 2 leads to habitat fragmentation, consider connectivity of habitat patches in the residual effect analysis. | |

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| | | | | <p>Table 9.3-22, which represent 43.5% of the Regional Study Area.</p> <p>Rationale: It is unclear whether the ecosites BS3 and BS7 (regenerating forest types) represent suitable habitat for Woodland caribou year-round. More information is required on the habitat quality (e.g., time since last forest fire) and suitability for different life stages of caribou.</p> <p>For conservatism, it is recommended to perform a second residual effect analysis not including regenerating forest ecosites.</p> | | |
| IR-154 | CNSC | Woodland Caribou Alteration and/or Loss of Habitat | Section 9.3.6.4.1 | <p>Context: Lichen, the primary food source for Woodland caribou (up to 70% of the year-round diet), can be exposed to airborne contaminants and dust deposition at distances of 1–40 km (e.g., increased metal concentrations or dust were detected in lichen at distances of 1–40 km from a mine site [1, 2]).</p> <p>Rationale: Further information is requested on how the potential for contamination of the food source “lichen” is reflected in the applied buffers of direct and indirect disturbance for woodland caribou.</p> <p>References: [1] Watkinson et al. (2021). Effects of dust deposition from diamond mining on subarctic plant communities and barren-ground caribou forage. Journal of Environmental Quality 50(4): 990-1003. doi: 10.1002/jeq2.20251. [2] Chen et al. (2017). Does dust from arctic mines affect caribou forage? Journal of Environmental Protection 8(3): 258-276. doi: 10.4236/jep.2017.83020.</p> | <p>1. Please provide additional justification for how the potential for contamination of the food source “lichen” is reflected in the applied buffers for sensory disturbance.</p> <p>See also related IRs: IR-137, IR-148 and IR-156.</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends the following:</p> <ul style="list-style-type: none">• COPC in Lichen monitoring is recommended in transects from the Project site to assess COPC concentrations and confirm whether the chosen buffer is conservative. | |
| IR-155 | ECCC | Wildlife and Wildlife habitat | Section 9.3.6.4.1, Alteration and/or Loss of Habitat | <p>Context and Rationale: In Section 9.3.6.4.1 of the draft EIS, the Proponent presents figure 9.3-14 and table 9.3-22, which “depicts available woodland caribou habitat in the Project study areas” and provide a summary of available Woodland Caribou Habitat in the Project Area, Wildlife Local Study Area, and the Terrestrial Regional Study Area.</p> <p>The Proponent does not provide a biologically relevant explanation on the ecosites that are considered available woodland caribou habitat.</p> <p>According to the amended recovery strategy for Caribou, all habitat within SK1 range has been designated as critical habitat. To align with best current knowledge and the amended recovery strategy, the map and table should show the biophysical attributes, as outlined in Appendix H of the recovery strategy.</p> | <p>1. Provide a biologically relevant explanation about how available caribou habitat was determined or determine available habitat based on new data from the province of Saskatchewan (See IR-145).</p> <p>2. Consider referencing Appendix H of the Amended Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada 2020 to define important biophysical features.</p> | |

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| IR-156 | ECCC | Wildlife and Wildlife habitat | Section 9.3.6.4.1 Section 9.3.7.3.1 | <p>Context and Rationale: In Section 9.3.6.4.1 of the draft EIS, the Proponent identified that 142 ha of available caribou habitat within the Project footprint will be directly impacted or lost, while an additional 1,165 ha will be indirectly impacted by Project activities such as sensory disturbance. They assessed the residual and cumulative effect of alteration to habitat for woodland caribou as not significant: “The residual effect of alteration and/or loss of available woodland caribou habitat is not expected to result in a change that will alter caribou habitat integrity to the point where it would not be able to sustain the regional woodland caribou population. Therefore, the effect is assessed as not significant.”</p> <p>Section 9.3.7.3.1 of the draft EIS states: “It is not expected that the cumulative effects of alteration and/or loss of habitat will alter the integrity of woodland caribou habitat within the Terrestrial RSA to the point where it is not sustainable or available to contribute to ecological functions. Therefore, the cumulative effects resulting from the Project’s residual effect interacting with residual effects from other projects and activities is predicted to be not significant.”</p> <p>For the residual effect of alteration and/or loss of available caribou habitat (Section 9.3.6.4.1, Table 9.3-24), the proponent assessed the magnitude as low, the geographic extent as local, the duration as long-term, the frequency as frequent, the reversibility as fully reversible, the context as high and the likelihood as likely. The rationale provided by the proponent is insufficient to determine the accuracy of these assessments, given the lack of data and the small size of the assessment area. ECCC does not support the residual effects assessment of low magnitude, given the uncertainties related to seasonal use by caribou in the project area and the current level of disturbance in the SK1 range.</p> <p>For the cumulative effect of alteration and/or loss of available caribou habitat (Section 9.3.7.3.3 , Table 9.3-30), the proponent assessed the magnitude as moderate, the geographic extent as beyond the RSA, the duration as long-term, the frequency as frequent, the reversibility as fully reversible, the context as high, the likelihood as likely, the significance as not significant and the level of confidence as moderate. The rationale provided by the proponent is insufficient to determine the accuracy of these assessments, given the lack to data presented for caribou and the small size of the RSA, compared to the SK1 region. ECCC does not support the conclusion of the cumulative effects assessments or for the level of confidence.</p> <p>The Amended Recovery Strategy for the Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada 2020 states that the range is currently at the 60% disturbance management threshold.</p> | <p>Provide a revised assessment of residual and cumulative effects, taking into consideration that the disturbance within the SK1 range is above the disturbance management threshold required for survival and recovery of the species.</p> <p>See also related IRs: IR-137 and IR-154.</p> | |

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| | | | | Therefore, any activity likely to result in the alteration or destruction of critical habitat may impact on the species survival and recovery. In addition, the Proponent’s assessment was based on information that was lacking data on calving, wintering and rutting areas, and connectivity and caribou movements. The absence of considerations of the regional context of disturbance does not provide a conclusion based on best available information. | | |
| IR-157 | ECCC | Wildlife and Wildlife habitat | Section 9.3.9 Ungulates, Furbearer and Woodland Caribou Summary | <p>Context and Rationale: The Proponent has committed to developing a Woodland Caribou Management Plan, which will include a “detailed assessment for the need for habitat offsets.” The Woodland Caribou Management Plan will support ECCC’s review of the Proponent’s assessment of residual effects following mitigation and offsetting.</p> <p>This plan should consider ECCC’s Operational Framework for Use of Conservation Allowances (ECCC, 2012). ECCC is available to assist the Proponent in the determination of appropriate offsets that would balance against Project adverse effects after the application of measures to avoid, minimize and restore on-site are adopted.</p> <p>Based on the Amended Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada 2020, anthropogenic impacts to local caribou populations experience a lag effect, which occurs over extended periods. This lag effect needs to be adequately considered when proposing offsets.</p> <p>ECCC is available to assist the Proponent in understanding how critical habitat is described in the Recovery Strategy and the determination of appropriate offsets that would balance against Project effects based on the predicted impacts to caribou habitat.</p> | <p>Provide the Woodland Caribou Management Plan for review. The plan should clearly demonstrate efforts to avoid and minimize any Project effects and restore on-site any disturbed areas prior to the consideration of offsetting. Details on how severity of disturbance and vulnerability of the species were considered should be explained.</p> <p>See also related: IR-149.</p> <p>Suggestions for mitigation and follow-up measures: ECCC notes that the Woodland Caribou Management Plan should clearly explain efforts to address Project effects, including any contribution to cumulative adverse effects, after it has been determined that all options in the previous steps of the mitigation hierarchy (i.e., avoidance, and minimization,) have been fully considered and applied.</p> <p>In the Woodland Caribou Management Plan, provide details on how the factors outlined in the Operational Framework for Use of Conservation Allowances (ECCC, 2012) were considered in determining the offsetting amounts, including the severity of disturbance and vulnerability of the caribou population. Important factors including time lag (the amount of time from restoration work to when the habitat would be considered caribou habitat) would also need to be considered.</p> <p>ECCC typically recommends a minimum offset multiplier of 4:1 (offset outcome: area disturbed). This is a benchmark ratio applied to a project that is in the lower end of the risk spectrum, such as one with a low severity impact adversely affecting a low vulnerability ecological component. In general, the minimum 4:1 multiplier accounts for time-lags to restoration, uncertainty in outcomes, a precautionary approach, and the adverse impact itself in its specific context. Offset multipliers are variable and determined by project-specific circumstances and associated risks and uncertainties.</p> | |

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| IR-158 | ECCC | Migratory birds | Section 9.4.1.2, Key Indicators and Measurable Parameters | <p>Context and Rationale: In Section 9.4.1.2 the Proponent outlined key indicators for “Migratory Breeding Birds” which includes Waterbirds and Waterfowl, Upland Game Birds and Migratory Songbirds. These are broad categories, which do not allow for assessment of the variation in habitat requirements or ecology of individual species or guilds.</p> <p>ECCC advises the Proponent to identify additional focal species that have the ability to represent anticipated impacts to a broader guild of species. Indicator species should be demonstrably sensitive to the potential effect of interest, and suitable for inferring effects on other species.</p> <p>Species may be grouped into guilds for assessment based on similarities in ecology or vulnerability to Project effects (e.g., species at elevated risk of collision with vehicle traffic).</p> | Identify focal species/guilds for each key indicator species within the Migratory Breeding Birds valued components. Provide an updated analysis of Project effects on migratory birds. | |
| IR-159 | ECCC | Migratory birds | 9.4.3.2.3 Baseline Studies – Migratory Songbirds Appendix 9-B, Section 2.10.2, Results | <p>Context and Rationale: Information presented in the draft EIS is insufficient to accurately predict Project impacts to breeding birds. The Proponent collected a single year of breeding songbird point counts and aerial waterfowl surveys (including avian species at risk). A single year of surveys in which birds may be unusually scarce or abundant could severely compromise interpretation of post-construction monitoring data.</p> <p>Additionally, data presented in the draft EIS is from 2017 and ECCC advises that more recent data is needed for a comprehensive baseline to verify Project impacts.</p> <p>Data from the Saskatchewan Conservation Data Centre (HABISask), the Saskatchewan Breeding Bird Atlas and the Boreal Avian Modelling project contain information on avian densities and avian species at risk that could supplement field data.</p> <p>The national standard for major projects recommends a minimum of two years of field surveys to be provided, so that temporal variability can be considered when comparing post-construction against baseline records and other available data.</p> | Supplement breeding bird point count data and aerial waterfowl data collected during 2017 with additional pre-construction field data or existing post-2017 data/modelling to provide a comprehensive baseline that can be used to verify Project impacts during construction and operational phases. | |
| IR-160 | ECCC | Migratory birds | Section 9.4.3.2.3 Baseline Studies – Migratory Songbirds | <p>Context and Rationale: ECCC advises that the results of the field studies need to be interpreted/analyzed in the context of the study area. The Proponent presents results on areas with highest richness and diversity but does not make a link to habitat that will be lost or experience indirect effects.</p> <p>Results from baseline studies as well as other supplemental information as per IR-159 should be used in effects assessment.</p> | Provide results interpreted in the context of Project direct and indirect effects. Include discussion on the habitat types that will be lost or indirectly impacted during the Project and the overall impact on the avian community, using results from the analysis of baseline studies and other supplemental data (as per IR-159). | |

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| | | | | | Discussion should support the conclusions of the effects assessment. See also related IRs: IR-161 and IR-162. | |
| IR-161 | CNSC | Bird Species at Risk | Section 9.4.3.3 Appendix 10-A (ERA) | <p>Context: For the assessment of effects on Bird Species at Risk (SAR), in the EIS it was decided to use representative species for certain SAR birds:</p> <ul style="list-style-type: none">Olive-sided Flycatcher and Common Nighthawk were selected to represent Barn Swallow.Yellow Rail and Rusty Blackbird were selected as substitutes for Horned Grebe. <p>No further rationale is provided to demonstrate that the identified surrogate species are representative of the Barn Swallow and Horned Grebe in the EIS. For example, do they share a common diet?</p> <p>Moreover, in the residual effects assessment, limited discussion is provided on the conservatism of chosen suitable habitat types for both surrogate and represented species, in the calculation of habitat loss and alteration, as well as change in mortality. For example, how does habitat for Common Nighthawk and Barn Swallow overlap (do they use identical habitat types?) and how does this affect the calculation of habitat loss and alteration used to evaluate the magnitude of residual effect?</p> <p>Finally, in the ERA, Lesser Scaup is the surrogate for Horned Grebe. Yellow Rail is also represented by Lesser Scaup but Rusty Blackbird is represented by Olive-sided Flycatcher.</p> <p>Rationale: It is unclear what criteria were applied to select surrogate species for Barn Swallow and Horned Grebe, and how the chosen surrogates relate to Barn Swallow and Horned Grebe in terms of habitat type and range, nesting, and feeding requirements etc.</p> <p>There is also inconsistency with respect to the use of surrogate species for the Horned Grebe between the EIS and ERA supporting document.</p> | <p>1. Please provide additional information to justify the selection of surrogate species for Barn Swallow and Horned Grebe in the EIS. This should include a description of the similarity of SAR and associated surrogate species and any relevant uncertainties.</p> <p>2. Please provide conservative estimates of habitat loss and alteration for the represented and not directly assessed species (Barn Swallow, Horned Grebe).</p> <p>3. Please provide clarity as to why different surrogate species are used for Horned Grebe between the EIS and ERA.</p> <p>See also related IRs: IR-160 and IR-162.</p> | |
| IR-162 | ECCC | Migratory birds | Section 9.4.3.3, Bird Species at Risk | <p>Context and Rationale: Not all avian species at risk present in the study area were included as Key Indicators in the avian species at risk (SAR) valued component (VC). Barn swallow and horned grebe were recorded in the study area, but not included as VCs. Additionally, bank swallow may inhabit the Project area. Impacts to Species at Risk Act Schedule 1 listed species need to be identified, avoided, lessened and monitored.</p> | <p>1. Explain how nesting habitat requirements of barn swallow is represented by common nighthawk and olive-sided flycatcher as a VC or assess individually each SAR that overlaps with the Project and is likely to be affected.</p> <p>2. Explain how nesting habitat requirements of horned grebe are represented by yellow rail and rusty blackbird as</p> | |

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| | | | | <p>In Section 9.4.3.3. the Proponent states: “It is acknowledged that the listed Barn Swallow (<i>Hirundo rustica</i>) and Horned Grebe (<i>Podiceps auratus</i>) could potentially occur in the Terrestrial RSA. Incidental observations occurred during the baseline studies (Appendix 9-B). To focus the effects assessment on a few key species (described in the following) it was decided to use Olive-sided Flycatcher and Common Nighthawk to represent Barn Swallow as well, and to use Yellow Rail and Rusty Blackbird as a substitute for Horned Grebe. Unlike Horned Grebe, Yellow Rail and Rusty Blackbird are also listed provincially.”</p> <p>Barn swallow, bank swallow and horned grebe may have different nesting habitat requirements than the representative species discussed in the draft EIS. An explanation of how differing species are representative of one another is required, or if an explanation cannot be provided, the species should be assessed individually.</p> | <p>a VC, or assess individually each SAR that overlaps with the Project and is likely to be affected.</p> <p>3. Assess individually each SAR that overlaps with the Project and is likely to be affected.</p> <p>See also related IRs: IR-160 and IR-161.</p> | |
| IR-163 | ECCC | Migratory birds | Section 9.4.3.3.3, Baseline Studies – Avian species at risk VCs | <p>Context and Rationale: The baseline studies and data analysis for species at risk (SAR) birds is insufficient to accurately predict Project effects.</p> <p>ECCC recommends the use of predictive modeling in relation to survey data and habitat attributes to produce distribution and density maps. Sites within the study area that support particularly high densities or diversity of an individual species, based on direct observation and, where appropriate, distribution or occupancy models, would greatly improve confidence in Project impact predictions.</p> <p>Additional information on specific habitat use or models of habitat used by SAR would facilitate a more complete analysis of Project effects.</p> | <p>Provide additional information, including mapping/modelling of specific habitat requirements for each avian species at risk or provide a justification of models used in the draft EIS.</p> | |
| IR-164 | ECCC | Migratory birds | Section 9.4.4.2.1, Alteration and/or Loss of Habitat – Migratory Breeding Birds | <p>Context and Rationale: The discussion on impacts to migratory songbirds presented by the Proponent is not sufficient to understand the impacts on various guilds of birds (e.g., aerial insectivores, forest birds, wetland birds, habitat specialists).</p> <p>As per IR-158, focal representative species/guilds should be used as key indicators (KI) in the Migratory Breeding Birds Valued Component. A greater level of detail on Project impacts to migratory songbirds with differing habitat requirements is needed for a fulsome assessment of effects.</p> | <p>1. Provide further discussion on impacts to different focal species/guilds within the Migratory Breeding Birds Valued Component.</p> <p>2. Provide mapping of important features or habitat types that will be lost due to the Project for different guilds of migratory birds.</p> | |
| IR-165 | CNSC ECCC | Birds (all species) | Section 9.4.4.2.2 Section 9.4.5.2.4, Avian Deterrence and | <p>Context: On p. 9-364 of the EIS, it is stated that exposure to hazardous materials through contact with contaminated waste ponds could affect avian health and contribute to mortality.</p> <p>However, the ERA places the avian receptors only in waterbodies and</p> | <p>Please perform an ecological risk assessment with avian receptors located at the contaminated waste ponds, including:</p> | |

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| | | | Prevention of Entrapment Appendix 10-A (ERA) | <p>locations outside of the Project area (see Figure 5-2 in the ERA), i.e., Whitefish Lake, McGowan Lake, the inlet to Russell Lake, and Kratchkowsky Lake.</p> <p>Further, there are insufficient details on the potential effects of the water quality in the water management and treatment facilities on birds, species at risk, and other wildlife, including the risk of bioaccumulation of contaminants. The Proponent should assess potential effects of water quality from these areas using applicable CCME guidelines.</p> <p>Rationale: It is unclear whether the ecological risk assessment based on the chosen exposure locations is protective and conservative for avian species potentially exposed to contaminated waste ponds on the Project site.</p> <p>While mitigation measures such as physical, visual, and/or auditory deterrents are proposed in Section 9.4.5.2.4, the possibility of avian species coming into contact with waste ponds cannot be excluded based on the available information in the EIS. The possibility of birds, species at risk, and other wildlife accessing the water management and treatment facilities for drinking water or other purposes is not discussed in the draft EIS.</p> | <p>1. Describe and analyze the possibility of birds, species at risk and other wildlife using the water or waste management facilities and provide an analysis to determine if there is a risk to wildlife that may access these areas.</p> <p>2. Identify the potential toxicity of water management ponds to aquatic migratory birds and species at risk (SAR).</p> <p>3. Describe what measures will be taken if the waters are found to be toxic to migratory birds and SAR.</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends that Denison ensure adequate mitigation measures are implemented to minimize the potential for avian exposure to pond waters.</p> | |
| IR-166 | ECCC | Migratory birds | Section 9.4.5.2 Additional Avian Species-specific Mitigation Measures | <p>Context and Rationale: Avian species-specific mitigation measures are not presented in the draft EIS. The Proponent has committed to providing a variety of environmental management plans.</p> <p>Section 9.4.5.2 reads: “Additional mitigation measures specific to the Raptors, Migratory Breeding Birds, and Bird Species at Risk VCs, in accordance with the Migratory Birds Convention Act, and tailored to Project features will be incorporated into various Project management and monitoring plans such as the, erosion and sediment controls, soil and vegetation monitoring, wildlife monitoring, the Decommissioning Plan, air quality monitoring, Spill Response Plan, Radiation Protection Plan, surface water and effluent monitoring, and Waste Management Plan.”</p> <p>Migratory birds, the nests of migratory birds and/or their eggs can be inadvertently harmed or disturbed as a result of many activities, including but not limited to clearing trees and other vegetation, draining or flooding land, or using fishing gear; this is known as incidental take. This inadvertent harming, killing, disturbance or destruction of migratory birds, nests and eggs is prohibited under the MBCA. Incidental take, in addition to harming individual birds, nests or eggs, can have long-term consequences for migratory bird populations in Canada, especially through the cumulative effects of many different</p> | <p>Provide details on species-specific mitigations for species at risk (SAR) and other avian species that will include:</p> <ul style="list-style-type: none">• details on what activity restrictions will be implemented for migratory birds and SAR and when they will be applied;• details on mitigations used during regular maintenance activities such as vegetation management (e.g., mowing), access road repair (e.g., aggregate stockpiles), and infrastructure repair;• details on methods used to detect species listed on Schedule 1 of the <i>Migratory Birds Convention Act</i> (e.g., Pileated Woodpecker) and mitigations/setback distances and timing to reduce risk to these species. | |

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| | | | | <p>incidents. For further details, please refer to the Avoiding Harm to Migratory Birds website at: https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds.html</p> <p>In order to assess the effectiveness of species-specific mitigations and need for additional mitigations ECCC requires details on the species-specific mitigation measures proposed, and the monitoring plans.</p> | | |
| IR-167 | ECCC | Migratory birds | Section 9.4.5.2.1 Work Timing Windows and Habitat Disturbance | <p>Context and Rationale: The Proponent has stated that when it is not practicable to clear outside of the breeding bird window, they will conduct pre-clearing surveys. Section 9.4.5.2.1 states: “Prior to commencing any site clearing (i.e., vegetation clearing and/or soil disturbance) during the nesting season, pre-clearing nest surveys will be conducted at that location within the Project Area.”</p> <p>ECCC does not recommend the use of nest searches or pre-clearing surveys for active bird nests during the breeding season as a mitigation, given the difficulty associated with finding nests reliably and the high likelihood of disturbing nesting birds when searching. Instead, ECCC recommends that clearing and grubbing activities not be conducted during the breeding bird season.</p> <p>The Migratory Birds Regulations 2022 (MBR 2022) brings new scenarios that need to be considered:</p> <ol style="list-style-type: none">1. Most migratory birds:<ul style="list-style-type: none">- Nests are protected only when they are in use or when live eggs or chicks are present.2. Migratory birds listed in MBR 2022 Schedule 1:<ul style="list-style-type: none">- For the 18 species of migratory birds identified on Schedule 1, the MBR 2022 provide year-round nest protection until they can be deemed abandoned.3. Migratory birds listed under SARA:<ul style="list-style-type: none">- For some SARA listed migratory birds, the residence prohibition (s.33) will protect nests that are not active, but are re-used in subsequent years, and the critical habitat prohibition (s.58) will protect nests that are part of the critical habitat identification. Those prohibitions apply everywhere in Canada and at all times of the year. In these cases, a SARA permit will be required. | <p>Provide the following information:</p> <ul style="list-style-type: none">• details on how vegetation clearing related to site development will be conducted to minimize risk to migratory birds and species at risk (SAR).• the timing window that will be used for vegetation removal to reduce risk to migratory birds and SAR | |
| IR-168 | ECCC | Migratory birds | Section 9.4.5.2.4, Avian Deterrence and Prevention of Entrapment | <p>Context and Rationale: The Proponent mentions that avian deterrents will be used on power transmission lines, buildings and other Project infrastructure. However, the Proponent does not mention any deterrents that will be used for deterring birds from the water or waste management facilities.</p> | <ol style="list-style-type: none">1. Provide information on avian deterrents to be used to prevent birds or other wildlife entering water or waste management ponds.2. Explain how proposed timing of use of deterrents will reduce risk of migratory birds making contact with | |

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| | | | | Details on deterrents for all Project components should be identified to assess residual and cumulative impacts to migratory birds. | treatment waters outside of the nesting season (i.e., during migration and stop overuse). 3. Explain which deterrents will be used, which deterrents were considered, and what alternative, adaptive measures will be considered if deterrents are unsuccessful for any Project components. | |
| IR-169 | ECCC | Migratory birds | Section 9.4.6.3, Residual Effects Evaluation for Migratory Birds, Table 9.4-15 and Map 9.4-11 | <p>Context and Rationale: The analysis of available habitat types for migratory songbirds appears incorrect.</p> <p>In their interpreted ecosite mapping, the Proponent identified 25 different ecosite types. In their table 9.4-15 and map 9.4-11, the Proponent only lists 8 ecosite types that are available migratory songbird habitat. Section 9.4.6 Residual Effects Evaluation for Migratory Songbirds reads: “Considering the baseline data (Appendix 9-B), migratory songbird habitat is described in the following text without species-specific differentiation and referred to as available habitat for migratory songbirds. Based on the baseline study results, 66.8%, 52.2%, and 50.7% of the Project Area, Wildlife LSA, and Terrestrial RSA, respectively, are assumed to provide available habitat for migratory songbirds (Table 9.4-15).”</p> <p>All Project areas, except some anthropogenic features and open water, would be considered available habitat for migratory songbirds. Although some ecosite types may have lower density and diversity, it is expected that all ecosites provide migratory songbird habitat.</p> | 1. Explain how information in Table 9.4-15 and map 9.4-11 were derived. 2. Explain why other habitat types were not considered as available habitat for migratory songbirds. | |
| IR-170 | ECCC | Migratory birds | Section 9.4.6.4, Residual Effects Evaluation for Bird SAR, Table 9.4-19 | <p>Context and Rationale: The table and map presented by the Proponent do not appear representative of all available habitat for common nighthawk (CONI). Although CONI do preferentially use open areas such as gravel (often an anthropogenic disturbance) and regenerating forest, as identified in the draft EIS, they also use rock outcrops that can be within forested areas. As this area lies within the pre- Cambrian shield, there are likely rock outcrops that are also available habitat.</p> <p>As aerial insectivores, CONI select nesting areas in close proximity to wetlands or lakes where there is abundant forage.</p> <p>Habitat requirements and preferences for all species at risk is required for developing effective mitigations and adaptive management.</p> | 1. Provide an updated table and map that considers all available habitat for common nighthawk. 2. Additionally, as part of environmental management plans the Proponent should include species-specific mitigations that are biologically relevant to all the species at risk for all Project phases and components. | |
| IR-171 | ECCC | Migratory birds | Section 9.4.6.4, Residual Effects Evaluation | <p>Context and Rationale: Section 9.4.6.4 Residual Effects Evaluation for Bird SAR – Common Nighthawk reads: “Progressive reclamation is anticipated to begin during Construction. However, a conservative approach is used, with Common Nighthawk (CONI) habitat in the</p> | Develop mitigation plans appropriate for avoiding collisions of common nighthawks with vehicles, when and where nighthawks are observed foraging near or roosting on gravel roads. Demonstrate how the planned mitigation | |

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| | | | | <p>Project Area considered to be unavailable for the duration of the Project, only becoming available as habitat following Post-Decommissioning (i.e., during the regeneration of vegetation following Decommissioning).”</p> <p>CONI may nest on the roadsides of access roads within the Project area. As such, the Project area should still be considered available habitat for the duration of the Project and appropriate mitigations and adaptive management should be discussed for this species.</p> | <p>activities will result in reduced residual effects from this pathway.</p> | |
| IR-172 | CNSC | Birds (all species) | Section 9.4.6.4.2 | <p>Context: Populations of listed species may be less resilient to changes in mortality.</p> <p>CSA N288.6:22 Clause 7.2.4.3 states that effects on a few individuals of endangered, threatened, or vulnerable species would not be acceptable.</p> <p>The residual effects assessment for “Change in Mortality” for bird species at risk states that Project mitigation measures identified in Section 9.4.5 are expected to limit interactions between bird species at risk and potential sources of direct and indirect mortality. However, the mitigation measures are not discussed with respect to their effectiveness to limit interactions, specifically for bird species at risk.</p> <p>Rationale: It is unclear if the proposed mitigation measures are effective in preventing mortality in bird species at risk for which even only a few deaths could negatively impact the population.</p> | <p>Please provide a discussion on mitigation measures with respect to their effectiveness in minimizing mortality for bird species at risk, for which effects on a few individuals would not be acceptable.</p> | |
| IR-173 | ECCC | Migratory birds | Section 9.4.8 Monitoring and Follow-up | <p>Context and Rationale: Monitoring and follow up programs are part of adaptive management and implementation of additional mitigations.</p> <p>In Section 9.4.8 the Proponent states: “Considering the Project planning, baseline survey results, and proposed mitigation measures, no follow-up programs are considered to be warranted at this time.”</p> <p>Project impacts related to mortality of birds, such as collisions with the transmission line, mortality along roads and use of waste and water management facilities should be monitored during all phases of the Project and adaptively managed.</p> | <p>Provide details on the follow-up program to monitor impacts to avian mortality. The follow-up plan should include:</p> <ul style="list-style-type: none">• Monitoring of avian use of waste and water facilities• Monitoring of mortality along access roads• Monitoring of mortality related to transmission lines• Monitoring of effectiveness of avian deterrents. | |
| IR-174 | ECCC | SAR - Bats | Appendix 9-B, Denison Mines Corporation Wheeler River Project, Terrestrial Environment, Wildlife and Vegetation | <p>Context and Rationale: The Proponent conducted acoustic surveys for bats and confirmed presence of two Species at Risk Act (SARA) schedule 1 listed bat species in the Project area, little brown myotis (<i>Myotis lucifugus</i>) and northern myotis (<i>Myotis septentrionalis</i>). However, the Proponent did not do an effects assessment of either of these bat species.</p> | <p>1. Conduct an effects assessment for little brown myotis and northern myotis, including the likelihood that tree clearing during the bat roosting period, is likely to ‘kill’, ‘harm’, or ‘harass’ Little Brown Myotis and Northern Myotis and its ability to carry out its life processes.</p> | |

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| | | | Baseline Inventory, Section 2.1.4 Acoustic Bat Surveys | Although bats are present in the study area, no work was done to identify hibernaculum or maternal roosting sites. All species at risk that are expected to be present in the Project area should be assessed and species-specific mitigations detailed. | <p>2. Describe and map locations of suitable myotis hibernacula and/or maternal roost habitat within the Local Study Area and Regional Study Area and explain how these habitats may be affected by Project activities.</p> <p>3. Describe what mitigation measures will be taken to avoid the breeding period for bats.</p> <p>4. Describe any pre-construction/pre- clearing surveys will be conducted to identify any hibernaculum and maternal roosting sites. Describe how monitoring will support adaptive management.</p> | |
| IR-175 | CNSC | Provincially Listed Species | Appendix 9-B; section 2.2.2 | <p>Context: Vegetation and wildlife habitat characterization field surveys were completed in 2017, based on which ecosite factsheets were prepared. The factsheets list observations of two provincially listed plant species with a rank of S3 (vulnerable/rare to uncommon; Table 2.4-2) according to the Saskatchewan Conservation Data Centre, which are not discussed in the main EIS document:</p> <ul style="list-style-type: none">• Angle-leaved sundew (<i>Drosera anglica</i>) observed in ecosites BS19, BS20, BS22, BS25• Neat Spike-rush (<i>Eleocharis nitida</i>) observed in ecosite BS25 <p>Table 9.2-12 in section 9.2.6.2.1 of the EIS indicates that there may be indirect disturbance to some of these ecosites (BS19, BS20, BS25). In section 9.2.6.3.1 it is discussed that listed plant species are not likely to return once lost from a specific location.</p> <p>Rationale: Given that not all areas in the revised Project footprint were surveyed for listed plant species in baseline studies, there is uncertainty as to whether any species were missed, in particular those that have been observed in ecosites present in the LSA/RSA (e.g., <i>Drosera anglica</i> and <i>Eleocharis nitida</i>, see also Appendix 2 Table of Appendix 9-B). It should also be noted that rare plant surveys were completed in summer 2017 only (section 2.4.2 of Appendix 9-B), which may underestimate annual rare species that may be dormant in the seed bank in some years due to specific seed emergence requirements.</p> <p>It is acknowledged that the proponent committed to pre-construction listed plant surveys targeted on ecosites encountered in the Project Area but not previously surveyed, as well as ecosites within the Project Area with high potential to support listed plants.</p> <p>More information is requested on the potential indirect effects on rare plant species as well as the planned pre-construction surveys.</p> | <p>1. Please provide a discussion on the potential risks from indirect effects on ecosites with observed rare plant species</p> <p>2. Please provide additional information on the ecosites included in the planned pre-construction listed plant surveys</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends focusing monitoring on ecosites that have known observations of listed plant species outside of the Project Area (e.g., BS19, BS20, BS22, BS25).</p> | |

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| IR-176 | CNSC | Human Health with respect to radiation exposure | Section 10.1.4.2.1 Section 10.1.6.1.4 Appendix 10-A (ERA) | <p>Context: In section 10.1.4.2.1, the proponent provides an evaluation of air quality constituents of potential concern to human health. It states: “A screening value for radon gas of 200 becquerels per cubic metre (Bq/m3) was available from Health Canada, which applies to total radon including background sources (Health Canada 2009). The radon concentrations which were predicted are incremental concentrations (i.e., above background) and were therefore compared to the applicable incremental screening value of 60 Bq/m3 for indoor air established by the Canadian Nuclear Safety Commission (CNSC) (Health Canada 2010a; Radiation Protection Regulations. SOR/2000-203).”</p> <p>The 60 Bq/m3 radon concentration value also appears in section 7.1.2 of Appendix 10-A (ERA).</p> <p>Further in section 10.1.6.1.4, it is stated: “Radon dose was calculated separately from the dose due to other radionuclides; however, the predicted radon concentration was compared against the CNSC incremental concentration limit of 60 Bq/m3.”</p> <p>The Radiation Protection Regulations do not stipulate a limit for radon above background for sites licensed by the CNSC. The effective dose limits for Nuclear Energy Workers (NEWs) and persons that are not NEWs are listed in section 13 of these regulations, and in subsection 1(3) of these regulations for the general public.</p> <p>The annual effective dose from all sources associated with the licensed activities and within the scope of the Nuclear Safety Control Act and Regulations must be compared to the applicable effective dose limit. For members of the public this limit is 1 mSv per calendar year.</p> <p>In Section 4.2.5.3 of Appendix 10-A (ERA), there appears to be no reference mentioned for the radon equilibrium factors. These factors are a significant input into the dose calculations for radon.</p> <p>Rationale: The reason for the requested change is to ensure consistency with the Radiation Protection Regulations.</p> | <p>The EIS and appendices should be aligned with the Radiation Protection Regulations by:</p> <ol style="list-style-type: none">1. Removing the reference to a 60 Bq/m3 limit.2. Reporting the assessment results as the total dose, from all radionuclides combined including radon progeny, and by comparing this annual effective dose to the effective dose limit. <p>Provide a summary of the conservative assumptions that have been included in the dose calculations.</p> <p>Provide a reference that shows how the radon equilibrium factors were determined.</p> | |
| IR-177 | HC | Change to an environmental component due to radiological contaminants | Section 10.1.4.2.1 (p. 10-22) Appendix 10-A (ERA): Appendix B Table B.9, Ref. 19-2638 | <p>Context: Section 10.1.4.2.1 states that, “Screening values for radionuclide concentrations in ambient air were not available. All relevant radionuclides were assessed in the HHRA in terms of their contribution to the total radiological dose to human and ecological receptors” (p. 10-22).</p> <p>Section 10 Appendix 10-A (ERA) states that, “No formal screening was conducted for radionuclides. However, since radiation dose to human</p> | <ol style="list-style-type: none">1. Assess predicted radionuclides in Section 10 Appendix 10-A (ERA) using appropriate available screening values. Alternatively, provide a justification for why a screening wasn’t conducted for radionuclides despite the availability of screening values (e.g., ICRP 96 and NORM Guidelines, 2011).2. Clarify if uranium progenies in air are considered in the | |

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| | | | Section 6, Table 6.1-1 (p. 6-7) | <p>receptors is of public and regulatory interest, the radionuclides in the uranium-238 decay series are carried forward as COPCs for further assessment” (Appendix 10-A (ERA): Appendix B Ref. 19-2638).</p> <p>Table 6.1-1 lists radionuclides as a key indicator for air quality, but only uranium and radon are considered in Section 6, and Section 10 Table B.9 does not include doses from uranium progeny in air.</p> <p>Rationale: Health Canada recommends using screening values that are available for radionuclides if they are appropriate for the dose and if the screening values have listed assumptions (such as particulate size and worker exposure time that can be adapted to in Denison’s models). Two examples are ICRP 96, which CNSC uses in their regulatory reports to derive reference air quality values for Pb-210, Ra-226, and Th-230 (CNSC: Regulatory Oversight Report for Uranium Mines and Mills in Canada 2019); and Health Canada’s Guidelines for Management of NORM (Health Canada: Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials, 2011).</p> | atmospheric transport and air quality modelling and are simply not reported, or if they are not included in the models because no screening criteria are available. | |
| IR-178 | HC | Change to an environmental component due to hazardous contaminants | Section 10.1.4.2.1 (p. 10-22) Section 6.1.4.2, Potential Project Related Effects (p. 6-31) | <p>The Baseline + Project scenario was not provided for radon levels.</p> <p>Context: Section 6.1.4.2 states that the predicted levels for radon were not added to the respective baseline air quality levels (p. 6-31), and further explains that “In all modelled phases of the Project, annual average radon concentrations at receptors beyond the Property Boundary are expected to be indiscernible from background levels.”</p> <p>In Section 10.1.6.1.4, a different approach to evaluating predicted radon levels is mentioned: “the predicted radon concentration was compared against the CNSC incremental concentration limit of 60 BQ/m3”(p. 10-44).</p> <p>Rationale: Without a rationale as to why baseline levels of radon were not included in the assessment, HC cannot fully evaluate the appropriateness of the air quality assessment. While Health Canada is of the opinion that using background radon levels as a screening value is appropriate in this case from a health perspective, different approaches to screening predicted radon levels in different sections appear to be used (i.e., background radon levels vs. CNSC incremental concentration).</p> | <p>1. Provide further information on whether and how baseline radon concentrations in air were determined.</p> <p>2. Include baseline radon concentrations in the predicted total concentrations when comparing to existing guidelines; alternatively, provide a rationale for why baseline concentrations of radon were not included.</p> <p>3. Discuss the potential health implications of the project-only increment-over-baseline radon levels</p> | |
| IR-179 | CNSC | Groundwater quality decommissioning objectives. | Section 10.1.4.2.2, Release of Treated Effluent to Whitefish Lake During Decommissioning | <p>Context: It is stated that “This process would continue until the recovered water meets acceptable groundwater quality decommissioning objectives”.</p> <p>Rationale: The information provided does not include groundwater</p> | Please provide groundwater quality decommissioning objectives or a reference to the information. | |

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| | | | | quality decommissioning objectives nor a reference to these objectives. | | |
| IR-180 | CNSC | Human health with respect to hazardous contaminants | Section 10.1.6.1.1, Human Receptors Selection and Characterization | <p>Context: Within the Human Health assessment, offsite receptors during the operation period are only considered downstream of Whitefish Lake. The only identified concern was for Se to the Fisher/Trapper located at Russel Lake. This section cites Indigenous Knowledge as informing the receptor selection and location.</p> <p>Rationale: While the assessment is fairly conservative in the assumptions made on intake and receptor habits, it stands to reason that if the trapper receptor was located closer to the operation, such as at McGowan or Whitefish Lakes, this exceedance of Se could be more pronounced.</p> <p>In terms of maintaining a conservative assessment, if the most vulnerable receptor can be shown to be protected at the point of highest expected COPC concentration, it can be concluded that this receptor would be protected further away from the project. Considering this, why was the hunter/trapper receptor not also assessed at Whitefish or McGowan Lake? Was Indigenous Knowledge specific in mentioning Whitefish or McGowan Lakes were not used for the activities carried out by identified receptors?</p> | <p>Please provide justification for excluding a receptor from occupancy at lakes closer to the project during operation (McGowan, Whitefish). Alternatively, conduct a risk assessment to a receptor at these lakes during operation to determine if there is a predicted risk that may require monitoring or mitigation.</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends the following:</p> <ul style="list-style-type: none">• Assessment of a receptor located closer to the point of effluent release may need to be considered to ensure there are negligible risks• If Se is expected to exceed hazard quotients further upstream, selenium removal technology may be required as part of the effluent treatment process as a mitigation measure. Other COPC's exceeding an HQ of 1 may also be identified under this process that could require specific monitoring or mitigation measures. | |
| IR-181 | CNSC | Human Health with respect to radiation exposure | Section 10.1.6.1.4 | <p>Context: In section 10.1.6.1.4, it is stated: “The maximum incremental radon concentration at the camp worker site during Operation was predicted to be 12.4 Bq/m3, which is below the CNSC limit of 60 Bq/m3 for incremental radon.”</p> <p>As per IR-176, there is no such CNSC limit for incremental radon.</p> <p>The camp worker would be considered a person who is not a nuclear energy worker (NEW) and subject to the dose limits of section 13 and 14 of the Radiation Protection Regulations, not the dose limit for the general public as per subsection 1(3) of the Radiation Protection Regulations. The CNSC has regulatory requirements for the ascertainment and recording of doses of radiation as per section 5 of the Radiation Protection Regulations. Every licensee must ascertain and record the magnitude of exposure to radon progeny, the effective dose and equivalent dose received by and committed to a person who performs duties in connection with any activity that is authorized by the Nuclear Safety and Control Act or is present at a place where that activity is carried on.</p> <p>The camp worker performs duties in connection with the licensed activity and is present at the location where the activity is carried out. Hence, they are not considered to be a member of the general public</p> | <p>The EIS and appendices should be aligned with the Radiation Protection Regulations by:</p> <ol style="list-style-type: none">1. Removing the reference to a 60 Bq/m3 limit for incremental radon.2. Revising all references to the ‘public dose limit’ applied to camp workers (non-NEWs) to align with section 13 and 14 of the Radiation Protection Regulations. <p>The proponent should explain why the radon dose for the camp worker appears as 0.13 mSv/year in one instance and 0.02 mSv/year in another.</p> <p>The proponent is also asked to provide the rationale as to why a non-NEW has a higher radon dose than a NEW.</p> | |

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| | | | | <p>(who has no connection with the activity)</p> <p>Further, the proponent indicates that the maximum incremental radon dose to the camp worker was estimated to be 0.13 mSv/year during Operation. The assessment assumes that the camp worker spends 100% of the time indoors. Table 10.1-11 shows the maximum total incremental dose for the camp worker to be 0.02 mSv/year. This appears to be a discrepancy.</p> <p>Table 5.2 in Appendix 10-C provides internal annual dose from radon inhalation. The radon doses to some NEW workers (9.44E-02 mSv/a Driller 1 and 1.03E-01 mSv/a Wellfield Operator 1, 2) here appear less than the radon dose (0.13 mSv/year from section 10.1.6.1.4) to the camp worker, who is a non-nuclear energy worker.</p> <p>Rationale: The reason for the requested change is to ensure consistency with the Radiation Protection Regulations and the environmental impact statement.</p> | | |
| IR-182 | HC | Change to an environmental component due to radiological contaminants | Section 10.1.6.1.4, (p. 10-44) | <p>Context: Section 10.1.6.1.4 states, "The limit is incremental and is exclusive of natural background, such as natural levels of radon and medical exposures. A dose constraint of 0.3mSv/yr was established for the public from all radionuclides and all pathways for the Project, as recommended by Health Canada (2010a). The dose constraint represents a dose lower than the public dose limit that ensures the combined dose from multiple sources does not result in exceedance of the public dose limit. Radon dose was calculated separately from the dose due to other radionuclides; however, the predicted radon concentration was compared against the CNSC incremental concentration limit of 60 BQ/m3" (p. 10-44).</p> <p>Rationale: Calculating radon separately from all radionuclides may underestimate the health risks by not considering combined doses from multiple sources when comparing to the public dose limit constraint of 0.3 mSv/yr recommended by Health Canada (2010a).</p> | 1. Provide clarification on how combined doses from all sources would be accounted for in respecting the public dose limit of 0.3 mSV/yr if radon concentrations are being calculated separately. | |
| IR-183 | CNSC | Human Health with respect to radiation exposure | Section 10.2 Appendix 10-C | <p>Context: Exposure scenarios for workers have been identified and high-level summaries of the assumptions and resultant dose estimates have been provided. However, the detailed dose calculations have not been provided.</p> <p>Rationale: The method used to estimate effective, equivalent and committed dose is required to be verified. Sample dose calculations should be included, to confirm use of acceptable input data, for at least the most dose significant scenarios.</p> | Provide the dose calculations for deriving the dose estimates for workers in all exposure scenarios, for at least the most dose significant scenarios. | |

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| IR-184 | CNSC | Human Health with respect to radiation exposure | Section 10.2 Appendix 10-C, 2.0 | <p>Context: It is stated in Appendix 10-C, section 2.0 that: “In addition, the CNSC has proposed a 100 mSv 5-year equivalent dose to lens of eye, in accordance with recent recommendations of the International Commission for Radiological Protection (ICRP, 2012a). This implies an average annual equivalent dose to lens of 20 mSv/a and will be considered as an applicable dose limit for workers.”</p> <p>As per section 14 of the Radiation Protection Regulations, the equivalent dose limit for the lens of an eye for nuclear energy workers (NEWs), effective January 1, 2021, is 50 mSv in a one-year dosimetry period.</p> <p>Rationale: The reason of the requested change is to ensure consistency with the Radiation Protection Regulations.</p> | The EIS and Appendix 10-C should be aligned with the Radiation Protection Regulations regarding the equivalent dose limit for the lens of an eye for NEWs. | |
| IR-185 | CNSC | Human Health with respect to radiation exposure | Section 10.2.3.2 Appendix 10-C Table 3.10-3.12 | <p>Context: The Geometries for External Exposure Scenarios Modelled in MicroShield for Sources in various locations were provided in tables 3.10-3.12 in appendix 10-C. The doses from those scenarios were omitted.</p> <p>Rationale: The method used to estimate effective, equivalent, and committed dose is required to be verified. Sample dose calculations should be included, to confirm use of acceptable input data.</p> | The proponent is asked to provide all the necessary information and assumptions required to perform the MicroShield calculations independently and to list the resulting calculated values from the listed scenarios. | |
| IR-186 | CNSC | Human Health with respect to radiation exposure | Section 10.2.3.2.4 Section 10.2.3.2.6 Section 10.2.4 Appendix 10-C, Section 3.2 | <p>Context: In sections 10.2.3.2.4 and 10.2.3.2.6, as well as section 3.2 of Appendix 10-C, the proponent has stated that workers in the drying and packaging areas of the processing plant will be required to wear powered air purifying respirators (PAPR) to reduce/eliminate inhalation exposure.</p> <p>Further in section 10.2.4, which elaborates mitigation measures, it is stated: “For the drying and packaging/loading areas of the ISR plant, use of PAPR has been assumed. It will be needed in these areas, and it has been planned in these areas to substantially reduce doses from inhalation of uranium dust. Dust levels in these areas will be monitored and kept ALARA.”</p> <p>The use of respirators appears to be in contradiction of the requirements of section 13 of the Uranium Mines and Mills Regulations, which states: <i>No licensee shall rely on the use of a respirator to comply with the Radiation Protection Regulations unless the use of the respirator (a) is for a temporary or unforeseen situation; and (b) is permitted by the code of practice referred to in the licence.</i></p> <p>The proponent is also reminded that respirators should not be the first choice for dose reduction in workplaces. They should only be used when the hierarchy of control (elimination, substitution, engineering,</p> | <p>Provide the rationale for mandating the use of respirators by workers in the drying and packaging areas of the processing plant.</p> <p>Include the demonstration of the application of the hierarchy of control for radiological protection within the design of these areas of the processing plant.</p> <p>Justify that this approach complies with section 13 of the Uranium Mines and Mills Regulations.</p> | |

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| | | | | or administrative controls) is not possible. Rationale: At this stage of the project, the proponent is expected to identify design improvements to these areas of the ISR plant/processing plant following the hierarchy of control for the radiological protection of workers, as per regulatory requirements and as described in REGDOC-2.7.1, <i>Radiation Protection</i> . | | |
| IR-187 | CNSC | Human Health with respect to radiation exposure | Section 10.2.3.2.4 Section 10.2.3.2.6 Appendix 10-C, Section 3.3, 6.0 | Context: The exposure scenarios and assumptions for the workers in the drying area and the packaging/loading area of the processing plant include the wearing of PAPRs, which is assumed to provide a 1000-fold reduction in dust exposure. Further to reference IR-186, the use of a respirator as well as in worker dose predictions for the project, appears to contravene section 13 of the Uranium Mines and Mills Regulations, and does not follow the hierarchy of controls for radiological protection of workers as described in REGDOC-2.7.1, <i>Radiation Protection</i> . Rationale: At this stage of the project, the proponent is expected to identify design improvements to these areas of the ISR plant/processing plant following the hierarchy of control for the radiological protection of workers, as per regulatory requirements and as described in REGDOC-2.7.1, <i>Radiation Protection</i> . | Modify the exposure scenarios and assumptions (i.e., remove the use of a respirator) for the workers in the drying area and the packaging/loading area of the processing facility. Assess the resultant exposures against CNSC regulatory dose limits and the ALARA principle. Identify mitigation measures as per the hierarchy of control for radiological protection. | |
| IR-188 | CNSC | Human Health with respect to radiation exposure | Section 10.2.4 | Context: The following is stated in section 10.2.4: “Dust inhalation is also a potentially substantial component of worker dose at the core shack. At this location, PAPR will not be required; however, N95 masks will be used, and dust levels will be monitored here...It may be possible to increase air exchange in the core shack, above the planned six exchanges per hour, should this be necessary. This would also reduce radon exposure in the core shack.” If it is possible to increase air exchanges in the core shack, it is not clear why this was not assessed and incorporated in the design of the core shack. Rationale: It appears that a control measure (e.g., air exchange protocols in the core shack) to reduce the exposure to workers has been identified. However, it is not certain if it has been formally documented to ensure that it is incorporated in the engineered design of the core shack. | Provide details on how the control measures to reduce the exposure to both workers through the air exchange protocols in the core shack have been formally documented to ensure that it is incorporated in the engineered design of the core shack. | |
| IR-189 | CNSC | Woodland Caribou Ecological Model | Appendix 10-A (ERA) | Context: In the ERA (p. C.12, section 2.3.6 Woodland Caribou) it is stated: “For the ecological model a diet comprised of 50% browse, 20% lichen and 30% macrophytes is assumed for the woodland caribou.” | Please provide additional evidence to support that those Woodland Caribou who may have higher consumption rates of lichen as part of their diet, will remain protected. This can be provided through including a second model | |

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| | | | | <p>In the EIS, section 9.3.3.3.1, it is stated: “Research has shown that up to 70% of the year-round diet of caribou may consist of ground and arboreal lichens.”</p> <p>Rationale: It is unclear whether the assumptions in the ecological model in the ERA regarding Woodland caribou diet are conservative, given only 20% lichen intake in the model. Lichen is known to accumulate COPC such as metals and dust from the atmosphere.</p> | <p>that assumes 70% lichen in the diet.</p> <p>See also related: IR-138.</p> | |
| IR-190 | HC | Change to an environmental component due to hazardous contaminants | <p>Appendix 10-A (ERA), Table 3-8 (p. 3.31) and Table 3-9 (p. 3.36)</p> <p>Appendix 6, Table 5 (p. 16)</p> | <p>NO2 criteria is not being consistently compared.</p> <p>Context: Provincial and federal air quality criteria/screening values for NO2 have been used inconsistently.</p> <p>Table 3-9 in Appendix 10-A (ERA) uses the 2015 Saskatchewan Ambient Air Quality Standards (SAAQS) value of 300 µg/m3 to compare the maximum concentrations of NO2 at receptor locations for the 1-hour average period, while Table 5 of Appendix 6 uses the 2025 Canadian Ambient Air Quality Standards (CAAQS) of 79µg/m3 for the same average period time.</p> <p>Rationale: By utilizing the SAAQS screening value for NO2, the maximum concentrations at receptor locations exceed the 1-hour threshold solely during the decommissioning stage (Table 3-9). However, if the 2025 CAAQS are applied, the screening values would be exceeded at receptor locations for all project phases. It is best practice to use the more protective air quality standards to evaluate potential human health risks associated with project activities.</p> | <p>1. Compare the predicted maximum concentrations to the most protective applicable air quality standards available. Alternatively, provide a rationale as to why the SAAQS for NO2 were used rather than the more protective 2025 CAAQS to determine potential exceedances and screen for the need for additional mitigation measures.</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends use of the standards from the 2025 CAAQS for NO2 in future mitigation and follow-up plans.</p> | Validate revisions to comment |
| IR-191 | HC | Change to an environmental component due to hazardous contaminants | <p>Appendix 10-A (ERA), Table 3-9 (p. 3.36) and Table 3-10 (p. 3.46)</p> <p>Section 6.1.8 (p. 6-44)</p> | <p>Non-threshold substances are not included in screening and monitoring plans.</p> <p>Context: Fine particulate matter (PM2.5) is not being considered further in secondary air quality screening for short and long-term exposure at human and ecological receptors because it is not predicted to exceed the screening values of the Ontario Ambient Air Quality Criteria (OAAQC) or the Canadian Ambient Air Quality Standards (CAAQS) for both annual and 24-hour average periods (Tables 3-9 and 3-10). Furthermore, it is not compared against the baseline for analysis.</p> <p>Table 3-9 indicates that coarse PM (PM10) is predicted to exceed the 24-hour CAAQS during all phases of the project. However, Appendix 10-A p. 3.46 states that, “There were no exceedances of PM2.5 which is generally considered to be a more reliable indicator of potential health effects. However, health effects would be infrequent and</p> | <p>1. Include PM2.5 and PM10 in the secondary air quality screening for short and long- term exposure at human receptors.</p> <p>2. Include PM10 and PM2.5 in the air quality monitoring plan as they are non- threshold substances.</p> <p>3. Provide a discussion of the significance of predicted exceedances of health- based standards.</p> <p>4. Identify additional mitigation measures to reduce concentrations of non- threshold air contaminants associated with the project.</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends use of the <u>2025 CAAQS Management Levels</u> to develop mitigation measures that</p> | |

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| | | | | <p>reversible, subsiding after exposure; therefore, PM10 was not considered for further quantitative assessment in the ERA.”</p> <p>PM10 and PM2.5 were not included in the air quality monitoring plan (Section 6.1.8).</p> <p>Rationale: Particulate matter and NO2 are considered non- threshold pollutants, meaning that health effects can occur at any level of exposure, The CAAQS for PM2.5 PM.10, and NO2 recognize that there is no population health threshold for human health effects; therefore, any increase in exposure will result in an incremental population risk (Environment Canada and Health Canada, 2012; CCME, 2000). The CAAQS values should not be construed as limits to which polluting up to is allowed. In addition, based on the principles of keeping clean areas clean and continuous improvement, proposed mitigation measures should not be confined to meeting the standards but should also be targeted towards reducing population exposure to CACs associated with the proposed project.</p> <p>Furthermore, although health risks associated with PM2.5 are higher than those associated with PM10, both fractions are considered non-threshold pollutants and identified by IARC (2013) as causes of cancer.</p> <p>Reference: [1] International Agency for Research on Cancer (IARC). 2013. IARC monographs on the evaluation of carcinogenic risks to humans. Volume 109. Outdoor air pollution. Lyon: International Agency for Research on Cancer.</p> | reduce project contributions of non-threshold pollutants (e.g., PM2.5, NO2). | |
| IR-192 | CNSC | Human Health with respect to radiation exposure | Appendix 10-A (ERA), Section 3.1.1.2, including Tables 3-1 and 3-2 | <p>Context: Section 3.1.1.2 in Appendix 10-A (ERA) provides the method of how select constituents including cadmium, chromium, selenium and lead-210 were determined. This section does not mention how the other constituents as listed in Tables 3-1 and 3-2 are determined.</p> <p>The values for Th-230 and U-238 in Table 3-1 are unexpected. Typically, these values should be at equilibrium.</p> <p>Rationale: The technical basis for the selection of constituents of concern is required as part of the environmental and human health risk assessments.</p> | <p>1. Provide the methodology of how all listed constituents are determined.</p> <p>2. Provide the rationale as to why Th-230 and U-238 are not in equilibrium.</p> | |
| IR-193 | ECCC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Section 3.1.1.2 Section 8.2.4.2.3 | <p>Context: Appendix 10-A (ERA) Table 3-1 ‘Screening of Effluent Quality against Surface Water Quality Guidelines for the Wheeler River ERA’ does not include acute water quality thresholds for all COPCs compared against predicted effluent quality. For example, it is stated that the final effluent quality discharge target for uranium is 0.057 mg/L. However, the CCME water short term (acute) water quality</p> | <p>1. Provide acute and chronic water quality thresholds for all required COPCs with monitoring required under the MDMER.</p> <p>2. Ensure all water quality thresholds are derived from receiving environment baseline parameters and that these</p> | |

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| | | | | <p>guidelines for the protection of aquatic life is 0.033 mg/L. The proposed effluent discharge target for uranium exceeds the acute water quality guidelines, indicating effluent may pose the risk of being acutely lethal to aquatic biota at end-of-pipe.</p> <p>All water quality thresholds should be derived from receiving environment parameters, and there are discrepancies between the values used in Appendix 10-A (ERA) Table 3-1 and the values presented in Tables 8.2-8 and 8.2-10 in Section 8.2.4.2.3 of the draft EIS. No selected screening value for TSS has been calculated from baseline conditions. Un-ionized ammonia, which is a regulated Schedule 4 substance under the MDMER, has not been included.</p> <p>Rationale: A review of all modelling results for all COPCs under the MDMER will assist ECCC in understanding the potential risks to the receiving environment.</p> | thresholds are consistently applied throughout the draft EIS. | |
| IR-194 | ECCC | Aquatic species | Appendix 10-A (ERA), Section 3.1.1.2 and Section 3.1.2.3 | <p>Context: In the ERA, COPCs should be selected for further assessment based upon the following factors:</p> <ol style="list-style-type: none">1. COPC concentrations in effluent that exceed selected water quality guidelines for the protection of aquatic biota, and2. Baseline COPC concentrations in the LSA that exceed selected surface water and sediment quality guidelines for the protection of aquatic biota. <p>However, only COPCs that had concentrations in effluent that exceeded guidelines were assessed further. Baseline concentrations of COPCs in sediment were not considered. In addition to this, not all COPCs that require monitoring under the MDMER had predicted effluent concentrations. From Section 8.2.3.3 Table 8.2-2 of the Aquatic Environment Report, it appears Aluminum in McGowan Lake and Whitefish Lake South and North, and pH in Whitefish Lake North exceed water quality guidelines. Predicted effluent concentrations or near-field surface water concentrations for Aluminum and pH are not provided.</p> <p>Rationale: It is not possible to determine if there is risk from effluent to the receiving environment and aquatic receptors based on the current information provided.</p> | <ol style="list-style-type: none">1. As noted in IR-114, provide the information on predicted effluent quality for COPCs with required monitoring under the MDMER.2. Provide the information on predicted maximum receiving environment surface water concentrations for COPCs with required monitoring under the MDMER in IR-114.3. Update the ERA to assess the risk of any additional MDMER COPC concentrations in effluent that exceed water quality guidelines.4. Update the ERA to assess the risk of COPCs that had elevated baseline water and sediment quality concentrations in the receiving environment. | Validate this correction with Samantha (previously referred to ECCC-SW-16) |
| IR-195 | ECCC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Section 3.1.2.1 | <p>Context: Figure 3-2 depicts modelled concentrations of COPCs in the receiving environment surface water during all Project phases. Effluent discharge rates during Operations and Decommissioning are not anticipated to differ significantly. However, COPC concentrations seem to decrease rapidly after the end of the operations period despite effluent releases continuing into the decommissioning phase.</p> | <ol style="list-style-type: none">1. Provide further information on modelled maximum COPC concentrations for each individual Project phase with estimated timing for peak concentrations to appear in the receiving environment.2. Provide further information on predicted effluent quality during the Project decommissioning phase. | |

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| | | | | Rationale: There has been no information provided on predicted changes in effluent COPC concentrations and discharge rates during the decommissioning phase. It remains unclear how COPC concentrations would decrease so quickly following the end of operations. | 3. Update ERA figures and conclusions as needed. | |
| IR-196 | ECCC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Section 3.1.2.3 | Context: Table 3-6 provides predicted maximum sediment concentrations of COPCs compared to sediment quality guidelines. Several selected sediment screening values are not the most stringent sediment quality guidelines, with no justification provided. Additionally, copper and lead appear to be missing guidelines that are available from the Burnett-Seidel and Liber (2013) study. Rationale: The most stringent guidelines should be used for the sediment quality risk assessment in the ERA. Use of the most stringent guidelines will allow the most protective assessment to analyze risks to the receiving environment, aquatic and terrestrial biota. | 1. Provide further information and justification for the selection of less stringent thresholds. 2. Update the ERA as needed. | |
| IR-197 | ECCC | Aquatic species | Appendix 10-A (ERA), Section 3.2 | Context: It remains unclear if atmospheric deposition from Project related emissions has been incorporated into modelling for the ERA and surface water and sediment quality assessments. Rationale: While expected Project air emissions are unlikely to have direct impacts on the aquatic receiving environment and aquatic biota, this Project effect pathway may have indirect effects through accumulation of COPCs over time or deposition of contaminants that are not expected in effluent, which should be evaluated with predicted emissions data incorporated into water quality modelling predictions. | Incorporate atmospheric deposition from Project-related emissions into water quality modelling and assess any Project related effects to aquatic receptors from this pathway. | |
| IR-198 | HC | Change to an environmental component due to radiological contaminants | Appendix 10-A (ERA) Appendix B, Tables B.7 and B.8 Ref. 19-2638 Appendix 10-A (ERA), Table 4-3 Ref. 19-2638 (p. 4.17) | Context: Section 10 Appendix 10-A (ERA) contains Table 4-3 (p. 4.17), which lists ingestion rates for traditional foods and includes the category “organs” for Mammals. Tables B.7 and Table B.8 in Section 10 Appendix 10-A (ERA) Ref. 19-2638 provide the predicted concentrations of radionuclides for ecological receptors during the project phases and during future centuries, respectively. They list the concentrations of radionuclides in moose and in moose organs, which is presented as a single cumulative organ value. Other terrestrial and aquatic animals (such as the black bear and woodland caribou) that are a part of the traditional diet of nearby Indigenous communities have higher concentrations of radionuclides than moose, yet concentrations are not provided for organs of these species. Rationale: While Health Canada is not aware of transfer factors to | 1. Provide more clarification on how the mammalian organ ingestion rates are calculated (which animals and relative contribution percentages). 2. Provide a rationale for why concentrations of radionuclides were not assessed in organs of animals (other than moose) that are consumed as country foods by Indigenous people harvesting in the area. | |

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| | | | | individual organs, or to organs in animals that are not ruminants, it would be beneficial to have a better understanding of radionuclide concentrations in the organs of other animals that may be consumed by local Indigenous communities. | | |
| IR-199 | ECCC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Sections 3.2.1 and 3.3.1, Wheeler River Project IMPACT Model | <p>Context: Model calibrated concentrations of selenium, uranium, and lead- 210 are under-predicted compared to measured baseline concentrations for water quality in the IMPACT modelling based on Figure 3-2. Calibrated concentrations of cobalt are under-predicted and there is poor agreement between model calibrated and measured concentrations of arsenic, lead-210, polonium-210, and radium-226 for sediment quality in Figure 3-3.</p> <p>Rationale: It is unclear how poor agreement between model calibrated and measured baseline concentrations of COPCs impacts the near-field and far-field modelling predictions of COPCs during all Project phases. It is also unclear why measured concentrations of COPCS could not be used directly as model inputs when there was poor agreement.</p> | <p>1. Provide justification as to why model calibrated concentration inputs of COPCs were preferable for use in predictive modelling of water and sediment quality over measured baseline concentrations.</p> <p>2. Provide a rationale detailing how under- or over-predicted model calibrated COPC concentration inputs influence IMPACT model predictions and uncertainty for water and sediment quality. Provide specific details on how this may impact the risk analysis for parameters that have been highlighted as having poor agreement between calibrated and measured concentrations (i.e., arsenic, selenium, uranium, lead-210, polonium-210, and radium-226).</p> | |
| IR-200 | HC | Indigenous Peoples' health / Socio- economic conditions | Section 10 (p. 4.10) Appendix 10-A (ERA), Table 4-4 (p. 4.19) | <p>Indigenous consultation should be included in the Country Foods analysis.</p> <p>Context: The Proponent obtained country food consumption data through engagement with a single local fisher/trapper and from a dietary survey administered by CanNorth to the English River First Nations (ERFN) in 2017. However, the potential health risks to consumers of traditional food were only assessed using the data obtained from the CanNorth dietary survey. Section 10 of the EIS <i>states the following:</i> “The diet assumptions for the fisher/trapper are conservative and are based on engagement with a local fisher/trapper. The diet of the fisher/trapper is representative of one person, who consumes a unique composition and quantity of traditional foods (e.g., ingestion rate of 175 kg/yr of caribou, equivalent to approximately 2 to 3 servings per day). Most people fishing, hunting, and trapping in the Local Study Area and Regional Study Area would consume traditional foods more consistent with the average traditional foods consumer diet which was developed from the ERFN country foods study. In comparison, the ERFN country foods study in Section 10 Appendix 10-A (ERA) Table 4- 4 indicates a caribou ingestion rate of 2.6 kg/yr (1 to 2 servings per month) and a total game ingestion rate of 21.3 kg/yr” (p. 4.10).</p> <p>Rationale: Health Canada is in general agreement that the dietary habits of the local fisher/trapper may be an outlier and not necessarily representative of most of the local population. However, a rationale has not been provided to demonstrate whether and how the 2017</p> | <p>1. Evaluate the suitability of using the 2017 EFRN survey results and consider surveying additional community members (such as local hunters/trappers) to obtain more representative country food consumption rates for use in the traditional foods risk assessment, and for communicating the results to the communities.</p> <p>2. Additionally, consider evaluating consumption patterns (and applicable TRVs) of sensitive or vulnerable populations (e.g., elders, toddlers, women of childbearing age) in the traditional food risk assessment and provide risk levels for these sub-groups separately.</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends providing the community with the opportunity to validate the ERFN 2017 survey results.</p> | Validate revisions to comment |

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| | | | | ERFN dietary survey results are representative of consumption patterns of local Indigenous communities. Also, it is unclear whether or how the ERFN dietary survey results account for the consumption patterns of vulnerable or more sensitive subgroups (e.g., heavy consumers, children and women of child-bearing age) | | |
| IR-201 | ECCC | Aquatic species | Appendix 10-A (ERA), Section 5.0 | <p>Context: For the ERA methodology the Proponent followed CSA N288.6-12 for the assessment of risk to aquatic biota from radionuclide and non-radionuclide COPCs. This is the 2012 version, and a more recent 2022 version was publicly released.</p> <p>Rationale: The Proponent should review the most up-to-date version of the standard to ensure no changes to the methodology of the COPC exposure assessment are required for the ERA.</p> | Update the COPC exposure assessment methodology in the ERA using the most recent CSA N288.6-22 standard, as needed. | |
| IR-202 | CNSC | QA/QC | Appendix 10-A (ERA), Section 6.0-Quality Assurance | <p>Context: This section provides only Quality Assurance (QA) of the ERA, including planning and preparation of the ERA.</p> <p>Rational: The Quality Control (QC) aspects are not included. Both QA and QC aspects provide confidence that ERA results are defensible and fit for use in decision-making.</p> <p>The N288.6 (Clause 10.2) requires that “Appropriate QA/QC requirements shall exist for all aspects of the ERA and should be specified prior to conducting the ERA”.</p> | Please include appropriate QC aspects, as per a Clause 10.2 of the N288.6. | |
| IR-203 | CNSC | Sediment Quality and Benthic Invertebrates | Appendix 10-A (ERA), Section 6.2 Future Centuries Sensitivity Analysis | <p>Context: This section of the ERA states “If treated effluent was released at the maximum upper bound discharge rate, the modelled concentrations of all COPCs are expected to be below their corresponding sediment quality guidelines.” It appears from Figure 6-2: “Comparison of maximum concentrations of COPCs in sediment at expected and upper bound discharge rate” that cadmium and vanadium would be over their sediment quality guidelines indicated if maximum upper bound discharge rates are used.</p> <p>Rationale: It is not clear which is correct; the statement that no exceedances of sediment quality guidelines when considering the maximum upper limit effluent release, or the figures indicating there could be exceedances for cadmium and vanadium. This discrepancy in the ERA should be explained and corrected.</p> | Please provide clarity on if cadmium and vanadium are expected to be over the sediment quality guidelines for the maximum upper bound discharge rate scenario. | |

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| IR-204 | CNSC | Human health with respect to hazardous contaminants | Appendix 10-A (ERA), 7.1.1, Non-radiological Human Health Risk Assessment | <p>Context: In the human health risk assessment of the non-radiological COPCs, it was determined that the project incremental HQ was predicted to remain below 0.2 for all non-carcinogens and all pathways during all phases of the project, except for selenium for the fisher/trapper at Russell Lake from the fish ingestion pathway.</p> <p>Rationale: Given that the fisher/trapper receptor will likely be exposed to higher concentrations of selenium from the consumption of fish at Russell Lake, there is an elevated risk of selenosis in exposed individuals. This potential for selenosis would be further exacerbated in individuals who consume fish taken from other lakes closer to the mining operation. There is, however, no discussion of mitigation of these risks to exposed individuals.</p> | <p>Please provide a discussion of measures that could be applied to mitigate the risk of selenosis in exposed individuals who consume fish from Russell Lake and other waterbodies closer to the mining operation.</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends the following:</p> <ul style="list-style-type: none">• Selenium abatement technologies may be considered to eliminate or reduce selenium in effluent entering the lake system.• If HQs continue to exceed 0.2, then it may be necessary to post fish consumption advisories, in consultation with the Medical Officer of Health for the jurisdiction where the project is located. | |
| IR-205 | CNSC | Geology and Groundwater | Section 7, appendix H | <p>Context: In this appendix the analytical concentration of various groundwater samples taken from monitoring wells is reported.</p> <p>Rationale: There is one sample labeled as “Tracer Tank” with no definition available in the current report. It is difficult to judge whether the results presented are relevant to the EIS and how it may impact the findings therein.</p> | <p>Please clarify the definition of “tracer tank”.</p> | |
| IR-206 | ISRD | Current use of lands and resources for traditional purposes | Section 11 Section 12 Section 15 Section 16 | <p>Context: Impacts to Lands and Resources Use have been identified by Indigenous Nations and communities.</p> <p>Rationale: Additional information is required to demonstrate whether Indigenous Nations and communities were engaged directly by Denison regarding the cumulative effects assessment, significance determination and residual effects, and thus the overall conclusions on potential adverse impacts of the project on the potential or established Indigenous and/or treaty rights and effects of changes to the environment on Indigenous peoples, pursuant to paragraph 5(1)(c) of the CEAA 2012.</p> | <p>Please describe any outstanding or residual issues or concerns raised by Indigenous Nations and communities that Denison was unable to address. In addition, outline any plans to find solutions or continue discussions with the potentially impacted Indigenous Nations and communities.</p> | |
| IR-207 | CNSC | Current use of lands and resources for traditional purposes | Section 11, Perceived Risks to Lands and Resources | <p>Context: The EIS states: “Resource users may also experience changes in their perception of the quality of resources for consumption such as the palatability of fish or wildlife or have apprehensions about the safety of resources for consumption. These changes may affect the patterns of ILRU during all Project phases including Post Decommissioning. The ERFN refer to this indicator as a “psycho-social’ effect, meaning that even if people know their fears are “<i>perceived fears, the fear ... is real and has real impacts on ERFN members’ perception of their overall health and well-being</i>” (ERFN and SVS 2022a).” (p. 11-11)</p> | <p>How does Denison plan to work directly with Indigenous Nations and communities who currently use the potentially impacted areas, including the RSA, to mitigate and monitor the perceived risks and/changes to the RSA?</p> <p>Has Denison had discussions with the potential impacted Indigenous Nations and communities on how fear and avoidance behaviors and related impacts on traditional land use will be mitigated, especially within the RSA?</p> <p>Additional information is needed to determine if Denison has engaged directly with the Indigenous Nations and</p> | |

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| | | | | <p>Resource harvesters may experience Project-related disturbances and, depending on how these changes are perceived, it may cause some resource harvesters to avoid the Project Area.</p> <p>Reductions in harvests may occur based on fear or uncertainty about the ongoing quality of country foods. For example, <i>“People stopped picking berries in this area when Key Lake mine was established because of concerns about health impacts”</i> (ERFN and SVS 2022b).</p> <p>Rationale: CNSC’s Generic Guidelines for the Preparation of an EIS state: “The EIS will document specific suggestions raised by Indigenous groups for mitigating the effects of changes to the environment on Indigenous peoples (section 5(1)(c) of CEAA 2012). For the mitigation measures intended to address the effects of changes to the environment for Indigenous peoples, the proponent must discuss the residual effects with the Indigenous groups prior to submitting the EIS.”</p> <p>These changes may affect the patterns of ILRU during all Project phases including Post Decommissioning.</p> | <p>communities to develop potential mitigation measures to address fear and avoidance impacts, such as a community monitoring program, which could help to reduce the perceived risk to lands and resource use through education, collaboration, and long-term monitoring with Indigenous Nations, in order to build trust.</p> <p>Suggestions for mitigation and follow-up measures: It is recommended that Denison consider engaging with potentially impacted Indigenous Nations and communities on the collaborative development and implementation of a monitoring program to help address concerns about potential impacts on lands and resources as a result of the project. The program(s) could help to monitor changes over time related the potential perceived risk of contamination of the land from Project activities and subsequent effects on the quality of fish, vegetation, and wildlife resources, which in turn could affect the safety of traditional foods and human health, and impacts on culture practices, and overall community well-being that travel to region yearly.</p> | |
| IR-208 | CNSC | Indigenous physical and cultural heritage | Tables 11.1-3, 11.1-4 and 11.1-5 Section 11.1.3.2.6 | <p>Context: Black bear is listed as a species hunted by several Indigenous nations, including Pinehouse residents. CNSC participated in an in-person engagement with Pinehouse residents in October 2022 and bears eating waste was identified as a concern for hunting and consumption.</p> <p>Rationale: Perceived risk of eating animals that are contaminated by hazardous or radiological wastes could deter community members from harvesting animals that are normally part of their traditional diet. Fencing for waste was specified as a deterrent for human trespassers, not animals.</p> | Please specify measures that Denison will take to ensure bears and other animals do not scavenge from waste facilities. | |
| IR-209 | CNSC | Indigenous Peoples' health / Socio-economic conditions | Section 12.1.4.2.1 (p. 12-22) Section 12.1.5 Section 12.1.6.2 | <p>Context: KML indicates that working at a mine camp could inhibit community members from participating in cultural activities and sharing them with family and community members, resulting in a loss of cultural knowledge and language, thus impact knowledge transmission (p. 12-22).</p> <p>Rationale: Denison addresses this by briefly identifying culturally sensitive policies which would eliminate residual effects (p. 12-30)</p> | Please provide detailed proposed mitigation measure for KML’s concerns related to loss of cultural knowledge and language should they work for Denison. | |
| IR-210 | CNSC | Current use of lands and resources for | Section 12.1.4.2.2, Potential Effect 2: Change in Traditional Diet, Perceived | <p>Context: The EIS states: “Project activities could change the perceived suitability of country foods. An ecological risk assessment (ERA) was conducted to consider both radiological and toxicological risks to ecological receptors such as terrestrial and aquatic invertebrates,</p> | Given concerns with psycho-social impacts and the influence of perception discussed by ERFN earlier on in the EIS, does Denison have information on the perspectives | |

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| | | traditional purposes | Suitability of Country Foods (p. 12-26) | <p>terrestrial and aquatic vegetation, fish, and terrestrial and aquatic mammals and birds. Results for the radiological assessment predicted no exceedances of the radiation dose benchmark for the ecological receptors. For non-radiological COPCs, no exceedances were predicted except for selenium in fish from Russell Lake, based on a conservative dietary assumption for one resource user. The traditional foods diet for the fisher/trapper is conservative as it assumes that their annual fish consumption (183 kg of fish per year) would be obtained from Russell Lake, meaning the exceedance of the benchmark for selenium from fish would only occur if fish were only sourced from this one lake. This one exceedance could potentially change the perceived safety of country foods for community members and make country foods a less desirable part of a traditional diet.</p> <p><u>Experience from other uranium operations in northern Saskatchewan suggests that resource use will continue despite the potential selenium exceedance. An examination of members of the Hatchet Lake Denesų́liné First Nation who live in Wollaston Lake near the Rabbit Lake operation found that over years of being active on the landscape both with and without the presence of the uranium industry, members had developed their own culturally appropriate practice of risk assessment and management based on their relationship with the land. Hatchet Lake Denesų́liné First Nation members appear to be more concerned with the direct effects of uranium mining on the local environment and less concerned about uranium mining’s effects on their health through consumption of plants and animals. This is likely due to their high level of confidence in recognizing affected plants and wildlife and avoiding them (Elias et al. 1997).</u></p> <p>The usage patterns of the ERFN Trapper have similarly allowed for continued use and access to areas proximal to other uranium operations. The ERFN Trapper had a positive relationship with other uranium operations in the ILRU LSA. He also continued to trap (i.e., used his trapline in Fur Block N-18), fish, and opportunistically pick berries, and consumed those resources during operations (KPI Program 2021). Good relationships between Denison and a new trapper who eventually takes over the trapline from the ERFN Trapper would promote continued use.” (p. 12-26)</p> <p>Rationale: The underlined reference suggests that negative perceptions may not prevent traditional resource users from continuing to consume, due to adaptation to potential risks in the environment.</p> | from Indigenous Nations and communities to validate this conclusion is applicable? | |

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| IR-211 | CNSC | Accidents and Malfunctions | Section 14.6.1, Bounding Scenario 1, Vehicle Accident and Aquatic Release of Radioactivity | <p>Context: Scenario 1 describes a spill of uranium concentrate into the lake. It’s not clear how the ecological risk assessment was performed. It is stated that sediment concentrations in post-remediation conditions are expected to exceed the benthic invertebrate benchmark and that these results indicate that a spill of uranium concentrate could potentially affect benthic invertebrate populations following a spill, but the spatial extent would be limited. For water, it is stated that when evaluating the potential effect, a comparison was made between the results of the estimated short-term water quality 1,892 µg/L (1.892 mg/kg) and the guideline (33 µg/L). This indicates that there may be some aquatic species that could be affected, but the effects are expected to be transient as the water concentration quickly drops to a long-term level of 0.19 µg/L. However, when looking at dose to other receptors, the results of the ecological risk assessment indicated short-term ingestion of contaminated water resulting from an accident would not result in potential risks to grouse, vole, or deer, however rationale for how these receptors were chosen is not provided.</p> <p>Rationale: It’s not clear from the EIS, why the receptors grouse, vole, and deer were chosen to evaluate ecological effects from a potential spill, and why they differ from receptors in the ERA. It is also not clear if the pathway from sediment ingestion/contact was considered for semi-aquatic receptors as they could be exposed to the increased concentrations post-spill. It is also not clear if SARA species exposure to sediment and water post-spill was considered.</p> | Please clarify why grouse, vole, and deer were chosen as receptors for the ecological risk assessment performed for accidents and malfunctions scenario 1 and clarify if the sediment pathway to receptors post-spill was considered, as well as if SARA species were considered. | |
| IR-212 | HC | Human health with respect to hazardous contaminants | Section 14 (p. 14-3) Appendix 16-C (p. 14 & 15) | <p>The follow-up plan does not sufficiently describe how various parties will be engaged in the design, implementation, and review of monitoring programs.</p> <p>Context: Section 14 of the EIS states that “The overarching fear of contamination from the mine is woven in to almost every other concern noted by participants in the TK study. It is worth acknowledging this concern separately given the potential for mental health impacts related to people’s experiences of fear and anxiety” (p. 14- 3).</p> <p>The commitment regarding monitoring and follow-up activities appears limited to “<i>shar[ing] information in a transparent manner with the General Public, and specifically those Communities of Interest and Nearby Land Users with whom Denison is regularly engaging about the Project. Such an information-sharing program would consider the involvement of the Regulators to make sure the information available addresses the issues identified as concerns</i>” (p. 14).</p> | <p>1. Provide details of how local, provincial and federal authorities, and Indigenous Nations and communities will be engaged in developing the follow-up and monitoring program, including the information-sharing program.</p> <p>2. Describe the steps that will be taken if there are any exceedances of established benchmarks or deviation from predictions.</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends that the proponent’s plan for communicating follow-up results (environmental and country foods) aims at, among other things, responding to community concerns regarding country foods to minimize avoidance of this resource. This goes beyond a passive dissemination of information and developing a strategy based on dialogue and the direct involvement of communities in monitoring, surveillance, and risk communication activities.</p> | |

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| | | | | Rationale: Country food safety is not regulated federally unless foods are sold commercially. Certain aspects of country food safety and availability may be covered by provincial regulators. It is unclear whether and how various levels of government and potentially affected communities would be involved in the development of the follow-up and monitoring program. It is also unclear what the information sharing program entails and how it would inform any adaptive management if monitoring results deviated from the predictions. | | |
| IR-213 | CNSC | Accidents and Malfunctions | Section 14.5.3 Appendix 14-A | <p>Context: The proponent states that the assessment of accidents and malfunctions began with the initial identification of hazard scenarios. Hazard scenarios were identified using a systematic approach that considered the existence of sources of hazards and initiating events for the Project in consideration of Project activities and components.</p> <p>The hazard identification was conducted to identify a comprehensive list of potential project-related accident and malfunction scenarios associated with the key project components and activities with further details provided in Appendix 14-A. The initial hazards were then screened qualitatively based on likelihood and consequence to determine overall risk level using a risk matrix approach. Bounding scenarios were then selected from this initial list of hazard scenarios.</p> <p>The results of numerical analyses (RESPEC, 2021) of detailed strip model suggest that the deformation imposed on the cemented steel casing from downward movement of the rock mass may exceed the assumed casing-strain yield limits and the failure limit locally after extracting the uranium ore. However, this potential hazard is not identified in the hazard identification.</p> <p>Rationale: Exceedance of steel casing yield limits and failure limit would either compromise the steel casing integrity or damage the steel casing and result in the leakage of injected solution, which could impact on mine operation and contaminate the surrounding groundwater.</p> | Please include the hazard of steel casing yield or damage in the table of hazard identification evaluation and conduct an initial risk screening and further detailed assessment as required. | |
| IR-214 | CNSC | Accidents and Malfunctions | Section 14.5.3 Appendix 14-A, section 3.2.3 | <p>Context: Hazard scenarios were identified using a systematic approach that considered the existence of sources of hazards and initiating events for the Project in consideration of Project activities and components. Details for how each of these project components and activities are considered in the initial hazard scenario identification process are provided in the accidents and malfunctions TSD (see Appendix 14-A; Ecometrix 2022).</p> <p>However, in Table 3-1 to Table 3-14 in Appendix A of Appendix 14-A, the following inconsistencies were identified:</p> | Please clarify or correct all inconsistent and/or inaccurate information in Tables 3-1 to 3-14 in Appendix A of Appendix 14-A. | |

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| | | | | <div><div>i. consequences for the hazards ID# 1.1, 1.5, 1.7, 14.2 include occupational major injuries; however, the severity (S) is denoted as number 2 that appears to be inconsistent with consequence rating number in Figure 14.5-2</div><div>ii. Hazard ID# 1.5 has a L=2, but it is described as a highly unlikely event, which is inconsistent with the term in Figure 14.5-2</div><div>iii. Hazards ID# 3.6 and 3.7 have a L=1, but they are described as low probability event that is inconsistent with the term in Figure 14.5-2</div><div>iv. Hazards ID# 8.2, 8.3, 9.1, 10.1 to 10.5, 11.1, 11.5 have a L=1, but they are described as unlikely events, which are inconsistent with the term in Figure 14.5-2. Rationale needs to be provided how stockpile erosion is considered to have a L=1</div><div>v. Hazard ID# 12.1 has a L=2 and S=3, but it’s risk ranking is moderate, which is inconsistent with the term in Figure 14.5-2</div><div>vi. Hazard ID# 13.3 has a L=2. Based on the operation experience in the similar projects in the northern Saskatchewan, ponds lining failure and leakage is a very likely event. Rationale needs to be provided to support L=2 or change the number for L.</div></div> <div>Rationale: Inconsistent or inaccurate/incorrect information was included in Accidents and Malfunctions assessment.</div> | | |
| IR-215 | CNSC | Human health with respect to hazardous contaminants | Section 14.6 | <div><div>Context: One of the potential risks of a uranium mine and mill is a spill of untreated effluent.</div><div>Rationale: In the EIS, it doesn’t appear that the scenario of a spill of untreated effluent to the environment has been considered.</div><div>A failure of the piping containing the untreated effluent could result in an uncontrolled release to the environment and could affect the groundwater, soil quality, and terrestrial biota.</div></div> | Please evaluate and provide the results for a bounding scenario of a spill of untreated effluent or provide justification for its exclusion. | |
| IR-216 | CNSC | Human Health with respect to radiation exposure | Section 14.6.1 Section 14.6.7 Appendix 14-A | <div><div>Context: Radiological doses to human receptors, including workers (i.e., driver(s) of the vehicles), from the Bounding Scenarios 1 (Vehicle Accident Including Rollover, Collision, Run Off Road) and 7 (Vehicle Accident Including Rollover, Collision, Run Off Road) have not been assessed.</div><div>Rationale: An estimate of the effective doses to human receptors, including workers, are required to determine whether the expected doses meet the dose limits set out in the Radiation Protection Regulations.</div></div> | Provide estimates (including calculations) of the potential radiological doses to human receptors, including workers, resulting from Bounding Scenarios 1 and 7. | |

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| IR-217 | CNSC | Accidents and Malfunctions | Sections 14.6.1 and 14.6.2 | <p>Context: Highway 914 crosses the Wheeler River 10 km southwest of the access road junction. A vehicle accident, including a rollover, collision, or run off road, at or near the bridge could potentially result in a release of uranium concentrate and release of fuels and chemicals into the surface water at this location. Denison believes that a release of uranium concentrate and a release of fuels and chemicals at this location would bound the releases at any other water crossing along the transportation corridor. However, no information on what other water crossings along the transportation corridor exist and how bounding scenarios 1 and 2 would bound the risk of releasing uranium concentrate and fuels and chemicals at other crossings.</p> <p>Rationale: The release of uranium concentrate and fuels and chemicals at water crossings would contaminate the water body at the crossings and pose a risk to the environment and public health.</p> | Please provide information on all water crossings along the transportation corridor and justification why bounding scenarios 1 and 2 would bound the effects of the accidental releases of uranium concentrate and fuels and chemicals at these crossings. | |
| IR-218 | CNSC | Accidents and Malfunctions | Sections 14.6.1.1 and 14.6.1.4 | <p>Context: Table 14.6-1 indicates that the average flow of Wheeler River south of Russel Lake is 17,340 L/s or 17.34 m3/s. This rate is used for uranium dissolution rate calculation. However, in section 14.6.1.4, it states that the average annual flow is 24.3 m3/s. In Table 14.6-3, the last two rows appear to be added wrongly.</p> <p>It also states that sediment quality results are shown in Table 14.6-5 for post-remediation conditions. During minimum flow conditions, the affected volume is expected to be smaller, resulting in a higher sediment concentration. In comparison, higher flow conditions are expected to result in a greater footprint and lower concentrations. However, in Table 14.6-5, the average sediments concentration and porewater concentration appear to be incorrect and switched between average flow and maximum flow.</p> <p>Rationale: Inconsistent/inaccurate information provided in the EIS.</p> | Please clarify and correct the inconsistent information on average flow rate of Wheeler River at the crossing and incorrect information in Table 14.6-3, and average sediment concentration and porewater concentration under average and maximum flow conditions in Table 14.6-5. | |
| IR-219 | CNSC | Accidents and Malfunctions | Sections 14.6.1.1.1 and 14.6.1.4.1; Sections 5.1.1 and 8.1 of Appendix 14-A | <p>Context: When assessing the release characterization of Bounding Scenario 1, the proponent assumed that 95% of the released uranium concentrate can be recovered from the release location without sufficient justification, and that different water column depths, i.e., 10 cm and 5 cm, and average water depth of 1.2 m at the release location were used without explanation.</p> <p>Rationale: As the recovery rate of the uranium concentrate would have an impact on the assessment of its potential effects, it is necessary to understand how the recovery rate and water level were selected for assessing this bounding scenario.</p> | Provide further rationale for assuming 95% recovery rate and for using different water column depths for uranium concentrate release characterization. | |

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| IR-220 | CNSC | Accidents and Malfunctions | Section 14.6.1.1.1 Appendix 14-A, Section 5.1.1 | <p>Context: The proponent states that based on drum deformations performed in a previous analysis (McSweeney et al. 2004), if a drum experienced a crush force of 100,000 lbs., then the deformation of the drum would cause the lid to detach from the drum. Using this drum failure mechanism, and assuming the drums weigh 450 kg and are arranged four across in the truck, at a speed of 48 km/h, the front 25% of the drums would fail, at 60 km/h to 97 km/h 55% would fail, at 145 km/h 75% would fail, and at ≥193 km/h all would fail. Given that the speed of the truck is likely between 60 km/h to 97 km/h, it was concluded that less than 55% of the drums would fail upon a traffic accident scenario.</p> <p>It is assumed to be 40 drums per shipment, so some stacking or rows of drums should be expected in this scenario. The drums stacked above could be at greater risk of deformation in a traffic accident. It is not clear whether drums stacking was considered in the previous study cited by the proponent and whether less than 55% fail is still an adequate percentage of drum failures in such traffic accident scenarios if drums stacking is needed.</p> <p>Rationale: Drum failure percentage will impact the release quantity of uranium in such an accident scenario and then impact the consequence assessment. Therefore, the drum failure should be adequately assessed and supported with sufficient information and justification.</p> | Please provide information and/or rationale as to whether drum stacking would impact drum failure at different speeds and confirm whether 55% drum fail for such an accident is still valid. | |
| IR-221 | CNSC | Accidents and Malfunctions | Section 14.6.1.3, Appendix 14-A, Section 7.1 | <p>Context: It is projected that there would be about 100 drums packaged per mill operating day. One trip per day for 330 days per year is assumed for the probability evaluation. This means 100 drums per trip, which is inconsistent with description in section 14.6.1.1.1 where assuming 40 drums in one shipment per day.</p> <p>Rationale: Shipments per day will impact the probability evaluation, and number of drums per trip will impact the release of uranium during an accident.</p> | Please clarify the number of shipments per day and number of drums per shipment that are expected and re-calculate the probability as necessary. | |
| IR-222 | CNSC | Accidents and Malfunctions | Section 14.6.2.4 | <p>Context: Bounding Scenario 2 consists of the aquatic release of fuel and hazardous chemicals due to traffic accidents. The EIS states that amongst the fuels considered for this scenario, the consequences of the release of gasoline and solvents are bounded by the consequences associated with the release of diesel. Both gasoline and solvents are lighter with higher vapour pressure; therefore, they have a shorter half-life in the aquatic environment and a lesser tendency for adsorption to sediments and suspended solids in the water column. There is no other justification provided to show that the release of diesel can bound other chemicals such as sulfuric acid and sodium hydroxide that are heavier than diesel.</p> | Please provide further justification that the consequences of the release of sulfuric acid and sodium hydroxide can be bounded by the consequences associated with the release of diesel. | |

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| | | | | Rationale: The release of either sulfuric acid or sodium hydroxide during accident could change the water PH significantly at the releasing location, which would post a negative impact on the local environment. | | |
| IR-223 | CNSC | Accidents and Malfunctions | Section 14.6.4.1 Appendix 7-A, Appendix K | Context: The EIS states that the 3D strip numerical model predicted that stresses and displacements did not show instability in the altered sandstone or basement rock at the location where a freeze wall would be placed around the Phoenix Deposit boundary (RESPEC 2021). The potential damage to the freeze wall due to mine-induced stresses and displacements under this scenario is excluded. Rationale: One outer section of the freeze wall (i.e., north-east freeze wall of the phase 4 mining area) and some internal cross walls are located in the desilicified zone. The RESPEC 2021 report (i.e., Appendix K of Appendix 7-A) appears not to have included the desilicified zone in the geomechnical modeling, nor is provided the stresses and the displacements/deformation of the area northeast of the phase 4 ore body where a significant extent of the desilicified zone exists. | Please provide information on the stresses and displacements/deformation of the area northeast of the phase 4 ore body from the geomechanical studies to demonstrate the resulted stresses and displacements will not impact on the freeze wall integrity after IRs for geomechanical studies for ore extraction are addressed. Technical Discussion Required: Yes | |
| IR-224 | CNSC | Human Health with respect to radiation exposure | Section 14.6.5.4 Appendix 14-A | Context: For the Bounding Scenario 5 (Process System and Piping Failure), doses to receptors at distances of 100 and 500 metres (0.25 and 0.01 mSv respectively) are predicted. The assessment also indicated that the dose to the unprotected worker staying inside the processing plant during the spill could exceed the 50 mSv dose limit specified by CNSC if workers did not leave the area quickly after the spill. The proponent did not provide the dose calculations for deriving the dose estimates. Rationale: The method used to estimate effective, equivalent, and committed dose is required to be verified. Sample dose calculations should be included, to confirm use of acceptable input data. | Provide the dose calculations for deriving the dose estimates for workers and members of the public for Bounding Scenario 5 (Process System and Piping Failure). | |
| IR-225 | CNSC | Human Health with respect to radiation exposure | Section 14.6.5.4 Appendix 14-A | Context: With the Bounding Scenario 5 (Process System and Piping Failure), the proponent states that Denison ensures that the process is designed to include control measures to reduce the exposure to both workers and members of the public as low as achievable. The measures would ensure that the processing plant is adequately ventilated, and that spills or leaks are detected by loss of system pressure, observation, or flow imbalance. It is not indicated where these additional measures have been detailed/elaborated within the EIS. | Provide details on how the control measures to reduce the exposure to both workers and members of the public, identified in the assessment of Bounding Scenario 5, have been formally documented and incorporated in the engineered design of the processing facility. | |

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| | | | | Rationale: Control measures to reduce the exposure to both workers and members of the public as low as achievable, that are identified in the assessment of Bounding Scenario 5, must be formally documented to ensure that they are carried over into the engineered design of the processing plant. | | |
| IR-226 | CNSC | Accidents and Malfunctions | Sections 14.6.6.1 and 14.6.6.4 | Context: It is stated that in the case of the accident and for a release amount of 1 kg inside the processing plant, the dose to offsite receptors at 200 m from the project site was calculated to be less than the CNSC public dose limit of 1 mSv. The analysis also indicated that the dose to a worker in a full-face-piece powered air-purifying respirator who stays in the area would be 88 mSv, which exceeds the annual worker dose limit of 50 mSv. Rationale: Section 14.6.6.1 indicates that 2 kg of uranium concentrate could be released in case of the accident. No rationale is provided why 1 kg rather than 2 kg uranium concentrate is used for dose calculation. If 2 kg is used as the source term, the dose to offsite receptors at 200m and workers in the area would be higher. | Please provide the rationale for using a source term of 1 kg rather than 2 kg of uranium concentrate for the dose calculation to offsite receptors and workers. If sufficient rationale cannot be provided, the doses to offsite receptors and workers should be recalculated using 2 kg uranium concentrate, and the results provide. | |
| IR-227 | CNSC | Accidents and Malfunctions | Section 14.6.6.1.1 | Context: Bounding Scenario 6 involves a fire and/or explosion within the processing plant, resulting in the release of a large amount uranium to the atmosphere. The airborne source term for this scenario is estimated with equation developed by the United States Department of Energy (USDOE), where the respirable faction is assumed to only include particles of 10 mm and smaller. Rationale: No rationale was provided to support the consideration of only 10 mm and smaller particles. As provided in Table 14.6-3, the particle size of uranium <15 mm is less than 20%. Majority of the uranium particle size is larger than 10 mm. The airborne source term is an important factor for the effects assessment and should be calculated with transparent and justified information/data. | Provide rationale for only considering 10 mm and smaller particles for the respirable fraction. | |
| IR-228 | CNSC | Human Health with respect to radiation exposure | Section 14.6.6.4 Appendix 14-A | Context: For the Bounding Scenario 6 (Facility Fire and/or Explosion), the predicted dose is less than 1 mSv to a member of the public 200 metres away from the project site. The analysis also indicated that the dose to a worker in a full-face powered air-purifying respirator who stays in the area would be 88 mSv, which exceeds the annual worker dose limit of 50 mSv. The proponent did not provide the dose calculations for deriving the dose estimates. Rationale: The method used to estimate effective, equivalent, and committed dose is required to be verified. Sample dose calculations should be included, to confirm use of acceptable input data. | Provide the dose calculations for deriving the dose estimates for workers and members of the public for Bounding Scenario 6 (Facility Fire and/or Explosion). | |

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| IR-229 | CNSC | Human Health with respect to radiation exposure | Section 14.6.6.4 Appendix 14-A | <p>Context: With the Bounding Scenario 6 (Facility Fire and/or Explosion), the proponent states that Denison would ensure that the design of the plant includes control measures to reduce the exposure to both workers and members of the public to levels that are as low as achievable. The measures would ensure that the processing plant is adequately ventilated.</p> <p>It is not indicated where these additional measures have been detailed/elaborated within the EIS.</p> <p>Rationale: Control measures to reduce the exposure to both workers and members of the public as low as achievable, that are identified in the assessment of Bounding Scenario 6, must be formally documented to ensure that they are carried over into the engineered design of the processing plant.</p> | Provide details on how the control measures to reduce the exposure to both workers and members of the public, identified in the assessment of Bounding Scenario 6, have been formally documented and incorporated in the engineered design of the processing facility. | |
| IR-230 | CNSC | Accidents and Malfunctions | Section 14.6.7.4 | <p>Context: It is stated that a conservative penetration time of 15 min was applied in the assessment. Based on this assumption, the maximum depth of contamination could be 90 cm (for penetration rate of 0.1 cm/s). It is not clear why the penetration time of 15 minutes is considered conservative as the penetration time would depend on the time needed for the emergency response team to respond.</p> <p>It is also stated that the wide range of the calculated velocities is a result of variation of soil conditions and the slope of the surface. The distance that the groundwater can travel under these extreme (i.e., conservative) conditions ranges from 0.15 m to 100 m. It is not clear how the groundwater travel distance of 0.15m and 100m is calculated.</p> <p>Rationale: The penetration time will influence the penetration depth of the released materials, which in turn, considering the groundwater travel distance, will impact the potential areas and volumes of contaminated soils and shallow groundwater.</p> | Please provide justification for applying 15 minutes of penetration time, and why it is considered conservative. In addition, please provide information on how the groundwater travel distance of 0.15 m and 100 m was obtained. | |
| IR-231 | CNSC | Accidents and Malfunctions | Sections 14.6.6.4 and 14.6.6.5 | <p>Context: The EIS states that in the unlikely event of an unmitigated accidental release of uranium due to a dryer explosion, doses to the workers are expected to have a moderate effect, while doses to members of the public are expected to have a minor effect. Based on this evaluation, the severity of the consequences of this accident and malfunction scenario is predicted to be moderate. In consideration of both probability and consequences, the overall risk related to Bounding Scenario 6 is predicted to be low.</p> <p>Rationale: When there is an explosion within the process plant, it is likely there will have worker fatality. The severity of the consequences</p> | Please re-evaluate the consequence and the risk of Bounding Scenario 6 by considering the potential worker fatality resulted from an explosion. | |

| Ref. # | Department | Project Effects Link | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Information Requirement (IR) ² | Denison Response |
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| | | | | of an explosion would be catastrophic and the risk of Bounding Scenario 6 would be higher. | | |
| IR-232 | ECCC | Change to an environmental component due to hazardous contaminants | Appendix 14-A, Table 3-7, ID# 7.1 Appendix 14-A, Table 5-5 | <p>Context: The Proponent indicates in Appendix 14-A, Table 3-7 that a release of sulfuric acid is a low consequence event therefore would not require further assessment. However, according to a Safety Datasheet on high concentrated sulfuric acid (ICSC 0362 - SULFURIC ACID, concentrated (> 51% and < 100%) (ilo.org)), the substance is incompatible with certain materials and can give off toxic fumes. Furthermore, it reacts with various metals to produce hydrogen gas, which is explosive.</p> <p>The Proponent provides estimates of chemicals, including sulfuric acid, to be transported to site in Appendix 14-A, Table 5-5. The annual consumption of sulfuric acid is estimated at 15,417 m3, in 617 trucks per year, but the concentration is not stated.</p> <p>Rationale: Given the high reactivity and inherent corrosive nature of sulfuric acid combined with the volume and concentration that may be stored on site, ECCC requests that the Proponent provide a detailed risk assessment related to a terrestrial spill of sulfuric acid, specifically at the processing plant.</p> | 1. Provide the volume and the concentration of sulfuric acid that will be stored on site. 2. Provide a detailed risk assessment of the fate and behavior of sulfuric acid during a release into the environment. | |
| IR-233 | HC | Human health with respect to hazardous contaminants | Appendix 14-A, Section 8.7 (p. 8.10) | <p>An effects assessment for a transportation accident scenario involving radioactive materials was not included.</p> <p>Context: The proponent provided an effects assessment relating to a diesel spill on the ground (Section 14 Appendix 14-A, Section 8.7). However, no information was provided regarding the potential human health effects of a uranium concentrate release at the two locations considered (Section 14 Appendix 14-A p. 8.10).</p> <p>Rationale: An accident involving radioactive material may have an impact on human receptors, based on the proximity of receptors and the proposed response protocols.</p> | 1. Assess and describe the potential health effects (chemical and radiological) of a transportation accident involving a uranium concentrate spill at the following locations: a) km 160 of Hwy 914, which is the location of a cultural camp that has been established by the ERFN. b) km 67 of Hwy 914, which is a gathering location for the Kineepik Métis Local associated with the Northern Village of Pinehouse. c) All other potential sites of importance for the public and Indigenous peoples. | |
| IR-234 | CNSC | Effect of Environment | Section 15.2.2 | <p>Context: Effects of seismic events on the uranium extraction and post decommissioning are not assessed.</p> <p>Rationale: Seismic events could further exacerbate the stability of the voids induced by the uranium extraction, which will result in extra stresses and displacements/deformation in the overlying rock formations. These extra stresses and displacements/deformation could impact on the mine operation and post decommissioning groundwater flow and contaminant transport.</p> | Please provide an assessment of seismic events on the mine-induced voids stability and the resulted effects on the mine operation and post decommissioning. Technical Discussion Required: Yes | |

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| IR-235 | ECCC | Fish and fish habitat | Section 15.5.2, Expected Environmental Conditions | <p>Context: In this section it is stated that: “Table 15.5-1 and Table 15.5-2 summarize the predicted mean values of the climate variables for the Tomblin Lake regional grid unit, following the RPC4.5 and RCP8.5 scenarios, respectively, as indicated by the Climate Atlas (PCC 2019).”</p> <p>RCP4.5 represents predicted climate conditions of a moderate carbon future.</p> <p>RCP8.5 represents predicted climate conditions under a high carbon future.</p> <p>The values shown in Tables 15.5-1 and 15.5-2 show averages of 25.9 and 26.7 mm for RCP4.5 and 25.9/27.5 mm for RCP8.5. These values do not correspond to the source indicated by the Proponent.</p> <p>Rationale: Based on the Proponent’s description we would expect to find the same values for “Max 1-Day Precipitation (mm)”in the Climate Atlas for RCP4.5 and RCP8.5 scenarios. ECCC was unable to duplicate the results.</p> <p>ECCC queried the Climate Atlas for Tomblin Lake and returned a result of “Region Geikie River.” https://climateatlas.ca/find-local-data</p> <p>ECCC then queried the Climate Atlas for Max 1 Day Precipitation (mm). https://climateatlas.ca/data/grid/782/maxdaypr_2030_85/line https://climateatlas.ca/data/grid/782/maxdaypr_2030_45/line</p> <p>The results displayed an array of values ranging from 83.6 mm (2050) to 87.3mm (2092) for a Regional Concentration Pathway RCP8.5 scenario and values ranging from 48.9mm (2050) to 89.5 mm (2083) for an RCP4.5 scenario.</p> <p>These values do not match the averages shown in Tables 15.5-1 and 15.5-2.</p> | <p>1. Provide the source of the data displayed in Max 1-Day Precipitation (mm) category in Tables 15.5.1 and 15.5-2.</p> <p>2. Provide detailed calculations for the following average values:</p> <ul style="list-style-type: none">• 25.9 mm 26.7 mm in Table 15.5-1: Predicted Climate Conditions of a RCP4.5 Moderate Carbon Future• 25.9 mm 27.5 mm in Table 15.5-2: Predicted Climate Conditions of a RCP8.5 High Carbon Future <p>3. Explain how the data shown in Tables 15.5.1 and 15.5.2 were used in the precipitation risk assessment.</p> <p>4. Denote the differences between “mean”, “value/max value”, and “fluctuation”, in the calculation of extreme event risk.</p> <p>5. Compare model derived data against:</p> <ol style="list-style-type: none">1. Natural variability of the observed data.2. Variability in the statistics generated via observation based time series. <p>Technical Discussion Required: Yes</p> | |
| IR-236 | ECCC | Fish and fish habitat | Section 15.5.2, Expected Environmental Conditions | <p>Context: It is stated that, “Table 15.5-1 and Table 15.5-2 summarize the predicted mean values of the climate variables for the Tomblin Lake regional grid unit...”</p> <p>As per the Proponent’s description, Tomblin Lake was chosen as representative location for Wheeler when Climate Atlas was used as data source.</p> <p>Rationale: In those two tables, for the “Max 1-Day Precipitation (mm)” the historical average is given as 24.1mm. Local time series analysis for the climatic region in which Wheeler Project is located provide</p> | <p>1. Provide a clear explanation on how the historical mean for 1-Day Max Precipitation was calculated.</p> <p>2. Compare the values obtained via various means (ex: copied from the internet, modeled via some online algorithm, derived from specialty literature), against time series analysis based on observations.</p> <p>Technical Discussion Required: Yes</p> | |

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| | | | | <p>averages (for 1-day max precipitation) of approximately 30+ mm.</p> <p>It is the Proponent’s responsibility to keep the required database current and up to date, because the length of the time series influences all derived statistics. Statistical analysis of extreme events is highly dependent of the mean with extreme values reaching values 3 to 4 times higher than the mean.</p> | | |
| IR-237 | CNSC | EA follow-up and monitoring program | Appendix 16-C throughout, including Table 1.5-1: Wheeler River Monitoring and Follow-up Program Summary (p. 8-15) | <p>Context: CNSC’s Generic Guidelines for the Preparation of an EIS state: “The EIS should provide discussion on the follow-up program’s requirements, and include:</p> <ul style="list-style-type: none">objectives and structure of the follow-up program and the VCs targeted by the programtabular summary and explanatory text of the main components of the program including:<ul style="list-style-type: none">a description of each monitoring activity under that component<u>which of the two generic program objectives the activity is relevant to (e.g., verify EA predictions, determine effectiveness of mitigation measures)</u>the specific statement from the EA that goes along with that generic objective and will be the focus for that activity (e.g., program objective: verify predicted effects; environmental assessment effect: no potential adverse effects)the specific monitoring objective for that activityplanned schedule<u>roles and responsibilities to be played by the proponent, regulatory agencies, Indigenous people, local and regional organizations and others in the design, implementation and evaluation of the program results</u><u>possible involvement of independent researchers</u><u>program funding sources</u>information management and reporting (reporting frequency, methods and format)<u>possible opportunities for the proponent to include the participation of the public and Indigenous groups, during the development and implementation of the program</u> <p><u>The follow-up program plan should be sufficiently described in the EIS to allow independent judgment as to the likelihood that it will deliver the type, quantity and quality of information required to reliably verify predicted effects (or absence of them) and confirm the effectiveness of mitigation measures.”</u> (Section 11)</p> <p>Rationale: The Summary of Monitoring and Follow-up Programs provided in Appendix 16-C contains very high-level information, and</p> | <p>It is recognized that this document will evolve over the planning process and be finalized prior to the EA Decision; however, as plans are developed and revised, CNSC staff expect that updates will be made to this document and provided with any future versions of the EIS.</p> <p>Appendix 16-C Summary of Monitoring and Follow-up Programs must include sufficient details to allow CNSC staff to determine the likelihood that it will deliver the type, quantity and quality of information required to reliably verify predicted effects (or absence of them) and confirm the effectiveness of mitigation measures. This includes concrete monitoring plans (sampling locations, frequency, etc.).</p> <p>Additionally, please incorporate any relevant information included in the EIS into this Summary.</p> | |

| Ref. # | Department | Project Effects Link | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Information Requirement (IR) ² | Denison Response |
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| | | | | <p>while some of the aspects detailed in the Generic EIS Guidelines are included, the aspects underlined are missing or appear incomplete.</p> <p>Further, all information from throughout the EIS should be incorporated into this Summary. For example, the EIS notes that: “Groundwater samples will be collected at least monthly and semi-annually in the wells within the freeze wall and on the freeze wall perimeter, respectively” (p. 7-109) and that “At least five to seven multi-well clusters are proposed across the mined area (Figure 7.8-2). Sampling will include KI parameters or the full suite of COPC at different times in the remediation process” (p. 7-111).</p> <p>These details (only examples) are not included in Appendix 16-C.</p> | | |
| IR-238 | CNSC | Current use of lands and resources for traditional purposes | Various sections of the EIS, including: Section 8 Section 9 Section 10 Section 11 Section 12 Section 15 Section 16 Appendix 16-C (p. 3) | <p>Context: The EIS indicates that “further detailed [follow-up and monitoring programs] will be developed as Project designs are finalized that may influence the nature, frequency, and locations of monitoring. In addition, input from regulatory agencies, the public and Indigenous Peoples will be considered.” (Appendix 16-C, p.3)</p> <p>It is not clear in several section(s) of the EIS and the Indigenous Engagement Report, whether Denison has provided the interested Indigenous Nations and communities with the opportunity to participate in the development, implementation, and review of monitoring and mitigation measures, as per the guidance of REGDOC-3.2.2 and CNSC’s Generic EIS Guidelines.</p> <p>Rational: As outlined in Section 11 of CNSC’s Generic Guidelines for the Preparation of an EIS, please include roles and responsibilities to be played by the proponent, regulatory agencies, Indigenous people, local and regional organizations and others in the design, implementation and evaluation of the monitoring program results as well as possible opportunities for the proponent to include the participation of the public and Indigenous Nations and communities, during the development and implementation of the program.</p> | <p>Please provide additional information to demonstrate whether Indigenous Nations and communities were engaged directly on the potential mitigation and monitoring measures to address the concerns raised regarding potential impacts of the project on the potential or established Indigenous and/or treaty rights.</p> <p>Provide a rationale if this engagement has not been completed. As the Project develops, please provide concrete actions Denison will take in the follow-up and monitoring programs to engage Indigenous Peoples to alleviate concerns and incorporate their interests, and when this engagement is planned to take place.</p> | |

ⁱ **Additional Lung Cancer Mortality from PM2.5: Recommended Approach and Sample Calculation**
Health Canada, Water and Air Quality Bureau, October 2022

Health Canada (2022) provides a quantitative estimate of the risk of lung cancer associated with exposure to PM2.5 in Canada. The pooled hazard ratio (HR) for lung cancer mortality in the Canadian population is 1.127 (95% CI: 1.085, 1.170)

per 10 µg/m3 increase in long-term exposure to ambient PM2.5. The slope coefficient (β) for this relationship is 0.01196, as derived below:

$$\begin{aligned} e^{(\beta \times 10 \text{ } \mu\text{g}/\text{m}^3)} &= \text{pooled hazard ratio per } 10 \text{ } \mu\text{g}/\text{m}^3 \\ e^{(\beta \times 10 \text{ } \mu\text{g}/\text{m}^3)} &= 1.127 \\ \beta \times 10 \text{ } \mu\text{g}/\text{m}^3 &= \ln 1.127 \\ \beta &= (\ln 1.127)/(10 \text{ } \mu\text{g}/\text{m}^3) \\ \beta &= 0.01196 \end{aligned}$$

The additional lung cancer mortality (over the baseline rate) from PM2.5 derived from a given source can be determined using the equation below, based on the attributable fraction or (HR-1)/HR (Greco et al. 2020):

$$ALCM = \left[\frac{(e^{\beta \cdot Exposure} - 1)}{e^{\beta \cdot Exposure}} \right] \cdot Baseline \text{ rate} \cdot Years$$

ALCM = additional lung cancer mortality cases per 100,000 population

β = 0.01196 (slope coefficient from meta-analysis in Health Canada (2022))

Exposure = estimated PM2.5 exposure concentration from the relevant source(s) (µg/m3) (does not include baseline PM2.5 exposure)

Baseline rate = 45.5 per 100,000 (current Canadian Age Standardized Mortality Rate (ASMR) for lung cancer from Canadian Cancer Statistics Advisory Committee 2021); the Canadian baseline rate is appropriate as the slope coefficient was derived from Canada-wide studies and an updated ASMR of Canada (if available) would be appropriate for use in the calculation

Years = years of project or project phase

Sample calculation:

Project estimates an exposure from relevant source(s) of 0.067 µg/m3 over 50 years of operation

$$\begin{aligned} ALCM &= \left[\frac{(e^{\beta \cdot Exposure} - 1)}{e^{\beta \cdot Exposure}} \right] \cdot Baseline \text{ rate} \cdot Years \\ ALCM &= \left[\frac{(e^{0.01196 \cdot 0.067} - 1)}{e^{0.01196 \cdot 0.067}} \right] \cdot 45.5 \cdot 50 \end{aligned}$$

ALCM = 1.8 additional lung cancer mortality cases per 100,000

References:

[1] Canadian Cancer Statistics Advisory Committee in collaboration with the Canadian Cancer Society, Statistics Canada and the Public Health Agency of Canada. Canadian Cancer Statistics 2021. Toronto, ON: Canadian Cancer Society; 2021. Available at: cancer.ca/Canadian-Cancer-Statistics-2021-EN

[2] Greco, S.L., MacIntyre, E., Young, S. et al. An approach to estimating the environmental burden of cancer from known and probable carcinogens: application to Ontario, Canada. BMC Public Health 20, 1017 (2020). <https://doi.org/10.1186/s12889-020-08771-w>

[3] Health Canada. Lung cancer and ambient PM2.5 in Canada: a systematic review and meta-analysis.

[4] Health Canada, 2022. Available online at: <https://publications.gc.ca/site/eng/9.907038/publication.html>

Annex 2

Federal Indigenous Review Team (FIRT) – Advice to the Proponent for the Wheeler River Environmental Impact Statement (EIS)

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Advice to the Proponent |
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| AD-01 | Canadian Nuclear Safety Commission (CNSC) | Glossary sections | <p>There are terms used throughout the EIS that may either need defining, or inclusion in the glossary.</p> <ul style="list-style-type: none">“Bounding”, “bounding case” and “bound” are used frequently throughout the EIS to describe the scope of the assessment. For example, p. 2-6 the EIS States: “Denison has bound the environmental assessment above the deposit...”“Laydown”. P. 2-54 states: “During Construction, Denison plans to create a laydown area next to the future domestic landfill to temporarily store construction waste. Examples of materials include clean wood, plastics, metal, and concrete. The construction laydown area will not be lined, but it will have a berm surrounding the area to minimize run-on and runoff.”“Deflagration” (p. 2-22)“Speed of sound” The EIS states: “Deflagration means the material burns slower than the speed of sound, thus no shock waves are generated. Propellant permeability enhancement methods reach injection pressures of up to 8,000 psi and are near instantaneous over periods of milli seconds...” (p. 2-22) - Explain briefly what is meant by “speed of sound”“Dries” (p. 2-65): “the main dries will be located in the processing plant”“Scarified” 2-84 Laydown areas will be scarified, covered with 0.5 to 1.0 m of stockpiled overburden, and vegetated with native, self-sustaining species.“Furblock” (p. 4-29)“Cutlines” (p. 4-101) | Add this terminology to either one of the early glossaries, or when describing the methodology, in order to help readers understand these terms (particularly non-technical readers, such as Indigenous peoples and members of the public). |
| AD-02 | CNSC | General | Mining solution and lixiviant are used interchangeably throughout the EIS. When both are used periodically, may be difficult for a member of the public to recognize that these are one in the same (mining fluid seems more often used). | Be consistent in how this is referred to, in order to ensure it’s clear to readers that these are one and the same. |
| AD-03 | CNSC | Throughout the Executive Summary (ES) and draft EIS | <p>Errors in formatting and grammar were identified throughout ES and EIS. Some examples are underlined below:</p> <ul style="list-style-type: none">“often referred to as “the final uranium product (yellowcake” (ES, p.16)“Whitefish Lake;;” (ES, p.47)“Forest fires are common throughout most of northern Saskatchewan, however, and are an important natural disturbance of northern boreal forest ecosystems” (p.72)“Other comments that the process reminded them of fracking, which carried a negative connotation...” incomplete sentence (EIS, p. 2-3)“.During this phase, water taking will mainly be used by the processing plant and wellfield remediation and to support the potable water plant and wash bay.” (EIS, p. 8-29)“In McGowan Lake, meanmercury concentrations in Northern Pike” (EIS, p. 8-224) | Please correct these and any other formatting, spelling or grammatical errors. |

¹ Unless otherwise stated, the section noted refers to the draft EIS

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Advice to the Proponent |
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| | | | <ul style="list-style-type: none">“Flows and water levels in lakes and rivers within the LSA will realize some adverse change (reduction) as a result of overprinting drainage areas reporting specifically to Whitefish Lake and water taking from this same waterbody.” (8-38)“Residual effects characteristics specific to Fish Health are defined in Table 8.5-6 with evaluation of residual effects provided in ” (EIS, p. 8-242)“Potential Project residual effects on the Fish Health VC are primarily related to c the controlled” (EIS, p. 8-249)“...resulting in a moderate level of uncertainty. .” (EIS, p. 9-47)“...the assessment. Error! Reference source not found. Provides a summary of unique identification numbers referenced within Section 10.1.” (10-10)“Kineepik Métis Local #9 have also note how the Project...” (EIS, p. 11-57)“But do not compose the same volume of consumption” (EIS, p. 11-56) – should this be comprise?“ Phoenix Infrastructure. I In total, approximately 284 ha” (EIS, p. 11-156) <p>Please note, this list is not exhaustive.</p> | |
| AD-04 | CNSC | Section 2.2.1 Mining (p. 2-4 to 2-5) | An arial view could be useful to help a reader understand the proposed freeze wall earlier in section 2 (e.g., The shape, whether it surrounds the deposit). This is unclear but there are good images further down in the EIS (i.e., Figure 2.3-1 on p. 2-78). | Consider adding image to Section 2.2.1, similar to or containing aspects of Figure 2.3-1. |
| AD-05 | Transport Canada (TC) | Sections 2.2.3.2, 2.2.3.10, 2.2.5.1, 2.3.1.6, 8.3.4.2.2, 11.1.4.4.2, | The two water crossings over Kratchkowsky Creek and Hart Creek and the water intake and effluent discharge/intake pipeline and diffuser at Whitefish Lake may be subject to the <i>Canadian Navigable Waters Act</i> (CNWA). However, these works may be exempt from the CNWA, if they meet the requirements of the Minor Works Order. | <p>*This advice pertains to the regulatory phase.*</p> <p>It is recommended that the Proponent self-assess each work using TC’s Project Review Tool as follows: https://npp-submissions-demandes-ppn.tc.canada.ca/projectreview-outildexamenduprojet</p> <p>If the works do not fit the Minor Works Order, the Proponent has the option to either submit an application for approval to the NPP, or use the public resolution process, as these are all unscheduled waterways. The full text of the Minor Works Order is available here: https://laws-lois.justice.gc.ca/eng/regulations/SOR-2021-170/page-1.html.</p> <p>Background information on the NPP, the Minor Works Order, the application for approval process and the public resolution process are available here: https://tc.canada.ca/en/programs/navigation-protection-program/apply-npp</p> |
| AD-06 | Environment and Climate Change Canada (ECCC) | Section 2.2.3.8, Project Description | <p>In this section it is stated that: “The third step of the Industrial Wastewater Treatment Plant (IWWTP) is anticipated to further neutralize and improve the remaining water quality proposed to be achieved with further pH adjustments through agitated tanks and a clarifier with negligible solids generation expected at this stage. Several additional technologies including ion exchange are being evaluated as part of an ongoing Best Available Technology Study to be complete as part of future permitting.” ECCC would be interested in reviewing this study when it becomes available.</p> <p>Considering that the third step of the effluent treatment process in the IWWTP is still undergoing development, ECCC cannot make final conclusions regarding the efficacy of the treatment process. When final treatment technologies have been evaluated and selected, ECCC would like to review this information to allow for release to the environment.</p> | ECCC requests the opportunity to review the Best Available Technology Study and selected treatment technologies for the IWWTP when the report becomes available. |

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Advice to the Proponent |
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| AD-07 | TC | Section 2.2.5.3 | <p>With respect to the proposed airstrip, under the <i>Aeronautics Act</i>, the proposed airstrip would be considered an “aerodrome”, which is defined as:</p> <p>“aerodrome means any area of land, water (including the frozen surface thereof) or other supporting surface used, designed, prepared, equipped or set apart for use either in whole or in part for the arrival, departure, movement or servicing of aircraft and includes any buildings, installations and equipment situated thereon or associated therewith.”</p> <p>Aerodromes, including the one proposed by Denison, are subject to the <i>Aeronautics Act</i> and the Canadian Aviation Regulations (CARs).</p> | <p>*This advice pertains to the regulatory phase.*</p> <p>The proponent must notify the Minister of Transport of the proposed airstrip (aerodrome). This notification, being a summary report to the Minister of Transport, is required by section 307 of the CARs (CARs 307). CARs 307 also requires Denison to undertake consultation in the prescribed manner before it constructs the proposed aerodrome at the mine site. Details of the consultation are to be included in the above-mentioned summary report to the Minister of Transport.</p> <p>CARs 307 identifies the requirement to consult to include anyone seeking to undertake a prescribed aerodrome work at a certified or non-certified aerodrome, whether it is the creation of a new aerodrome or, at an existing aerodrome, lengthening an existing runway or making a new one. The Regulation also provides minimum expectations for how the consultation should be conducted, including timelines, who to notify and under what circumstances. The intent of the Regulation is to compel consultation in advance of an aerodrome work that will result in sustained and regular impact on interested parties as identified in the Regulation.</p> <p>As the proposed aerodrome will not be within 4 kilometres of a city or built-up area, under CARs 307, the proponent is required to consult the following interested parties:</p> <ul style="list-style-type: none">(i) the Minister of Transport,(ii) the providers of air navigation services,(iii) the operator of a certified or registered aerodrome located within a radius of 30 nautical miles from the location of the proposed aerodrome work,(iv) the authority responsible for a protected area located within a radius of 4 000 m from the location of the proposed aerodrome work,(v) any local land use authority where the proposed aerodrome work is to be carried out, and(vi) the owner of any land bordering the land on which the proposed aerodrome work is to be carried out. <p>Proponents are encouraged to share their plans with the local land use authority before the consultation period. The local land use authority may have information about other nearby projects or developments that could impact on the proponent's plans.</p> <p>In summary, regarding the airstrip (aerodrome), the proponent must complete the consultation and file the summary report with the Minister of Transport, prior to commencing construction of the aerodrome.</p> <p>Further details can be found at: https://laws-lois.justice.gc.ca/eng/regulations/SOR-96-433/FullText.html#s-307.01.</p> |

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| | | | | TC recommends that the proponent contact TC’s Aerodromes Group at CASPNR-SACRPN@tc.gc.ca before starting the consultation, to ensure it is completed in accordance with CARs 307. |
| AD-08 | CNSC | Figs. 3.4-1, 4.3. 1, and where applicable throughout the EIS | Some maps in the EIS do not contain highway numbers. | Please consider including the highway numbers on the maps early in the Draft EIS when laying out the project location so the reader can become familiar with road network within northern Saskatchewan when discussions take place. |
| AD-09 | CNSC | Section 4, including Figures 4.3.1 and/or 4.3.2 and where applicable throughout the EIS. | The maps included in the EIS in sections do not have any Treaty boundaries. First Nation Treaties should be included on the map. Not all First Nations reserves, and boundaries are included on the map such as Cree Lake and Slush Lake, please include on map and consider adding others from the NAD. | It is recommended that Denison update the maps in these sections to include Treaty Boundaries and community locations are included on the Project location map in Figure 4.3.2 and other maps throughout the entire EIS where applicable. |
| AD-10 | CNSC | Section 4 | Overall, CNSC believes that Denison is abiding by the communications strategies and products identified in their PIDP, but would be interested in additional information that is available. | While CNSC staff are satisfied that the proponent meets the requirements with this EIS, further clarity and detail on the strategic planning behind these communications activities would be beneficial and would further support the overall goals of the Project’s engagement activities. |
| AD-11 | CNSC | Section 4 Indigenous Engagement Report (IER) | There is a summary of what engagement activities will occur moving forward. However, it is not clear which engagement activities/meetings will occur during the different stages of the EA/ project life cycle. Please provide additional details upon submission of the Final EIS. | Denison should consider clarifying in the updated IER which engagement activities will occur during each stage of the project moving forward as per Reg Doc 3.2.2 before submitting the Final EIS. |
| AD-12 | CNSC | Section 4 IER | Information included in the EIS Section 4 and IER regarding engagement activities, communication and issues and concerns raised will need to be updated when the next version of the EIS is submitted. The EIS and IER will need to be updated to include information from Fall of 2022 until approximately two months prior to the submission date of the next EIS. | When re-submitting the EIS, ensure that the engagement log, issues and concerns tables and information about engagement activities done to date have been updated. No action needed only advice to update this section before submission with most up to date engagement activities including any that take place with other Indigenous Nations and communities not included in the Draft EIS. |
| AD-13 | CNSC | Section 4 IER | Denison states that validation of VC selection was completed with ERFN, the Northern Village of Beauval, the Northern Village of Pinehouse Lake, and the Northern Hamlet of Patuanak (hereafter Beauval, Pinehouse, and Hamlet of Patuanak, respectively). The EIS states that this was completed through a shared online survey. The EIS also indicates that YNLR was also included in this process. | <p>How has Denison validated VC selection with the other Indigenous Nations and communities that have showed interest and if so, by what methods (survey’s, engagement, meetings, review of Draft sections etc.?) Did Indigenous Nations and communities select any VC’s that were not included in the EIS and if so why not?</p> <p>Please elaborate and provide more details in the EIS on any other methods used including engagement sessions that were completed with Indigenous Nations and communities, through in-person community workshops, VC selection approval through early review of Draft EIS sections.</p> |
| AD-14 | CNSC | Section 4.3.1, Pg 246 | On this page, Denison states that MN-S is “currently structured with a President, an Executive, a Provincial Metis Council, Regional Presidents, and Local Presidents. The wording of ‘Regional President’ is incorrect and should be changed to say, ‘Regional Director’. | Please update all wording of “Regional President” to “Regional Director” when referring to MN-S. |
| AD-15 | ECCC | Sections 5.3.4 (Table 5.3-3); 8.1.3.3 Climate Change; 8.1.3.4 Climate Change Influenced Extreme Events; Table 15.4-1: Summary of Potential Effects of Short-term Extreme Weather | The Proponent indicates that the Project’s full lifetime is roughly 40 years (including the post-decommissioning phase) and that climate conditions are important design considerations for a number of sensitive aspects of the Project. Potential future climate changes and their potential effects on the Project and Valued Components (VCs) are described in various sections of the draft EIS. Notably, in Section 15.5.2, ensemble mean projections are provided for several climate variables for two future time periods and emissions scenarios (RCP 4.5 and 8.5). In Section | ECCC recommends that when considering potential future climate change and relevant effects on the Project, the Proponent consider the range of variability from the ensemble of models (not just the ensemble mean). ECCC also recommends that the Proponent consult the 2019 Canadian Standards Association Guidance on Intensity Duration Frequency for Canadian Water Resources practitioners , which provides examples of alternative methodologies to estimate |

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| | | Events on the Project and Associated Mitigation; Section 15.5 Climate Change. | <p>8.1.3.4, the Proponent describes possible future changes in short-duration precipitation extremes (based on Intensity Duration Frequency or IDF curves from the IDF_CC tool) and indicates that an increase in their frequency and magnitude may occur over the Project lifetime “... and may require consideration for greater storage and conveyance capacity for Project water management infrastructure” (p.8-41).</p> <p>The Proponent indicates that aspects of the Project are being designed to meet standards based on design values that appear to be derived from observed (i.e. historical) climate conditions (e.g. water management infrastructure; see Table 15.4-1). In Section 15.5.3, they indicate that an adaptive management approach will be used to address some aspects of future climate change as necessary. For example, page 15-19 of the draft EIS states that: “Denison will develop an Emergency Preparedness and Response Program for the Project to address forest fires and extreme weather that may occur. If unforeseen effects on the Project occur from longer and more severe forest fire seasons associated with climate change, or increased frequency or severity of extreme weather (e.g., ice storms, snowstorms, flooding), Denison will apply adaptive management that includes monitoring climate factors so that they can proactively mitigate or prevent adverse climate effects on the Project.” (Emphasis added).</p> | <p>future return values for design as needed.</p> <p>In terms of adaptive management, ECCC recommends that the Proponent clearly outline what climate factors will be monitored to mitigate or prevent adverse climate-related effects. This should include information on when and how the climate factors would be monitored and under what circumstances particular adaptive management approaches would be applied.</p> |
| AD-16 | CNSC | Section 5.10 (p.70) and throughout the EIS | <p>In section 5.10 of the ES, where the seven scenarios are listed, formatting is inconsistent. Likelihood is in quotes in some places, but not in all.</p> <p>Not significant is bolded inconsistently throughout the EIS.</p> <p>As well, in many cases noted as “not significant”, where others note “are not expected to have a significant effect”.</p> | <p>Suggest making formatting consistent if going to use quotes and bolding to highlight sections of the text.</p> <p>Also, validate that use of “not significant” and “are not expected to have a significant effect” are consistently used (where appropriate).</p> |
| AD-17 | ECCC | Appendix 6-A Air Quality Technical Supporting Document A.10 | Some of the off-road vehicles have an emission rating of Tier 2 but in Appendix 6-A Section A.10 the Proponent claims that “for non-road diesel combustion, Tier 4 emission factors were assumed”. Choosing an engine with a lower Tier will increase emissions in NOx significantly and the Proponent should be using the best available technologies to minimize environmental impacts. | ECCC recommends that the Proponent choose engines that meet the most stringent emission standards to the extent possible, which are Tier 4 for the compression-ignition engines, during all phases of the Project. |
| AD-18 | ECCC | Appendix 6-C, Climate Baseline and GHG Emissions Report | <p>Understanding Project emissions is important to inform analysis of a Project’s potential impact on Canada’s emissions targets and climate change commitments.</p> <p>ECCC notes that Section 4.0 and Appendix C: Greenhouse Gas Emissions Calculations of Appendix 6-C identifies the source of emissions and quantifies them in the construction, operation, and decommissioning phases of the Project, in accordance with the Draft Technical Guide Related to the SACC (Draft Technical Guide). While ECCC recognizes that the emissions will be relatively small in the post-decommissioning phase, the identification and quantification of the emissions in this phase is not found in the draft Environmental Impact Statement (EIS). The post- decommissioning phase is expected to last 15 years, likely going past 2050.</p> <p>The draft EIS does not discuss emission intensities of the Project, only the grid electricity. The draft EIS also does not discuss the Project’s potential impacts on Canada’s climate targets.</p> | <p>ECCC recommends that the identification of the sources of Greenhouse Gas (GHG) emissions and quantification of these emissions be described for the post-decommissioning phase, as done for the other phases.</p> <p>ECCC recommends the Proponent include discussion on the emission intensities of the mining of the product, following the guidance of the SACC and the Draft Technical Guide.</p> <p>ECCC recommends that the Proponent discuss the potential impacts that the Project may have on Canada’s ability to meet its climate-related targets, following the guidance of the SACC and the Draft Technical Guide.</p> |
| AD-19 | ECCC | Appendix 6-C, Climate Baseline and GHG Emissions Report | The draft EIS lacks information related to estimates of impact on carbon sinks and emissions from land-use changes. As land use shifts from a vegetated site prior to development, to an industrialized site, removal of vegetation and peat will have impacts on carbon sinks and construction emissions. | <p>Land Use Change</p> <p>Regarding the lack of site-specific information of above-ground mass of vegetation, an initial site survey on-site using basic information such as site class and species would assist in determining the above-ground biomass. More specific data, such as</p> |

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| | | | <p>Section 6, Appendix 6-C, 4.1.2 Land Use Change states that site-specific information of above-ground mass of vegetation was not available and default data from Table 20 of the Draft Technical Guide were applied. The default data is contained in this table is not applicable in this case, as they represent aboveground woody vegetation in cropland systems.</p> <p>ECCC recognizes that the usage of the median value of 0.51 for the carbon content is reasonable.</p> <p>From the information given in the draft EIS, it does not seem that the soil carbon was taken into account. In the absence of detailed information, the Proponent assumed that the area cleared would also be excavated (and drained in the case of wetland areas) which would create significant additional emissions from soil disturbances and drainage.</p> <p>Section 4.1.2 also states the Project involves clearing an area of approximately 169.6 hectares. There are no estimates on the impact on carbon sinks related to the Project.</p> | <p>regional data from provinces, forest companies, or literature may be available, and generic national data is available (e.g., Fo148-1-2E.pdf (publications.gc.ca), 4775.pdf (nrcan.gc.ca)).</p> <p>ECCC recommends that the Proponent also consider biomass that are not aboveground and confirm whether soil carbon is taken into account, as well as wetlands.</p> <p><i>Carbon Sinks</i> ECCC recommends that the Proponent provide a quantitative and qualitative description of the Project’s impact on carbon sinks, following the guidance of the SACC and the Draft Technical Guide.</p> |
| AD-20 | NRCan | Section 7.3.1, Physical Geography | Drumlins and eskers in the region trend Northeast to Southwest as opposed to northwest to southeast as written on page 7, line 18. Correct orientations are used on page 7, line 23. | NRCan recommends revising the text. Please refer to 250 000 scale Surficial Geology Lines from Quaternary mapping, CSRS NAD83 Zone 13, Saskatchewan Geological Survey 2017. |
| AD-21 | NRCan | Section 7.3.2.3, Metacrystalline Basement Rock | Pegmatite missing from list of basement rock types. | NRCan suggests addition of pegmatite to the list of basement tock types as shown on Figure 7.3-6. |
| AD-22 | NRCan | Section 7.3.3.1, Aquifer Properties, Section 7.3.2.3, Metacrystalline Basement Rock, Appendix 7A, 2.0, 2.3.1, 2.3.2 | The terms “metacrystalline” and “metagranitic gneiss” are not frequently used terms in scientific literature. Gneiss is, by definition, a metamorphic rock. | NRCan suggests revision to “Crystalline Basement rocks” or “Basement metamorphic rocks”, and “granitic gneiss” as used in Figure 7.3-6. Please refer to Oxford Dictionary of Earth Sciences. |
| AD-23 | NRCan | Appendix 7A, 2.3.1, Metacrystalline basement rock | Orogeny is the process, orogen (or orogenic belt) is the feature produced by orogeny. | NRCan suggests replacing “Tran Hudson Orogeny” with Trans Hudson Orogen”. |
| AD-24 | NRCan | Appendix 7A, 2.3.1, Metacrystalline basement rock | Quartzite is by definition a metamorphic rock, and the term is used later without the meta-prefix. | NRCan suggests replacement of the term “meta-quartzite” with “quartzite”. |
| AD-25 | NRCan | Appendix 7A, 2.3.4, Athabasca Group Sandstones and Conglomerates | Sands are unlithified, whereas you are referring to grain sizes in this case. | In Table 2-1, NRCan suggests replacing the term “sands” with “grain sizes” under MFc and MFb descriptions. |
| AD-26 | NRCan | Appendix 7A, 2.3.5, Overburden | Typo on page 2, line 7: “A grain size sample was collected in GWR-033 from approximately 9 m below ground surface, and the same consisted of 8.8% clay (less than 4 µm). | NRCan suggests revision of “same” to “sample” and clay to “clay-sized” grains. |
| AD-27 | CNSC | Section 8.2.1.3 – Spatial and Temporal Boundaries | It is noted that McGowan Lake is an identified reference lake for the Key Lake Mill site. With the establishment of the Wheeler River mine, effluent would be flowing into McGowan Lake, which could potentially interfere with Key Lake’s environmental monitoring program by compromising McGowan Lake’s baseline conditions. Depending on the loading of COPC’s into McGowan Lake and resultant water concentrations, it may no longer be accepted as an acceptable reference lake for use by Key Lake. This would require Cameco to modify their monitoring program at the Key Lake Mill. | The CNSC advises Denison to communicate with Cameco to ensure they are aware of this situation. Coordination between the two companies may be necessary to ensure Key Lakes environmental monitoring program is not compromised. It is recommended to discuss this potential issue with Cameco ahead of time to determine the best path forward. |

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| AD-28 | ECCC | Section 8.2.4.2.3 Appendix 10-A, Section 3.1.1.2 | <p>Tables 8.2-9 and 8.2-10 in Section 8.2.4.2.3 Part II_S8 Aquatic Environment and Table 3-1 in Appendix 10-A Section 3.1.1.2 demonstrate predicted maximum effluent concentrations of Constituents of Potential Concern (COPCs) and maximum predicted receiving environment concentrations.</p> <p>The final effluent quality discharge target for uranium is 0.057 mg/L. However, the Canadian Council of Ministers of the Environment (CCME) water short-term (acute) water quality guidelines for the protection of aquatic life is 0.033 mg/L. The proposed effluent discharge target for uranium exceeds the acute water quality guideline, indicating effluent may pose the risk of being acutely lethal to aquatic biota at end-of-pipe. While uranium is not a Schedule 4 substance with prescribed concentration limits under the Metal and Diamond Mining Effluent Regulations (MDMER), the MDMER requires the characterization of uranium concentrations in effluent under Schedule 5, and requires that all mine effluent released from final discharge points be non-acutely lethal.</p> <p>Under Schedule 5 Section 9(d) of the MDMER, the Proponent will likely be required to conduct selenium fish tissue sampling if average annual concentrations of selenium in effluent equals or exceeds 5 ug/L.</p> | Discharges from the proposed Project will alter water quality in the immediate receiving area, and this may include some sublethal effects on aquatic biota, which must be minimized. It remains the Proponent’s responsibility to adhere to the MDMER to ensure that effluent at the end-of-pipe from all final discharge points be non-acutely lethal and meet requirements for prescribed deleterious substances under Schedule 4 of the regulations. |
| AD-29 | CNSC | Section 8.3.3 Figures 8.3.5 etc. 8.5-4 | It does not appear that aquatic baseline sampling maps for Russell Lake have LAB 1 and 2 locations showing the baseline sampling locations within Russell Lake. (Figures 8.3.5). Please update the Figures throughout aquatic environment section to include of the baseline sampling studies/ locations within Russell Lake. | Please update maps and sections in EIS to reflect aquatic baseline studies that were completed. |
| AD-30 | CNSC | EIS sections 8.4.3.2.4 Benthic Invertebrate Community and 8.4.7.6 Climate Change Considerations | <p>ECCC EEM guidance recommends the use of multiple reference areas as it offers the greatest statistical power to detect a meaningful difference between a reference area and an exposure area and can also give an indication of variability among reference areas. It is also important to incorporate multiple reference locations into the study design to aid in designing against spatial confounding factors.</p> <p>Section 3 of the Aquatic Environment Baseline Study Report details the similarities between benthic invertebrate communities by using the mean Bray-Curtis index between sampling locations and the median reference condition for the lake group size. It’s not clear in the EIS if there are any issues expected to be able to use this data to compare project effect locations to references sites into the future, as some sampling locations are currently not very similar to the reference sites.</p> <p>In addition, climate change could affect the sediment and benthic communities in the future. The EIS states “the frequency and magnitude of extreme precipitation events have the potential to change water levels and flows in the RSA, which may affect sediment transport, deposition, and therefore benthic invertebrate habitat. Changes to average and upper and lower bounds of ambient temperatures may also affect aquatic habitat, which in turn may affect benthic invertebrate communities. Climate change over the life of the Project (i.e., 35 to 40 years) will be monitored as part of the Project’s environmental monitoring programs, and influences on water quality, sediment quality, and benthic invertebrates will require adaptive management to mitigate any potential effects of the Project that may be exacerbated by climate-related changes on the aquatic environment”. It is recommended to ensure that appropriate number/location of reference sites are sampled to enable any changes to sediment or benthic invertebrate communities that may be due to climate changes, and not project effects, are able to be assessed.</p> | Considering climate change may change the lake conditions from baseline conditions, and that there is already natural variability between lakes that will be used as reference lakes and exposure lakes, it could become difficult to show changes to sediment/benthic invertebrates are not due to project activities, therefore there is a recommendation to ensure the current baseline data is adequate, and to consider if additional data, and addition of additional reference stations, will be needed moving forward. |

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| AD-31 | CNSC | Section 8.4.6.1, Residual Effects Characterization | The EIS states “Local Indigenous communities have expressed direct concern with respect to mercury. Mercury has not been identified as a COPC for the Project as it is currently not present in the receiving environment (i.e., background condition) at detectable concentrations and will not be produced as part of the mine process; therefore, it will not be discharged to the aquatic environment. However, it is understood that potential nutrient enrichment-related effects are possible and can be linked to increases in mercury in the environment.” Based off concerns from Indigenous communities, and the fact that phosphate is a COPC in the effluent, and elevated concentrations of mercury were measured near the Kratchkowsky Lake bottom, adding methylmercury to the environment sampling plans may be beneficial. | Please consider adding methylmercury to the environment sampling plans (such as fish dorsal muscle) in order to confirm there are no unexpected effects of the project on levels, and to satisfy stakeholder concerns. |
| AD-32 | CNSC | Section 9.1.8.3, Appendix 10-A (ERA) section 3.2.1.5 | <p>It appears there is no consistency between the assessment of soil quality in the ERA and the baseline soil sampling program presented in the EIS. The baseline program includes 10 soil permanent sampling locations (Appendix 9-B, section 2.5). Sampling at these locations is proposed to be continued during the Operation Phase, and monitoring data will be compiled and reported annually/periodically (EIS section 9.1.8.3).</p> <p>Conversely, the ERA estimates and predicts concentrations of COPC in soil based on atmospheric deposition. Furthermore, the location of ecological receptors in the ERA (Figure 5-2) is different from the permanent soil sampling plot locations (Appendix 9-B, Figure 2.5-1). It is unclear why measured baseline soil quality data were not discussed in the ERA and whether future monitoring data will be considered in the ERA to verify accuracy of predicted COPC concentrations</p> | Please clarify how baseline measured data on COPC concentrations in soil is considered in the current and future iterations of the ERA. |
| AD-33 | CNSC | Section 9.3.3.1.2 | <p>Indigenous knowledge is summarized with regard to moose, including:</p> <ul style="list-style-type: none">• Calving sites close to the Wheeler River, with lots of muskeg in the area. A moose calving area is located in the Terrestrial RSA, southwest of the Project Area.• A wildlife corridor is used by moose, running between Cree Lake (outside and to the west of the Terrestrial RSA) and Russel Lake (in the southern portion of the Terrestrial RSA). <p>It is unclear how this information is incorporated into the residual effects assessment.</p> | Please clarify how Indigenous knowledge on moose calving sites and corridors in the RSA is incorporated into the residual effects assessment for the key indicator “moose”. |
| AD-34 | CNSC | Appendix 9-B | <p>Baseline studies for birds are restricted to short time frames in one year only, for example:</p> <ul style="list-style-type: none">• Breeding Songbird Point Count Call Survey (June 7 and 17, 2017)• Aerial Waterfowl and Raptor Stick Nest Survey (June 15 and 16, 2017) <p>The Canadian Wildlife Service (2022) recommends:</p> <ul style="list-style-type: none">• Consider the potential effects of projects on birds throughout the year and document the distribution and abundance of birds in all seasons. Some species may be under-represented in existing data bases due to temporally restricted periods of detectability.• Explicitly target species at risk and other focal species.• Conduct at least two years of field surveys as a national standard for major projects, so that temporal variability can be considered in future comparisons to baseline data. <p>Reference: Canadian Wildlife Service. 2022. Guidance Regarding Data Needed to Support Assessment of Project Effects on Birds. Environment and Climate Change Canada, Gatineau, Quebec. 80 p.</p> | Please consider conducting surveys following CWS’s recommendations or provide an explanation as to how current baseline data for birds is sufficient to characterize the existing environment. |

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| AD-35 | CNSC | Section 10, IMPACT MODEL | Denison discusses details of the IMPACT model but has not provided scenario(s) used to facilitate review. | Please consider providing CNSC with the IMPACT model scenario file(s) in the spirit of regulatory cooperation. |
| AD-36 | English River First Nation (ERFN) | Section 10.1.3.2, Traditional Foods Diet (p. 10-15) | The EIS States: "The ERFN is comprised of seven reserve lands across Saskatchewan" (p. 10-15) While this is accurately reflecting a source document, the source document is incorrect. | Please update to "The ERFN is comprised of seven historical settlements that have now grown into 19 different reserves across Saskatchewan" |
| AD-37 | CNSC | Section 10.1.9, Human Health Summary and Appendix 10-A – 4.4.1 Risk Estimation | The Human Health section of the EIS, as well as the ERA, indicates that there is an exceedance for selenium for the fisher/trapper receptor, with the Project estimated to contribute to the majority of this exceedance (0.93 of the HQ). While the assessment is conservative by assuming an increase intake rate of fish solely sourced from Russel Lake, the precautionary principle should be considered to ensure in reality the HQ for selenium remains below 1, even under conservative assumptions. | Please conduct of effluent, water, and aquatic organism monitoring (as already suggested in EIS) to confirm HQ's are highly conservative in the EIS modelling and receptors remain protected. Should it be determined Se concentrations are increasing in the environment at such a rate as there may be in impact to the environment or human health, installation of a selenium removal circuit into the effluent treatment process should be considered. The proponent should ensure that the proposed wastewater treatment system design incorporates the capability for expansion or upgrades in alignment with the precautionary approach, pollution prevention, and continuous improvement. |
| AD-38 | CNSC | Appendix 10-A (ERA) | It is unclear if measured or modelled COPC concentrations in blueberry were used in the calculations of human receptor dose. Similarly, it is unclear if measured or modelled COPC concentrations in lichen and blueberry were used in the calculations of ecological receptor dose. CSA N288.6-22, Clause 7.3.6 states that "Measured concentrations of COPCs should be used, where possible, in the exposure assessment." Please see the Clause for further information. | Please clarify if measured or modelled COPC concentrations in blueberry / lichen were used in the calculations of human and ecological receptor dose. |
| AD-39 | CNSC | Appendix 10-A (ERA), Table 2-2 | Table 2-2: Estimated Home Ranges of Selected Terrestrial Ecological Receptors Based on the reference McLoughlin et al. (2016), the Home Range for Woodland Caribou is indicated as "Expected = 80 km2" which represents the mean range sizes pooled over the two study years for calving/post-calving. The indicated Minimum (67 km2) and Maximum (267 km2), however, do not relate to the calving/post-calving stage, which is not clearly stated in Table 2-2. In contrast, these values are actually mean range size values for autumn/rut and early winter, respectively, as described in the source document on Page 83 (McLoughlin et al., 2016). It should be noted that in terms of true minimum and maximum, the source document states that individual home ranges, based on up to two years of GPS locations, varied in size from 16.2 km2 to 1363.9 km2 (Page 82 of McLoughlin et al., 2016). Reference: McLoughlin et al. 2016. Population dynamics and critical habitat of woodland caribou in the Saskatchewan Boreal Shield. Interim Project Report, 2013–2016. Department of Biology, University of Saskatchewan, Saskatoon. 162 pp. Available online at http://mcloughlinlab.ca/lab/wp-content/uploads/2019/06/2013-2016-SK-Boreal-Shield-Caribou-Project-Interim-Report-Nov-18-2016.pdf | Please provide clear details on the source of the home range values listed in Table 2-2. |
| AD-40 | CNSC | Appendix 10-A (ERA) section 3.2.1.5 | Although the soil type selected in the ERA for modeling of atmospheric deposition to soil is sandy soil, organic soils have been delineated and characterized (section 9.1.3.3 of the EIS) as | Please clarify if COPC modeling based on sandy soil is protective of organic/peaty soil and provide justification. |

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| | | | valued component (i.e., “Organic Matter/Peat”). It is unclear if the soil quality modeling performed in the ERA is protective for soil types other than sandy soil. | |
| AD-41 | CNSC | Appendix 10-A (ERA), Table 5-5 | Table 5-5: Complete Exposure Pathways for All Selected Ecological Receptors to be Assessed using the IMPACT Model The exposure pathway for phytoplankton is stated as “direct contact in sediment”, however, phytoplankton live suspended in the water column. It is acknowledged that in the IMPACT modelling report, phytoplankton is described with an occupancy factor of 1 in water (Table 2-5). | Please add the pathway “direct contact in water” to Table 5-5 and revise all calculations accordingly. |
| AD-42 | CNSC | Appendix 10-A (ERA), Table B.12 | Table B.12: Sample Calculation – Adult Recreational Fisher/Hunter (McGowan Lake) Dose and Risk Calculations for Selenium The source for the Terrestrial Plant Ingestion Dose for Labrador tea and blueberry is stated as “Table C.5”, however, this table could not be located. | Please provide the referred-to Table C.5 or an alternate source of information for the Terrestrial Plant Ingestion Dose for Labrador tea and blueberry. |
| AD-43 | CNSC | Appendix 10-A (ERA), Environmental Risk Assessment for Wheeler River Technical Support Document | The ERA is prepared by Ecometrix and submitted to Denison Mines. It is unclear if the ERA submitted has been reviewed and accepted by the proponent (Denison Mines). CSA N286-12 clause 9.5.5 specifies that “the selected supplier’s technical documents that are required to be submitted shall be reviewed and accepted”. Meeting these CSA N286-12 requirements will ensure that the proponent has control of the purchased services as a future licensee applicant. | Provide clarifications if ERA documents have been reviewed and accepted by the proponent. |
| AD-44 | CNSC | Section 11 | It is not clear whether all of the interested Indigenous Nations and communities were engaged on the results and findings of the Heritage Resources Impact Assessments (HHRIA) or just ERFN? | CNSC staff would appreciate an update on any engagement activities that have taken place with regards to any of the HHRIAs for the Project, or any site or thing that is of historical, archaeological, paleontological or architectural significance as requested by other Indigenous Nations and communities to date. |
| AD-45 | CNSC | Section 11.1.4.5.2. Perceived Suitability/Safe Use of Resources (p. 11-59) | The EIS States: “Section 2.6.1 in Section 2 describes the extensive review of mining methods that led to the decision to adopt the ISR mining method.” (p. 11-59). This reference is not correct, as this section does not contain a review of the mining methods. | Please update this to reflect the appropriate section. |
| AD-46 | TC | Section 14.6.7.2 | Transport Canada would like to clarify that although the proponent may use a third party to assist in developing emergency response assistance plans (ERAPs), it is the proponent’s responsibility to submit the ERAP application(s) to Transport Canada, per Section 7(1) of the <i>Transportation of Dangerous Goods Act, 1992</i> as follows: Emergency response assistance plan 7 (1) No person shall import, offer for transport, handle or transport dangerous goods in a quantity or concentration that is specified by regulation — or that is within a range of quantities or concentrations that is specified by regulation — unless the person has an emergency response assistance plan that is approved under this section before (a) importing the dangerous goods; (b) offering the dangerous goods for transport; or | *This advice pertains to the regulatory phase.* Transport Canada notes that the sentence highlighted in yellow below is incorrect and should be revised or removed. While a contractor could assist the proponent to develop the ERAP(s), it is the responsibility of the proponent to apply to Transport Canada for approval of the plan(s). 14.6.7.2 Design and Mitigation Considerations Principal traffic risk mitigation measures include: <ul style="list-style-type: none">• traffic control measures such as speed limits;• travel management plans;• spill and emergency response planning; and• driver training. |

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Advice to the Proponent |
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| | | | (c) handling or transporting the dangerous goods, in the case where no other person is required to have an emergency response assistance plan under paragraph (a) or (b) in respect of that handling or transporting. | <p>Additionally, Denison considered several provisions to make sure that the effects of a terrestrial release of hazardous materials are as low as practicable. In addition to transportation mitigations listed for Scenarios 1 and 2, the following provisions were considered.</p> <ul style="list-style-type: none">• The <i>Transportation of Dangerous Goods Act, 1992</i> (Government of Canada 2019) outlines the requirements for entities that transport dangerous goods to establish emergency response assistance plans. These plans list specialized personnel and equipment that are required for responding to an incident. It is expected that a contractor responsible for the transportation of uranium concentrate, fuel, and hazardous chemicals would develop these plans. |
| AD-47 | Health Canada (HC) | Appendix 14-A (p. 8-9) | <p>Context: No emergency response plan has been provided within the draft EIS, which states that emergency response plans will be developed in the future (Section 14 Appendix 14-A, p.8-9).</p> <p>Rationale: For any emergency event, Health Canada considers the protection of human health as a primary consideration in the development of emergency preparedness and response plans. This includes monitoring for human health impacts and the provision of health-related guidance. Further, this will be a requirement of the licensing process.</p> <p>The proponent should ensure that the emergency response plans consider the protection of all relevant potential human receptors that could be impacted by an onsite or project-related off-site accident involving the release of chemical and/or radiological substances.</p> | <p>It is recommended that Denison develop an emergency response plan in consultation with potentially affected communities and stakeholders that includes, but is not limited to, the following:</p> <ol style="list-style-type: none">1. All relevant contact information of the communities, especially related to km 160 of Hwy 914, which is the location of a cultural camp that has been established by the English River First Nation and km 67 of Hwy 914 that is a gathering location for the Kineepik Metis Local associated with the Northern Village of Pinehouse.2. Description of the mechanisms for communication with communities in case of an emergency.3. Description of the partnership with and the training of local communities and local responders (see Section 14 Appendix 14-B, p.1).4. Description of mutual aid agreements with neighboring industries/municipalities, where appropriate. |
| AD-48 | ECCC | Appendix 16-C, Summary of Monitoring and Follow-up Programs | Appendix 16-C does not include consideration of any monitoring and follow-up programs regarding GHGs. | ECCC recommends that the Proponent consider developing a GHG follow-up program to measure and compare actual GHG emissions against the draft EIS estimates, including reporting the Project’s actual emissions and updating the emissions estimates as needed. |
| AD-49 | ECCC | Appendix 16-A Summary of Residual Effects Appendix 16-B Summary of Cumulative Effects | ECCC notes that GHG mitigation measures have not been considered for the Project. Furthermore, the Project’s lifetime is expected to extend into 2050 and beyond. Consistent with the information requirements of the SACC, and aligning with Canada’s commitment to achieve net-zero GHG emissions by 2050, the Proponent should provide a credible plan that describes how the Project will achieve net-zero emissions by 2050. | <p>ECCC recommends that the draft EIS include an assessment of potential GHG mitigation measures throughout all phases of the Project. This could include a Best Available Technologies / Best Environmental Practices (BAT/BEP) Determination, as described in Section 3.2 of the Draft Technical Guide.</p> <p>ECCC also recommends that the Proponent provide a credible Net-Zero Plan on how to achieve the target of 0 kt CO2 eq/year, for the year 2050 and beyond, following the guidance of the SACC and the Draft Technical Guide.</p> |

Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement
For response by regulators or government entities (Posted June 2023, updated with comment 26 on April 2024)

| Number | Source | Reference to EIS ¹ , appendix, or TSD | Comment Summary (all original submissions can be found on Canadian Impact Assessment Registry reference: 80171) | Regulator Response |
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| 1. | Birch Narrows Dené Nation (BNDN) (February 28, 2023) | Section 12.0 and 13.0 | <p>Comment #17: BNDN notes that no specific management or monitoring plan has been included in the EIS documentation related to the verification of residual socio-economic impacts, both positive and negative, for the local economy.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none">Denison must develop a Socio-Economic Monitoring Plan for the life of the Project to verify the effects assessment included in the EIS and to be included in the Project’s approach to adaptive management. This Plan would include an approach, co-developed with Indigenous groups in the local study area (including BNDN), to monitoring the realization of the benefits and impacts of the Project (e.g., employment and procurement targets, training and capacity building, community investments, etc.) as mitigation and enhancement measures are implemented. Monitoring and subsequent regular evaluation would allow for the real-time adjustment of targets and/or an approach to adjusting enhancement measures or identifying offsetting benefits where targets are not met. <p>See Section 4.2 for additional information on this topic (p. 19-21).</p> | <p>As a provincial Environmental Assessment (EA) under the Saskatchewan <i>Environmental Assessment Act</i> is currently underway, the provincial process requires proponents to outline the possible impact on local communities and socioeconomic factors². As such, the proponent provided detailed information regarding socio-economic impacts (both positive and negative) within the EIS to meet the provincial EA requirements.</p> <p>For EAs evaluated under the <i>Canadian Environmental Assessment Act</i> of 2012 (CEAA 2012), considerations for socio-economic impacts are made when effects are identified as described in section 5(1)(c), which stipulates:</p> <p>(c) with respect to aboriginal peoples, an effect occurring in Canada of any change that may be caused to the environment on</p> <ul style="list-style-type: none">(i) health and socio-economic conditions,(ii) physical and cultural heritage,(iii) the current use of lands and resources for traditional purposes, or(iv) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance. <p>As per REGDOC 2.9.1, CNSC staff expect that an applicant characterize the socio-economic environment and identify all indirect socio-economic effects. An indirect effect is a secondary environmental effect that occurs as a result of a change that a project may cause to the environment.</p> <p>CNSC staff are satisfied with Denison’s evaluation of potential impacts from the proposed project, their evaluation of socio-economic factors and their commitment to informing BNDN throughout the monitoring program design and implementation (28, Commitments Register Version 4). Further, Denison will be expected to provide a more detailed EA Follow-Up monitoring plan prior to a Commission hearing, will be evaluated and refined in further detail.</p> |
| 2. | BNDN (February 28, 2023) | Section 12.0 and 13.0 | <p>Comment #17: BNDN notes that no specific management or monitoring plan has been included in the EIS documentation related to the verification of residual socio-economic impacts, both positive and negative, for the local economy.</p> <p>Request/recommendation:</p> | Please refer to CNSC’s response to comment #1 above. |

¹ Refers to EIS, unless otherwise noted

² Province of Saskatchewan, *Technical Proposal Guidelines: A Guide to Assessing Projects and Preparing Proposals under the Environmental Assessment Act*, November 2021, <https://publications.saskatchewan.ca/api/v1/products/113159/formats/137589/download>

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| | | | <ul style="list-style-type: none"> The Crown must include the development of a Socio-Economic Monitoring Plan as a condition of approval for the Project. <p>See Section 4.2 for additional information on this topic (p. 19-21).</p> | |
| 3. | BNDN (February 28, 2023) | Appendix 9B Section 2.5.1 Appendix 8E Table 4 | <p>Comment #18: In several instances in the draft EIS Denison has noted that Indigenous Nations are concerned with the possibility of mercury contamination from mining operations. BNDN shares these concerns with other Indigenous Nations. Due to the very low concentrations of mercury present in the Phoenix deposit, Denison has not meaningfully studied the potential impacts the Project may have on altering mercury biogeochemistry in the downstream environment.</p> <p>BNDN notes that background mercury concentrations can be elevated in many unexpected and remote locations due to atmospheric deposition (often due to coal plants) (Jackson, 1997). BNDN is very concerned that Denison has not analyzed for mercury as part of their baseline soil geochemistry assessments for the Project, especially in wetlands downstream of the Project. Mercury concentrations in wetland soils are sensitive to changes in water chemistry that can lead to increased mercury methylation. This is especially acute from increases in nutrients and sulphates which can active sulfate reducing microorganisms that methylate mercury (Liu, Li, & Cai, 2012). Table 4 of Appendix 8e shows that the effluent discharged to Whitefish Lake will have mercury concentrations almost 5,700 times background concentrations. This dramatic increase in sulfate loading to Whitefish Lake may not exceed water quality objectives unto itself but may be sufficient to meaningfully change mercury biogeochemistry in downstream wetlands.</p> <p>BNDN is very concerned with the complete lack of assessment and analysis of baseline mercury concentrations and the potential changes to mercury cycling that could be induced by the Project.</p> <p>Request/recommendation:</p> <ol style="list-style-type: none"> BNDN requests that Denison undertake baseline studies of mercury concentrations in soils, with a focus on baseline concentrations of mercury in organic wetland soils downstream of the project. Note that mercury sampling should sample total mercury and methylmercury in all analyses, as well as porewater total mercury and methylmercury. The study design and implementation should be undertaken collaboratively with BNDN. BNDN recommends that the CNSC requires Denison to undertake a baseline assessment of mercury in soils (with a focus on wetlands) prior to construction of the Project. This may be established as a condition of approval for the Project. Depending on the findings of the baseline mercury in soils and wetlands studies, the CNSC should include a condition of approval on the Project that requires Denison to monitor mercury biogeochemistry in the receiving environment over the life of mine. <p>See Section 4.3 for additional information on this topic (p. 25-28).</p> | <p>CNSC staff are satisfied with Denison’s commitments to collecting additional background information pertaining to water and sediment quality mercury and methyl mercury from local study area lakes and rivers prior to development (Refer to IR-46 and IR-48 in Table XX (hyperlink the IR table here), as well as undertaking monitoring of total and methyl mercury and monitoring of mercury in country foods (i.e. fish tissue) (8-42, 8-44, Commitments Register version 4).</p> <p>As noted in the Federal Indigenous Review Team’s (FIRT) conclusions on IR-198-R1, the following elements will be further assessed as part of licensing technical reviews, prior to the granting of a licence:</p> <ol style="list-style-type: none"> Establishing/confirming baseline concentrations of Hg in water, sediment, and fish tissues with additional baseline data collection before construction; Regular monitoring of sulphate as an indicator for mercury in water quality, and monitoring of mercury in fish tissue during construction, operation and post-closure; and, Undertaking an HHRA should monitoring results exceed established/confirmed baseline levels, to inform decisions on adaptive management and mitigation measures <p>CNSC staff will be monitoring Denison’s activities with regards to meeting these expectations.</p> |
| 4. | BNDN (February 28, 2023) | Figure 2.2-15 Section 2.2.3 | <p>Comment #30: Denison notes that they have made the conservative assumption that no water would be recycled as mining solution as part of their water balance calculations. BNDN agrees that this conservative assumption is appropriate for assessment of potential impacts of the Project. While this assumption is appropriate for the environmental assessment, BNDN wishes to understand the proportion of industrial wastewater that may be recycled on site and any commitments</p> | <p>CNSC staff are satisfied with Denison’s response that they intend to continue to refine effluent quality and volume predictions are part of the BATEA assessment and licensing phase of the project and their commitment (10-17, Commitments Register version 4) to maximize the recycle and reuse of process water to reduce freshwater intake and release. REGDOC-2.9.1 requires Denison to ensure that their effluent and emissions</p> |

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| | | | <p>Denison is willing to make regarding continual refinement of the water treatment process to increase the proportion of water that is recycled.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> a) BNDN requests that Denison commit to continual refinement of the Industrial Waste Water Treatment Plant (IWWTP) treatment process to maximize the amount of water that is recycled to the deposit. b) BNDN recommends that the Crown include a condition of approval for the project regarding continual improvement of water treatment to maximize recycling. c) BNDN requests that Denison share available information on the proportion of water that they currently anticipate being able to recycle. <p>See Section 4.3 for additional information on this topic (p. 25-28).</p> | <p>preventive and control measures are established using best industry practice, incorporating the application of BATEA, ALARA, process optimization, continuous improvement and the results of an ERA.</p> <p>This will be further assessed as part of the licensing technical assessment, prior to the granting of a licence. If licence conditions are required, these will be proposed incorporated into the Licence and Licence Conditions Handbook.</p> |
| 5. | BNDN (February 28, 2023) | Table 2.3-3 | <p>Comment #32: Table 2.3-3 of the draft EIS shows Denison's proposed mining area decommissioning objectives, which are the groundwater quality objectives for the residual water in the ore zone following the flushing of the system during mine decommissioning. BNDN is surprised to see that relatively high concentrations of metals are expected to remain in the restoration solution as a final objective, such as 100 mg/l uranium and 2 mg/l cobalt, amongst many other metals.</p> <p>BNDN notes that potential risks to groundwater and surface water could be dramatically reduced through more stringent mining area decommissioning objectives. It is also feasible that processing efficiencies and high uranium prices may allow for substantially lower concentrations of uranium to be mined economically. The long-term contamination of groundwater from the high concentration of metals in the restoration solution is one of BNDN's primary concerns with the Wheeler River Project, and BNDN would strongly prefer that Denison strive to minimize the residual contamination remaining in groundwater following decommissioning to the greatest extent possible.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> a) BNDN requests that Denison provide documentation that estimates the time, efforts and costs associated with reducing concentrations of metals in the restoration solution by 1 order of magnitude and 2 orders of magnitude. Note that these calculations should include costs that could be recovered by processing subeconomic UBS. b) BNDN requests that Denison work with BNDN through terms defined in a BNDN project agreement to establish achievable decommissioning objectives that would be satisfactory to BNDN. c) BNDN requests that the Crown place a condition of approval upon the Wheeler River Project that Denison is required to work with BNDN to establish mutually agreeable mining area decommissioning objectives. d) BNDN requests that Denison undertake a study of ISR operations elsewhere in the world to determine the lowest concentrations of UBS that could be processed economically utilizing industry best practices and commit to exceeding global standards. <p>See Section 4.3 for additional information on this topic (p. 25-28).</p> | <p>Through the CNSC's licensing process, Denison is required to submit a preliminary decommissioning plan. If the proposed Wheeler River Project receives positive EA and licensing decisions from the Commission, Denison will have to update the preliminary decommissioning plan every 5 years at a minimum. Before decommissioning, Denison will be required to submit a detailed decommissioning plan (DDP) as part of the licence application to decommission the Wheeler River Project. Consultation with Indigenous Nations and communities, as well as members of the public is a requirement for the development and review of the DDP.</p> <p>CNSC staff are satisfied that Denison is expecting to continue to optimize remediation targets and objectives through updates to the decommissioning plan. CNSC staff expect that Denison will continue engaging with interested Indigenous Nations and communities throughout the development of these plans and over the project lifecycle.</p> |
| 6. | BNDN (February 28, 2023) | Section 2.9.1.3.1 | <p>Comment #36: Denison documents their conceptual level environmental protection program, including several proposed management and monitoring plans which they will develop to manage operations on site.</p> | <p>CNSC staff are satisfied with Denison's commitment to share information with interested Indigenous Nations and communities throughout the monitoring program design and implementation process.</p> |

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| | | | <p>The environmental protection measures which Denison undertakes at the Project site are highly consequential to BNDN, and BNDN requires the opportunity to provide our knowledge and input into environmental protection measures developed for activities within our Ancestral Lands.</p> <p>Request/recommendation:</p> <p>a) BNDN requests that Denison commit to involving BNDN in the development, review and approval of all environmental monitoring plans developed for the Project. Details of BNDN involvement in the development of environmental monitoring plans should be undertaken within an Environmental Committee, with specific terms defined within a BNDN-Denison Project Agreement for the Wheeler River Project</p> <p>b) BNDN requests that the CNSC impose a condition of approval on the project which states the requirement for Denison to consult with BNDN on all environmental management and monitoring plans for the project.</p> <p>See Section 4.3 for additional information on this topic (p. 25-28).</p> | <p>If the proposed Wheeler River Project receives positive EA and licensing decisions from the Commission, CNSC staff will ensure Denison is meeting their EA commitments through an EA follow-up and monitoring program, which can span the lifecycle of the facility. Denison will also have to meet the requirements in their licence conditions handbook throughout the applicable licensing phase.</p> <p>Denison has committed to monitoring that will verify ERA model predictions, provide data to improve model predictions, follow requirements and guidance in CSA N288.4-19 (CSA 2019), as well as engagement with local communities on this topic (10-12, Commitments Register Version 4), as expected by the CNSC. Further, CNSC staff are committed to collaborating on monitoring and follow-up activities with interested Nations and communities, particularly where potential impacts on traditional land use and rights are identified.</p> |
| 7. | BNDN (February 28, 2023) | Section 7.6.2.3 | <p>Comment #37: In Section 7.6.2.3 of the draft EIS and the geology and groundwater summary table in Appendix 16A, Denison states that they expect no residual effects to groundwater quality during the operations, decommissioning or future centuries period of the Project. Denison has also not placed a significance determination on the impacts to groundwater quality based on the findings of the draft EIS due to groundwater being considered an intermediate VC.</p> <p>BNDN disagrees with both the residual effects assessment and the fact that groundwater quality has been assessed solely as an intermediate VC. The protection of groundwater resources is highly important to BNDN. Our members place immense value on clean spring water and the protection of groundwater more generally. The advancement of the Wheeler River Project will permanently impair groundwater resources in and around the Wheeler River Project. The contamination of groundwater at the Project will have a significant impact on our members’ connection to the land and ability to exercise our Treaty and Aboriginal rights. BNDN see the limited interpretation of residual effects and the lack of inclusion of groundwater quality as a receptor VC as a significant oversight in the assessment of impacts of the Project on the environment and BNDN Treaty and Aboriginal rights. This must be corrected to properly assess the Project and thus ensure that project impacts are appropriately mitigated and accommodated.</p> <p>Request/recommendation:</p> <p>a) Denison must apply a significant determination to groundwater quality and quantity for all projects phases, including the future centuries period. The significance determination must be developed following consultation and engagement with BNDN.</p> <p>b) Denison must re-evaluate the residual effects of the project on groundwater quality including the future centuries period. This re-evaluation must be following consultation and engagement with BNDN.</p> <p>c) BNDN requests that the CNSC work with our Nation to understand the significant impacts that the permanent contamination of groundwater caused by the project will have on our Treaty and Aboriginal rights.</p> <p>See Section 4.3 for additional information on this topic (p. 25-28).</p> | <p>CNSC staff have reviewed Denison’s response to this comment, and through the EIS technical review, which resulted in over 50 Information requests from the Federal Review Team related to groundwater, CNSC staff are satisfied with the responses provided. CNSC staff will continue to assess how the proposal meets regulatory requirements prior to the granting of a license.</p> <p>Since the commencement of the Wheeler River Project EA in 2019, CNSC staff have identified Indigenous Nations and communities who may have an interest in the project and have provided each identified Nation or community with a notice of the commencement of the EA, the opportunity to apply for participant funding, and a copy of the project description and draft EIS for comment.</p> <p>CNSC staff has expressed an interest in meeting with BNDN to discuss concerns raised and would be happy to arrange meetings with CNSC SMEs to provide any additional information on these concerns, as well as any other questions BNDN may have related to groundwater, and CNSC staff’s assessment.</p> <p>CNSC staff will continue to provide interested Indigenous Nations and communities with timely project updates and opportunities to review information at key points during the EA process. To date, this has included review of Denison’s Project Description and draft EIS, and will include review of CNSC’s EA report and Commission Member Document (CMD), Denison’s CMD, as well as an opportunity to present at the public Commission hearing.</p> <p>Further, CNSC staff are committed to ensuring that any information related to BNDN that is shared is adequately reflected in CNSC documentation and conclusions on Denison’s proposal.</p> |

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| 8. | BNDN (February 28, 2023) | Section 7.8.2 | <p>Comment #38: Section 7.8.2 of the draft EIS documents the groundwater monitoring proposed for the surface facilities and the ISR recovery area. It also describes a conceptual excursion contingency plan wherein Denison has proposed their plans to manage situations where groundwater contamination occurs beyond what is predicted in the EIS. BNDN notes that Section 7.8.2 lacks information on the involvement of Indigenous Nations related to groundwater monitoring.</p> <p>As stated previously, BNDN is highly concerned with the level of impact the Project will have on groundwater resources. As such BNDN requires Denison to communicate excursions of groundwater and the consequent management of excursions to our Nation.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> a) BNDN requests that Denison revise Section 7.8.2 to include Indigenous engagement and input for groundwater monitoring results and the management of observed groundwater excursions. The manner in which Denison engages BNDN on groundwater monitoring and management will likely occur through an Environmental Committee, which should be defined in a BNDN-Denison Project Agreement. b) BNDN requests that the CNSC impose a condition of approval on the Project that clarifies that Denison is required to engage with impacted Indigenous Nations such as BNDN on groundwater monitoring and management. <p>See Section 4.3 for additional information on this topic (p. 25-28).</p> | <p>CNSC staff are satisfied with Denison’s commitment to share information with BNDN throughout the monitoring program design and implementation process (commitment 28 of Table 3-2, Denison’s Commitments to the Public, Indigenous Nations and Communities, Commitments Register version 4).</p> <p>If the proposed Wheeler River Project receives positive EA and licensing decisions from the Commission, CNSC staff will ensure Denison is meeting their EA commitments through an EA follow-up and monitoring program, which can span the lifecycle of the facility. Denison will also have to meet the requirements in their licence conditions handbook throughout the applicable licensing phase.</p> |
| 9. | BNDN (February 28, 2023) | Appendix 8E Table 4 | <p>Comment #41: Table 4 of Appendix 8e of the draft EIS shows the predicted site discharge concentrations of the contaminants of potential concern (COPCs). BNDN notes that the concentrations of a number of COPCs do not achieve water quality objectives that is the best available technology economically achievable (BATEA). Example COPCs include copper, molybdenum, selenium, uranium, vanadium, zinc and ammonia.</p> <p>BNDN requires proponents operating on our Ancestral Lands to, at a minimum, achieve BATEA standards for effluent treatment and discharge. This takes reasonable and appropriate precaution without imposing unreasonable costs on the operation.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> a) BNDN requests that Denison commit to achieving BATEA criteria for all COPCs in their effluent. b) Denison must work with BNDN to identify mutually agreeable and appropriate effluent discharge criteria for their effluent. BNDN expects that identifying suitable effluent discharge criteria will be undertaken through an Environmental Committee with a terms of reference defined in a BNDN-Denison project agreement c) BNDN requests that the CNSC impose a condition of approval on the Project that BNDN is engaged. <p>See Section 4.3 for additional information on this topic (p. 25-28).</p> | <p>Denison will be required to demonstrate that their water treatment plant is the best available technology economically achievable in accordance with CNSC REGDOC 2.9.2. Denison will also be required to meet the release limits in the Metal and Diamond Mining Effluent Regulations for all phases of the project. Denison will also be required to test the contaminants of potential concern as outlined in the legislations referenced and they will be subject to licensing conditions for environmental monitoring.</p> <p>CNSC staff are satisfied with Denison’s commitment to share information with BNDN throughout the monitoring program design and implementation process (commitment 28 of Table 3-2, Denison’s Commitments to the Public, Indigenous Nations and Communities, Commitments Register version 4).</p> <p>If the proposed Wheeler River Project receives positive EA and licensing decisions from the Commission, CNSC staff will ensure Denison is meeting their EA commitments through an EA follow-up and monitoring program, which can span the lifecycle of the facility. Denison will also have to meet the requirements in their licence conditions handbook throughout the applicable licensing phase.</p> |
| 10. | BNDN (February 28, 2023) | 8.2.4.1.1 Site Water Management | <p>Comment #45: BNDN is concerned that the small volume of Effluent Monitoring and Release Ponds may create a lack of operational flexibility. For example, in the EIS, it is stated that:</p> <p>“Treated water from the IWWTP will be pumped to the three Effluent Monitoring and Release Ponds (each 3,300 m3). These ponds will be designed to hold effluent for 72 hours for testing before discharge to the environment.” – EIS, pp 723</p> | <p>If the proposed Wheeler River Project receives positive EA and licensing decisions from the Commission, Denison will be required to meet all applicable effluent discharge thresholds. This will include all requirements and criteria listed in the <i>Metal and Diamond Mining Effluent Regulations</i>.</p> |

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| | | | <p>If water quality in these ponds exceeds discharge criteria then there may be a need to store water so that additional treatment and monitoring can occur prior to discharge. However, only having capacity for three days of storage means it is unlikely the Proponent would be able to adequately treat water prior to reaching storage capacity, resulting in a need for emergency release of poor- quality water.</p> <p>Request/recommendation:</p> <p>a) BNDN requests that additional storage capacity be included as part of the design for water management system. This must include adequate storage capacity to ensure Denison has the ability to retain water for sufficient time to allow treatment, in the event that exceedances of water quality discharge criteria occur. Alternatively, Denison can commit to halting discharge (and operations if required) should water quality exceed discharge criteria. Discharge into Whitefish Lake would resume once water quality in the Effluent Monitoring and Release Ponds has been returned to below discharge criteria.</p> <p>b) BNDN requests that the CNSC impose a condition of approval for the Project that requires Denison to must meet effluent discharge criteria prior to discharge and must halt operations if treated effluent in the monitoring and release ponds does not meet effluent discharge criteria.</p> <p>See Section 4.4 for additional information on this topic (p. 48-51).</p> | <p>Denison will also have to meet the requirements and criteria listed in the CNSC’s applicable regulatory documents (such as REGDOC-2.9.1, <i>Environmental Protection: Environmental Principles, Assessments and Protection Measures</i> and REGDOC-2.9.2, <i>Environmental Protection: Controlling Releases to the Environment</i>) and in the applicable CSA standards (including CSA N288.5-22, <i>Effluent Monitoring Program at Nuclear Facilities and Uranium Mines and Mills</i>).</p> <p>Throughout the lifecycle of the facility, CNSC staff will perform ongoing monitoring and compliance activities to ensure Denison is respecting the applicable effluent monitoring requirements and other requirements listed within their licence conditions handbook.</p> |
| 11. | Peter Ballantyne Cree Nation (PBCN) (March 3, 2023) | General | <p>The Wheeler River project falls within PBCN traditional territory, where traditional land use activities have historically been and are currently practiced. PBCN has traditional territory spanning Treaty 10 with the nearest community of Southend located 185km away from the Project. PBCN has exercised aboriginal rights in and around the Project site and currently exercises Indigenous and Treaty Rights in proximity to the Project.</p> <p>PBCN is concerned that the Project has potential adverse environmental, cultural and socio-economic impacts to PBCN members, lands and uses, including hunting, fishing and gathering in all seasons.</p> <p>Both Denison and CNSC indicate that they have fulsome aboriginal engagement policies and guidelines and appear to be undertaking their delegated Crown duty to consult in good faith, as informed by those policies, principles, legal and regulatory requirements. However, there has been an initial error in the assessment, both by Denison and CNSC, as PBCN was erroneously excluded from indigenous engagement, ostensibly due to distance from Wheeler and a lack of understanding of PBCN lands and Indigenous activities potentially impacted by the project.</p> <p>PBCN wishes to participate fully in the regulatory review of the Wheeler River project. PBCN requests that the CNSC ensure that it’s review timelines be adjusted, as required, to ensure fulsome participation by PBCN with the proponent and the regulator, going forward.</p> <p>PBCN’s goals are to:</p> <ul style="list-style-type: none">Meet with CNSC to share PBCN knowledge of its land, and Indigenous uses, and how these may be impacted by the Project and methods to address any adverse impacts. | <p>The CNSC ensures that all nuclear EA and licensing decisions under CEAA 2012 and the NSCA uphold the honour of the Crown and uphold Indigenous peoples’ potential or established Indigenous and/or Treaty Rights pursuant to section 35 of the <i>Constitution Act, 1982</i>. Since the commencement of the Wheeler River Project EA in 2019, CNSC staff have identified First Nations and Métis who may have an interest and rights in relation to the project and have provided each identified Nation or community with a notice of the commencement of the EA, the opportunity to apply for participant funding, and a copy of the project description and draft EIS for comment.</p> <p>Although PBCN was not originally identified as being potentially impacted by the project based on information available to CNSC staff with regards to PBCN’s rights and interests, PBCN applied for and was awarded Participant Funding for review of the draft EIS. From this time on, CNSC staff have included PBCN on all communications related to progress of the proposed project, have met with PBCN to discuss the project and concerns raised, and continue to welcome any relevant information on how the proposed project may impact PBCN’s land use and potentially impact PBCN’s Treaty Rights. CNSC staff have provided funding support and encouraged PBCN to provide specific information with regards to their current and traditional land use and rights practices that could be impacted by the proposed project. To date, PBCN has not provided specific information regarding how their rights and interests could be directly impacted by the proposed project.</p> <p>The CNSC understands the importance of building strong and ongoing relationships with potentially impacted Indigenous Nations and communities and ensuring that the consultation process is meaningful and addresses the concerns raised by the Nations and communities. CNSC staff will continue to build relationships and engage regularly with all interested Indigenous Nations and communities, including PBCN, in order to consider issues and concerns related to the project. CNSC staff will continue to provide interested Indigenous Nations and communities with timely project updates and opportunities to review information at key points during the EA</p> |

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| | | | <ul style="list-style-type: none">Establish a shared understanding of how PBCN would like to be engaged in the regulatory review, including, but not restricted to, timely project updates, information and an opportunity to discuss concerns throughout the EA process, including the review of the dEIS, CNSC’s staff’s EA Report, and other project-related documentation | <p>process. This will include the upcoming review of CNSC’s EA report and Commission Member Document (CMD), Denison’s CMD, as well as an opportunity to present at the public Commission hearing.</p> <p>As per the requirements and guidance of the CNSC’s regulatory document REGDOC-3.2.2, Indigenous Engagement, CNSC staff expect that Dennison will continue engaging with PBCN and other Indigenous Nations and communities to identify potential concerns related to impacts on Indigenous and/or Treaty Rights as a result of the proposed project.</p> |
| 12. | PBCN (March 3, 2023) | General | <p>The Wheeler River project falls within PBCN traditional territory, where traditional land use activities have historically been and are currently practiced. PBCN has traditional territory spanning Treaty 10 with the nearest community of Southend located 185km away from the Project. PBCN has exercised aboriginal rights in and around the Project site and currently exercises Indigenous and Treaty Rights in proximity to the Project.</p> <p>PBCN is concerned that the Project has potential adverse environmental, cultural and socio-economic impacts to PBCN members, lands and uses, including hunting, fishing and gathering in all seasons.</p> <p>Both Denison and CNSC indicate that they have fulsome aboriginal engagement policies and guidelines and appear to be undertaking their delegated Crown duty to consult in good faith, as informed by those policies, principles, legal and regulatory requirements. However, there has been an initial error in the assessment, both by Denison and CNSC, as PBCN was erroneously excluded from indigenous engagement, ostensibly due to distance from Wheeler and a lack of understanding of PBCN lands and Indigenous activities potentially impacted by the project.</p> <p>PBCN meets nearly all of Denison’s stated criteria to evaluate Indigenous communities located within the Saskatchewan Northern Administration District that would be engaged by Denison.</p> <p>A full and accurate description of PBCN’s rights and interests is an essential part of the Wheeler dEIS and is necessary to ensure a fulsome environmental assessment. PBCN is interested in the opportunity to collaborate with Denison mines to comprehensively identify PBCN’s rights and interests that may be impacted by the project.</p> <p>PBCN’s goals are to:</p> <ul style="list-style-type: none">Work together with Denison in a spirit of mutual respect to cooperate to collectively identify means to avoid, mitigate or otherwise address potential negative impacts of the project on PBCN’s territory and the exercise of its Indigenous rights and interests.Participate in a funding agreement with Denison to facilitate and support PBCN participation and meaningful engagement in the EA process.Meet with Denison to share PBCN knowledge of its land, and Indigenous uses, and how these may be impacted by the Project and methods to address any adverse impacts.Explore employment and job opportunities related to the Project. | <p>Please refer to CNSC’s response to comment #11 above.</p> |
| 13. | Kineepik Metis Local #9 (KML) and the | Water Security Education of In-Situ Recovery and | <p>Section 1.5 and 3.4 of KML and NVP submission: KML as a community wishes to understand the technical background of water protection processes, the Lixiviant solutions, interactions of chemical compounds with water and toxicity. The KML Community will require this knowledge to have confidence in the continued success of the new mining application on our traditional territories. What are the potential effects to the aquifers and waters around Denison and Wheeler River?</p> | <p>In response to KML’s comments, CNSC staff have met regularly with KML and coordinated with the KML team to arrange information sessions with community members, as well as conduct outreach, consultation and engagement where staff have learned more about KML land use and traditional practices, as well as shared information on the EA process, the technology proposed, and answer questions. CNSC staff have also held</p> |

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| | Northern Village of Pinehouse (NVP) (February 17, 2023) | Freeze Wall Technology | <p>KML describes that they need to understand:</p> <ul style="list-style-type: none">• how water protection processes such as reverse osmosis and water treatment are used in the mining operations.• the exact molecular compounds that are part of the “Lixiviant” solution• how this chemical compound interacts with water and at what concentrations that is becomes toxic. <p>KML further states: “If these processes are not well understood by our communities, how can we state that we are prior informed and offer consensus to the process?”</p> <p>Ultimately, as noted in their summary of Primary Concerns:</p> <ol style="list-style-type: none">1) There is a need for funding for education and training to reach a standard of knowledge in mining, science and math required to understand the impacts of uranium mining industry that is expected for an Indigenous community to be able to make free and prior informed decision on impact and expectation of that industry.2) Development of a centre of Excellence in Pinehouse to organically develop the knowledge transference required for Indigenous community to understand the uranium mining industry including regulations, materials used, transportation, end use of products, education required mitigation efforts etc.3) Support for training and education to support KML and Pinehouse on uses of artificial intelligence in the mining projects and to what level this activity can be managed by and in the community. A strategy to build capacity for matriculation graduates with the following classes English 30A 30B Chemistry 30, Physics 30, Math 30. <p>KML wants to increase the community western education levels so that they are knowledgeable and have the capacity to protect themselves and the environment.</p> | <p>monthly meetings with KML representatives, in order to provide updates on the proposed project, and discuss topics of concern to KML. CNSC staff have received KML’s KML Value Ecosystem Components Study, which inform the CNSC’s assessment and EA process.</p> <p>It is CNSC staff’s determination that Denison has adequately engaged and shared information throughout this process and are satisfied with Denison’s engagement with KML to date.</p> <p>Further, Denison’s EIS states that residents and communities in the LSA, including members of KML and NVP will be given first priority for employment, training, and business opportunities. Denison further indicates that mitigation and enhancement measures will be implemented by Denison to enhance the positive effects of the Project on employment and training, income, traditional economy, and business opportunities and minimize adverse effects including:</p> <ul style="list-style-type: none">• A Human Resource Development Plan to initially prioritize Indigenous and non-Indigenous communities in the LSA in terms of employment and training opportunities;• Establishment of a procurement approach through all phases of the Project, focusing on businesses based within the LSA communities, followed by Indigenous and / or businesses in the RSA;• Negotiation with the Province of Saskatchewan to develop the Project’s Surface Lease Agreement and Human Resource Development Agreement. <p>CNSC staff and subject matter experts are committed to continued information sharing with KML and consultation on topics that are of primary concern to their members.</p> |
| 14. | KML and NVP (February 17, 2023) | Road safety concerns Maintenance of 914 road with 914 Extension | <p>Section 5 and 5.2 of KML and NVP submission: When determining community safety with respect to need for increased transportation for a new operation, the Indigenous people of KML have the following concerns:</p> <ul style="list-style-type: none">• The state of the existing road from 165 to 914: The road has received upgrades up to the kilometer 75 on highway 165. From Kilometer 75 to Kilometer 112 where Highway 165 ends and Highway 914 begins, Highway 914 needs an upgrade in width all the way to Pinehouse to create a more industrialized road. KML are not looking forward to the spring road conditions with just the current industry activity.• Every community member has reported near miss incidents with the increased traffic caused by the general resurgence of the Uranium Industry using semi truck and heavy hauls to transport material to the operations and project sites. With the increase in incidents and near misses the opportunity for a major incident is inevitable, with the current road conditions. Adding the development of a new Denison mining operation will only increase this potential for incidents for people using this road.• When you add the rough road conditions, visibility reduction in the winter and summer with dust and snow flurry from large vehicles. This causes unsafe conditions and increases the potential for incidents.• The current capacity for road maintenance from the community members of Pinehouse are not prepared for the additional maintenance requirements for the road becoming a connected road. <p>The road must be developed to an industrial rating to allow for the increase in industrial use so that members of KML do not experience safety issues. KML is requesting that the Transport Canada, Ministry of Highways respond to the concerns of</p> | <p>CNSC staff have met regularly with KML and coordinated with the KML team to arrange information sessions with community members, as well as conduct outreach and engagement where staff have learned more about KML land use and traditional practices, as well as shared information on the EA process, the technology proposed, and answer questions. CNSC staff have also held monthly meetings with KML representatives, in order to provide updates on the proposed project, and discuss topics of concern to KML. CNSC staff have received KML’s KML Value Ecosystem Components Study, which informs the CNSC’s assessment and EA process, where community safety with respect to roads in Saskatchewan is well documented.</p> <p>CNSC staff are satisfied with Denison’s engagement with KML to date, and in June 2024 received letters of support for the proposed project from both KML and NVP, which indicated their support and consent for the development and operation of the Project.</p> <p>Highway improvements are not within scope of the EA review under CEAA 2012, however, CNSC notes KML’s perspective of increased traffic volumes and subsequent desire for highway safety and improvements. CNSC staff are also satisfied with Denison’s commitment to work with KML to establish an Emergency Preparedness and Response Program and work together as partners with KML in discussions about upgrading highways with the provincial government (commitment 14 and 16 of Table 3-2, Denison’s Commitments to the Public, Indigenous Nations and Communities, Commitments Register version 4).</p> |

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| | | | <p>Pinehouse and inform the community of the plans for road infrastructure development. KML would request the road be developed to the standard that the Key Lake and McArthur River road is managed all the way to Junction of Highway 165 and Highway 2.</p> <p>KML and NVP request further capacity to develop road management capacity so KML can provide the support necessary to manage the integrity of the road.</p> <p>As also noted in their summary of Primary Concerns, this includes a requirement for:</p> <ul style="list-style-type: none">• Immediate efforts to build and increase emergency response capacity with community people from KML and NVP to support capacity for road incidents.• Significant improvements to the road to an industrial grade from Highway 2 to the Key Lake gatehouse to support the massive increase in heavy traffic from Industry | <p>CNSC recommends that Denison continue to work with KML and NVP to and engage in discussions around safety concerns regarding highways with the Provincial Government.</p> |
| 15. | KML and NVP (February 17, 2023) | Waste management of new development and historical issues | <p>Section 6.1 of KML and NVP submission: KML is concerned with cumulative impacts from historical legacy exploration and mining practices. Not specific to Denison, Cameco or Orano, KML notes that land users have often found remnants of past poor exploration practices which are now affecting our continued land use. The abandoned camps and industrial and domestic waste left with no known program for clean up are the most significant of these remnants. They would like the EIS to host in partnership with provincial government regulators to host a conversation on progressive reclamation of these legacy sites.</p> <p>This conversation should prioritise the community capacity and an environmental agent for process that occur on our traditional territories. This conversation could include changing the policies of waste (future waste) being brought into the NAD. KML’s contention is that waste that is brought into the region should be removed entirely from the region. The need for a regional waste management facility or a transfer station must be developed in partnership with KML.</p> <p>As noted in their summary of Primary Concerns, this includes a requirement for:</p> <ul style="list-style-type: none">• Immediate efforts to build capacity in a regional waste management operation within or near the community. To build current and future expertise in domestic waste, special waste, recycling, and the development of a transfer station in Pinehouse to support all mining activity including current operation and exploration. | <p>CNSC staff have concluded that Denison’s cumulative effects assessment for the proposed Wheeler River Project is acceptable.</p> <p>As a member of the International Atomic Energy Agency (IAEA), Canada strives to implement its waste management practices so that they align with the best practices and the guidelines of the IAEA and the international community. In addition, to ensure compliance with its international legal commitments, the CNSC must regularly report on its regulatory performance, undertake peer reviews, and undergo scrutiny by the IAEA.</p> <p>Consultation with Indigenous Nations and communities, and engagement with the public are important aspect of the CNSC’s regulatory and decision-making processes to ensure that their concerns are heard and addressed throughout the regulatory process and in order to determine that the project as proposed by the proponent, will make adequate provisions to protect people and the environment.</p> <p>Canada's Radioactive Waste Policy Framework clearly defines the role of government, and waste producers and owners. The government has the responsibility to develop policy, to regulate, to oversee producers and owners to ensure that they comply with legal requirements and meet their funding and operational responsibilities in accordance with approved waste disposal plans. It also makes clear that waste producers and owners are responsible, in accordance with the principle of “the polluter pays”, for the funding, organization, management and operation of disposal and other facilities required for their wastes.</p> <p>The CNSC licenses, monitors and inspects nuclear facilities, including radioactive waste management facilities in order to protect the health, safety and security of Canadians and the environment. The CNSC operates within a modern and robust legislative and regulatory framework. This framework consists of laws passed by the Parliament of Canada that govern the regulation of activities of Canada’s nuclear industry. The regulatory framework also includes instruments such as regulations, licences and regulatory documents.</p> <p>Consultation with the public, Indigenous Nations and communities and interested parties is an important part of the process for the CNSC in the development of regulatory tools and the framework. All draft documents are made available for public feedback and all comments are posted on the CIAR.</p> |

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| | | | | <p>Under the CNSC’s regulatory framework, applicants are responsible for selecting and justifying their proposed project. At the present time, the framework and mandate of the Commission is to consider the proposed project and any potential significant adverse environmental effects it can have before making an EA decision. The EA process is currently ongoing and the Commission has not yet rendered a decision on the project.</p> <p>CNSC staff are satisfied with Denison’s engagement with KML and NVP to date, and in June 2024 received letters of support for the proposed project from both KML and NVP, which indicated their support and consent for the development and operation of the Project.</p> |
| 16. | KML and NVP (February 17, 2023) | UNDRIP and TRC Protocols | <p>Section 6.3 of KML and NVP submission: KML sees limited mention that this project has respected the intent of the United Nations Declaration on the Rights of Indigenous People or the Recommendations of the Truth and Reconciliation Commission. There is limited opportunity for this project to review the implications of UNDRIP and TRC and how this project will cause to effect for the Indigenous rights bearing members of Pinehouse. This is not case for other agencies providing information for this project.</p> <p>KML request advocacy to increase education for external agencies on the need to develop greater understanding of UNDRIP and TRC calls to actions. These agencies can be contractors, regulators, and managers within the companies. This process could be developed if the agencies co develop a centre of excellence in Pinehouse.</p> | <p>The CNSC is committed to supporting the Government of Canada’s whole-of-government approach to implementing the United Nations Declaration on the Rights of Indigenous Peoples Act (UNDA) and the principles of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP). The CNSC’s processes for consultation and engagement with Indigenous peoples are mindful of and consistent with the principles articulated in UNDRIP. The CNSC follows existing legal frameworks including CEAA 2012, the NSCA and the common law duty to consult in conducting its consultation, regulatory and decision-making processes which further supports the UNDRIP and the FPIC principle. CNSC works towards achieving consensus with potentially impacted Indigenous Nations and communities through meaningful consultation, identifying mitigations and accommodation measures to address concerns and potential impacts and supporting Nations in arriving at their own position on the project and position on consent. CNSC staff support Nations with articulating and communication their position on FPIC to the Commission so that it can be taken into account as part of the decision-making process.</p> <p>Consultation with Indigenous Nations and communities and public engagement are important aspect of the CNSC’s regulatory and decision-making processes to ensure that their concerns are heard and addressed throughout the regulatory process and in order to determine that the project as proposed by the proponent, will make adequate provisions to protect people and the environment.</p> <p>The framework and mandate of the Commission is to consider the proposed project and any potential significant adverse environmental effects it can have before making an EA decision. CNSC staff will not move forward with a recommendation to the Commission unless we deem the proposal to be safe. Further, the Commission will only allow the project to proceed if it is convinced that it is safe for the public and the environment. In addition, the Commission must ensure as part of its decision-making that the honour of the Crown has been upheld and that the CNSC has met its Duty to Consult and Accommodate obligations as part of the consultation and regulatory process.</p> <p>CNSC staff are satisfied with Denison’s engagement with KML and NVP to date, and in June 2024 received letters of support for the proposed project from both KML and NVP, which indicated their support and consent for the development and operation of the Project.</p> |
| 17. | KML and NVP (February 17, 2023) | Co-Management, Food Sovereignty and Metis Land Access | <p>Section 6.4 of KML and NVP submission: Potential impacts to KML are from increased development and access to their territory. Current provincial regulation of hunting, fishing, tourism, resources development and increase human traffic will affect and limit our ability to practice our protected rights. Western business with greater acumen may displace economic activity as they note that they are still evolving their understanding of the industry business practices.</p> | <p>This comment is out of scope of the CNSC’s mandate and CEAA 2012, however both federal and provincial staff are aware of these concerns.</p> |

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| | | | KML request further study on how current provincial regulations including opportunity for co-management so lessen the impacts from this project and from increased encroachment. | In June 2024, both regulatory bodies received letters of support for the proposed project from KML and NVP, which indicated their support and consent for the development and operation of the Project. Both provincial and CNSC staff are satisfied with Denison’s engagement with KML and NVP to date. |
| 18. | KML and NVP (February 17, 2023) | Waste Management Plan | <p>Section 6.5 of KML and NVP submission: KML describes Indigenous Economic Leakage and Triggered Response Capacity as concerns:</p> <ul style="list-style-type: none">Indigenous Economic Leakage: the lack of capacity within Indigenous communities like Pinehouse prior to massive development projects like uranium mining operations. No ability in existing community development to capitalize on industrial activity in their areas because of historic colonization and racism. There are limited businesses, stores, materials and infrastructure within community to support and build upon.Triggered Response Capacity: the respond required by the Indigenous people of KML to meet the need of industry. The community is required to change focus away from Indigenous community needs to focus on the needs of Industry. This includes time to respond to the industrial education, safety protocols, regulatory responses. The need as a community to participate in the Duty to Consult on exploration requests, feasibility studies, Environmental impact studies, negotiate agreements, industry training requirements. All of this removes the community ability for practicing Indigenous cultural activities, less time of Cree language retention. This response increases as the Collateral Effect increase. <p>It is acknowledged by KML that these are factors are exacerbated by an additional mine. As noted in their summary of Primary Concerns, this necessitates:</p> <ul style="list-style-type: none">Systemic increases in the use of services in Pinehouse including COOP store and PBNLP, Pinehouse Housing Corporation, Pinehouse Fishing COOP and Wild Rice, and KML Metis Local to prevent the continuation of Indigenous economic leakage.Consideration to build industry supporting infrastructure such as warehousing, hotels, bulk fuels parts and mining necessities in Pinehouse to support community development and to stop the Indigenous economic leakage which has occurred over the last 50 years of development. | <p>As noted in previous comments, CNSC staff have worked with KML to ensure that concerns raised by KML have received satisfactory responses from Denison, and other parties as required. Socio-economic concerns are primarily considered in the scope of factors reviewed by the province and the proponent.</p> <p>In June 2024, both regulatory bodies received letters of support for the proposed project from KML and NVP, which indicated their support and consent for the development and operation of the Project. Both provincial and CNSC staff are satisfied with Denison’s engagement with KML and NVP to date.</p> |
| 19. | English River First Nation (ERFN) (February 22, 2023) | Section 12.1.6 Residual Effects Evaluation | <p>Comment #ERFN-187: Section 12.1.6 of the EIS defines a significant adverse residual effect on Cultural Expression as “an effect that is highly different from baseline conditions and trends and cannot be managed or mitigated through adjustments to existing programs, policies, or other mitigation.” The EIS goes on to state that “because residual adverse effects on Cultural Expression are not expected to result in this level of change, effects are expected to be not significant for the Project.”</p> <p>ERFN does not agree with this assessment of the potential residual effects of the Project, which is fundamentally deficient based on the limited scope of KIs and measurable parameters that were selected for analysis. ERFN also does not agree that the mitigation measures presented in Section 12.1.5 are sufficient to address effects of the Project on Cultural Expression that will be highly different from baseline conditions.</p> <p>Question/Recommendation: Until Section 12.1 is revised to include a more holistic consideration of KIs and measurable parameters for Cultural Expression that ERFN has set out above, Denison’s assessment of the nature of potential Residual Effects should be considered incomplete and deficient. In addition, until ERFN confirms CNSC that Denison and ERFN have reached mutually</p> | <p>The CNSC ensures that all EA and licensing decisions under CEAA 2012 and the NSCA uphold the honour of the Crown and consider Indigenous peoples’ potential or established Aboriginal and/or treaty rights pursuant to section 35 of the <i>Constitution Act, 1982</i>.</p> <p>Denison and ERFN have reached an agreement regarding concerns in section 12.1, with Denison committing to working with ERFN to understand how follow-up programs might be executed at the community level to address community perspectives. Indigenous Knowledge from ERFN was integrated throughout the Cultural Expression section.</p> <p>CNSC staff are satisfied with this outcome, and Denison is required to report to the CNSC regarding their engagement activities and it is expected that further details will be provided in the EIS and Denison’s Indigenous Engagement Report. CNSC staff will be requiring that Denison follow up on any commitments made to Indigenous Nations and communities, and Denison will be required to continue engaging, according to any EA or licence conditions. CNSC staff are committed to collaborating on conducting oversight of Denison’s compliance with any proposed licence condition with ERFN.</p> |

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| | | | agreed-upon terms of mitigation and accommodation that address the effects of the Project on Cultural Expression, this EIS should not be considered complete or approved by CNSC. | |
| 20. | ERFN (February 22, 2023) | Section 12.2.6 Residual Effects Evaluation | <p>Comment #ERFN-194: Section 12.1.6 of the EIS defines a significant adverse residual effect on Cultural Expression as “an effect that is highly different from baseline conditions and trends and cannot be managed or mitigated through adjustments to existing programs, policies, or other mitigation.” The EIS goes on to state that “because residual adverse effects on Cultural Expression are not expected to result in this level of change, effects are expected to be not significant for the Project.” ERFN does not agree with this assessment of the potential residual effects of the Project, which is fundamentally deficient based on the limited scope of KIs and measurable parameters that were selected for analysis. ERFN also does not agree that the mitigation measures presented in Section 12.2.5 are sufficient to address effects of the Project on Cultural Expression that will be highly different from baseline conditions.</p> <p>Question/Recommendation: Until Section 12.2 is revised to include a more holistic consideration of KIs and measurable parameters for Community Well-Being that ERFN has set out above, Denison’s assessment of the nature of potential Residual Effects should be considered incomplete and deficient. In addition, until ERFN provides confirmation to CNSC that Denison and ERFN have reached mutually agreed upon terms of mitigation and accommodation that address the effects of the Project on Community Well-Being, this EIS should not be considered complete or approved by CNSC.</p> | <p>The CNSC ensures that all EA and licensing decisions under CEAA 2012 and the NSCA uphold the honour of the Crown and consider Aboriginal peoples’ potential or established Aboriginal and/or treaty rights pursuant to section 35 of the <i>Constitution Act, 1982</i>.</p> <p>Denison and ERFN have reached an agreement regarding concerns surrounding Cultural Expression, with Denison committing to working with ERFN to understand how follow-up programs might be executed at the community level to address community perspectives. Indigenous Knowledge from ERFN was integrated throughout the Cultural Expression section.</p> <p>CNSC staff are satisfied with this outcome, Denison is required to report to the CNSC regarding their engagement activities with ERFN.</p> |
| 21. | ERFN (February 22, 2023) | Section 13.2.1 Key Indicator: Employment and Training (all indicators) | <p>Comment #ERFN-213: The data are not presented from a GBA+ perspective, limiting the assessment’s estimate of the Project adverse or disproportionate impacts separated based on gender, sexual orientation, race, or other factors which have historically been used to disadvantage populations interacting with mining projects.</p> <p>Question/Recommendation: Complete the assessment using a GBA+ framework.</p> | <p>Denison, through a Human Resource Development Plan, will initially prioritize Indigenous and non-Indigenous communities in the local study area in terms of employment and training opportunities (anticipated to be in institutions in northern Saskatchewan) and will work with the leadership of these communities to assist in determining hiring and training practices during all phases of the Project.</p> <p>GBA plus analysis is not a requirement for environmental assessments of designated projects under CEAA 2012. With this in mind, CNSC staff understand that through the draft EIS review process, Denison has worked directly with ERFN to understand, consolidate and resolve any of its outstanding concerns. Denison and ERFN have come to a resolution in this area of interest.</p> <p>CNSC staff are satisfied with this outcome and expects Denison to report to the CNSC regarding on-going engagement activities with ERFN.</p> |
| 22. | ERFN (February 22, 2023) | Section 13.5.2. Summary of Project- related Residual Adverse Effects on Economy | <p>Comment #ERFN-238: The effects of the Traditional Economy are likely underestimated. The effects from a GBA+ perspective are unknown. The potential boom- bust effects of the Project are not considered.</p> <p>Question/Recommendation: Assess the impact of the project on GBA+. Re-assess the direction of the residual impact if necessary.</p> | <p>Denison and ERFN have come to a resolution in this area of interest as of November 2023. Indigenous Knowledge has been integrated throughout Section 13 Economics and Section 13.1.4 provides further details on the influence of Indigenous Knowledge, Local Knowledge, and Engagement on the Economic Assessment. Denison notes that the "Traditional Economy" was included as a key indicator in Section 13 and was integrated in a fulsome manner.</p> <p>As noted previously, GBA plus analysis is not a requirement for environmental assessments of designated projects under CEAA 2012. However, CNSC staff are satisfied with this outcome and expects Denison to report to the CNSC regarding on-going engagement activities with ERFN.</p> |

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| 23. | ERFN (February 22, 2023) | Section 14.6.3.4 Evaluation of Consequences | <p>Comment #ERFN-257: Denison argues in sections 14.6.3.1, 14.6.3.3 and 14.6.3.4 without substance that the risk of groundwater contamination due to the loss of freeze capacity is very unlikely. The lack of evidence presented to substantial these claims is alarming to ERFN. ERFN agree that under normal circumstances the likelihood of the freeze wall failing allowing for groundwater contamination is on the lower end of the likelihood spectrum, however, ERFN are not currently assessing effectiveness under normal circumstances, but rather as a result of accident or malfunction. Based on the discussion provided in section 14.6.3.4, there is great concern to ERFN that Denison would be a) able to detect the failure of a freeze wall and b) identify the exposure pathway to enable Denison to take appropriate action before catastrophic environmental impacts are observed.</p> <p>Question/Recommendation: ERFN is gravely concerned about the information put forward by Denison in section 14.6.3 regarding the risk assessment associated with likelihood and consequences of failure by the freeze wall. Denison has not presented a viable method to monitor the effectiveness of the freeze wall. Additionally, Denison indicates that there are no viable methods of detecting impacts or intervening until they are observed, indicating failure of the freeze wall. Finally, when speaking to the likelihood of an accident or malfunction, Denison only offer a best guess. ERFN requests that CSNC and Denison take seriously the possible threat to the environment and by extension ERFN Rights and interests associated with the failure of the freeze wall. ERFN cannot overstate the need to provide additional analysis of contingency measures to avoid containment in the event the freeze wall fails to contain mining fluids and other sources of groundwater contamination associated with Wheeler River activities.</p> | <p>Denison has committed to no residual effects to groundwater beyond the mining area during operations and during decommissioning activities; nor effects from changes in groundwater to surface water in the vicinity of the project during the same time period. Denison also provided more information on the freeze wall and ISR mining approach. Denison will continue to work with ERFN to align the ERA updates and reviews of those updates as recommended.</p> <p>An agreement was reached between Denison and ERFN in November 2023. Denison is required to report to the CNSC regarding their engagement activities with ERFN.</p> |
| 24. | YNLR (March 4, 2023) | Section 3 Value of IK in EA Practice, various pages | <p>Comment #9, 10, 12, 15, 16, 17, 19 and 35, Appendix B: YNLR notes that as the Athabasca Denesųliné were not considered to be an Indigenous COI, the opportunities to contribute to our knowledge to this discussion were diminished or lost.</p> <p>Comment #19, Appendix B: The mis-categorization as the Athabasca Denesųline am Indigenous Community rather than as an Indigenous COI is a step backwards rather than forwards with regards to reconciliation. A letter to Denison dated July 29, 2022, YNLR critiqued the designations of COI and IC as being artificial and marginalizing. Denison responded October 28, 2022, after the submission of Wheeler River EIS with an alternative view.</p> <p>Other related comments include:</p> <ul style="list-style-type: none"> • Comment #9, Appendix B: Only 4 of 31 aspects influenced (from EIS Table 3.5-1) for Indigenous knowledge and 3 of 37 aspects influenced (from EIS Table 3.5-2) for local knowledge were taken from Athabasca Denesųline knowledge sources. How will Denison address this? • Comment #10, Appendix B: YNLR notes that the Athabasca Denesųliné communities should be considered an Indigenous COI per Denison’s definition (EIS page 4-vii) as they are/have: <ul style="list-style-type: none"> ○ signatories of Treaty 10 and Athabasca Denesųline traditional territory is within the Project area (Hatchet Lake First Nation is a signatory to Treaty 10 as recognised on page 4-47 of the draft EIS) ○ established Treaty rights in proximity to the Project ○ more likely to experience impacts, for example, water drainage as indicated on page 1-7 of the EIS ultimately flows into Wollaston Lake where the Athabasca Denesųline community of Hatchet Lake is located • Comment #12 and 16, Appendix B: YNLR notes that the Project is located within Nuhenéné (the Athabasca Denesųliné traditional territory) as recognised on page 4-61 of the draft EIS. Further, Hatchet Lake First Nation is a signatory to Treaty 10, while Black Lake First Nation and Fond du Lac First Nation are signatories to Treaty 8, and as such all have | <p>The CNSC ensures that all of its EA and licensing decisions under CEAA 2012 and the NSCA uphold the honour of the Crown and uphold Indigenous peoples’ potential or established Aboriginal and/or treaty rights pursuant to section 35 of the <i>Constitution Act, 1982</i>.</p> <p>CNSC staff have identified Indigenous Nations and communities who may have an interest and rights in relation the project, including the Ya’thi Néné and provided each identified group with a notice of the commencement of the EA, the opportunity to apply for participant funding and a copy of the project description and draft EIS for comment. CNSC staff work primarily with Ya’thi Néné Lands and Resources Office, who coordinates any consultation activities, on behalf of Hatchet Lake, Black Lake and Fond-du-lac Denesuline First Nations.</p> <p>As per the requirements and guidance of the CNSC’s REGDOC 3.2.2, Indigenous Engagement, CNSC staff expect that Denison will continue engaging with YNLR and other identified Indigenous Nations and communities to identify potential concerns related to impacts on Aboriginal and/or treaty rights as a result of the proposed project and working collaboratively with the identified communities on addressing these concerns, where appropriate, as this process continues. Denison is also required to report to the CNSC regarding their engagement activities.</p> <p>CNSC staff have determined that Denison has demonstrated a commitment to working with identified Indigenous Nations and communities including establish working relationships and to develop engagement work plans. In response to concerns about this, Denison has added Hatchet Lake Denesuline First Nation who is represented by Ya’thi Néné as a Community of Interest for the Denison Wheeler River Project in the Final EIS and reflected local and traditional knowledge shared by YNLR and the First Nations that it represents in the Final EIS. Denison has also committed to sharing information on environmental monitoring plans as they develop, to</p> |

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| | | | <p>Treaty Rights within the Project area and that ; that our communities are in proximity to the Project and have demonstrated traditional activity</p> <ul style="list-style-type: none">• Comment #15, Appendix B: YNLR notes that the Athabasca Denesųline has relationships with other projects such as McArthur River and Key Lake as indicated in ROC-78, page 504, Combined Appendices for the Wheeler River Project Draft EIS.• Comment #17, Appendix B: Given these EIS defined criteria, YNLR has difficulty understanding why the Athabasca Denesųliné have been excluded from Indigenous COI status for this project. Exclusion of COI status means loss of opportunity for the communities to be part of greater engagement throughout all stages of the Project. Lost opportunities are considerable and include loss of participation at all phases of the Project and include influence regarding the boundaries of the study areas, possibilities for increased discussions regarding environmental and health concerns, mitigation procedures, and planned remediation, potential to participate in monitoring and research projects and future opportunities such as employment.• Comment # 35, Appendix B: YNLR notes that the engagement database demonstrates that their opportunities to contribute were limited. For example, of the approximately 101 pages of Engagement Database tables that are dispersed through several sections of the appendices for the EIS (2022), there are 6 entries credited to the Athabasca Denesųliné. Given an average of 3 to 5 entries per page in the tables, this means that only 1-2% of the contributions were made by the Athabasca Denesųliné. These limited opportunities may well be the result of the exclusion of Athabasca Denesųline from the COI category. | <p>support collaboration on monitoring plans of specific interest with YNLR. CNSC staff are satisfied with these commitments and results.</p> <p>Over the course of this process, CNSC staff have met regularly with YNLR and their board, to discuss CNSC's mandate and regulatory oversight role with regards to the Wheeler River Project, as well as other licenced sites. CNSC staff have also been working directly with YNLR to organize meetings and discussions with SMEs from CNSC and Environment and Climate Change Canada, to answer outstanding questions and concerns related to the project, CEAA 2012 methodologies, as well as regulatory processes followed by the Government of Canada. The CNSC also provides updates on and discusses the Wheeler River Project as part of regular engagement meetings with YNLR as part of the CNSC-YNLR Terms of Reference for long-term engagement which was established in 2022.</p> <p>CNSC staff will continue to provide Indigenous Nations and communities, including YNLR and impacted locals, with timely project updates and opportunities to review information and be consulted and engaged at key points during the EA process. To date, this has included review of Denison's Project Description and draft EIS, and will include review of CNSC's EA report and Commission Member Document (CMD), Denison's CMD, as well as an opportunity to present at the public Commission hearing.</p> <p>In addition to information sharing and providing opportunities for review of documents, CNSC staff will be working directly with YNLR as the rights impact assessments and Environmental assessment report are drafted. CNSC staff are committed to ensuring that any information related to YNLR, the Nations and communities they represent and their rights and interests are adequately reflected in CNSC documentation and conclusions on Denison's proposal.</p> |
| 25. | MN-S (March 4, 2023) | <p>Executive Summary, Section 3 Project Setting</p> <p>Executive Summary, Section 3.4.3 Proposed Schedule and Activities</p> <p>Executive Summary, Section 4 General</p> <p>EIS, Glossary</p> | <p>Issue #ES-002: Denison does not acknowledge that the Project falls within the MN-S Homeland.</p> <p>Issue #ES-013: MN-S is listed under Indigenous Organizations instead of Indigenous Communities of Interest.</p> <p>Issue #ES-012, ES-005 and 4-001: Per Denison's definition, MN-S, NR1 Locals, and NR3 Locals should be considered an Indigenous Community of Interest. Denison notes site visits as the only engagement-associated activities in each Project Phase. Additional involvement opportunities should be provided to MN-S throughout the life of the Project</p> <p>Further, MNS refers to CNSC correspondence (Appendix A) indicating that consultation and engagement was expected to be with NR1 Locals, NR2 Locals, NR3 Locals, and MN-S. Given NR2's involvement in NexGen and Fission, MN-S limited its engagement and consultation expectations to NR1 Locals, NR3 Locals, and itself.</p> <p>Recommendations:</p> <ul style="list-style-type: none">• Denison needs to engage all potentially impacted Métis, including: MN-S, NR1 Locals, and NR3 Locals, in addition to Kineepik Metis Local #9, as an Indigenous Community of Interest throughout the life of the Project.• Denison needs to revise their Indigenous Community of Interest definition in the Final EIS to reflect the uniqueness of Métis governance structures. Specifically, a definition that recognizes Métis Locals proximate to the Project, MN-S, and MN-S regional leadership. | <p>The CNSC is committed to ensuring that all of its EA and licensing decisions under CEAA 2012 and the NSCA uphold the honour of the Crown and uphold Indigenous peoples' potential or established Aboriginal and/or treaty rights pursuant to section 35 of the <i>Constitution Act, 1982</i>.</p> <p>CNSC staff have identified Indigenous Nations and communities who may have rights and an interest in the project, including the Métis Nation of Saskatchewan (MN-S). MN-S was provided with a notice of the commencement of the EA, the opportunity to apply for participant funding and a copy of the project description and Denison's Draft EIS for comment.</p> <p>CNSC staff regularly meet with MN-S to discuss topics that relate to CNSC's mandate, including progress on the proposed Wheeler River Project, related to both the licensing and EA process.</p> <p>As per the requirements and guidance of the CNSC's REGDOC 3.2.2, Indigenous Engagement, CNSC staff have confirmed that Denison has engaged with MN-S and other identified Indigenous Nations and communities (including Kineepik Métis Local) to identify potential concerns related to impacts on Aboriginal and/or treaty rights as a result of the proposed project and working collaboratively with the identified communities on addressing these concerns, where appropriate.</p> |

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| | | | <ul style="list-style-type: none">• Denison needs to engage MN-S, NR1 Locals, and NR3 Locals, to understand their preferred level of involvement throughout the life of the Project.• Denison needs to acknowledge MN-S, NR1 Locals, and NR3 Locals as an Indigenous Community of Interest in the Final EIS.• Denison needs to revise the Final EIS Executive Summary to note that the Project falls within the Homeland of MN-S, NR1 Locals, and NR3 Locals. Denison needs to apply this change throughout the EIS, where applicable.• Denison to acknowledge that lease review data is not an appropriate way to determine Métis traditional resource use in and around the Project in the Final EIS. | <p>Denison is required to report to the CNSC regarding their engagement activities and it is expected that further details will be provided in the evergreen Indigenous Engagement Report in any future submissions. Denison has committed to work with identified Indigenous Nations and communities to establish working relationships and to develop engagement work plans. Further, in response to MN-S's comments, CNSC staff have confirmed that in the Final EIS Denison have acknowledged that the project falls within the MN-S homeland. Denison agreed to fund a Metis Knowledge Study and capacity agreement, has reflected Traditional knowledge shared by MN-S and continues to engage with MN-S with respect to mitigation, monitoring and decommissioning as the project continues to advance.</p> <p>CNSC staff will continue to provide Indigenous Nations and communities, including MN-S and potentially impacted Métis Locals, with timely project updates and opportunities to review information and be consulted and engaged at key points during the EA process. This will include the upcoming review of CNSC's EA report and Commission Member Document (CMD), Denison's CMD, as well as an opportunity to present at the public Commission hearing.</p> |
| 26. | Prince Albert Grand Council (PAGC) (March 6, 2023) | General Comments | <p>Overall Comments from the PAGC submission: The EIS does not address multiple issues related to ecosystems, human health, and the long-term sustainability of the Wheeler River project, particularly Indigenous concerns regarding the loss of caribou, wolverine and other culturally significant animals. There are no details on economic benefits from the mines through Indigenous partnerships, including equity-based participation in the workforce with training opportunities for Indigenous personnel to operate in management roles.</p> <p>PAGC requests a response from the CNSC in writing to the General Manager Lands and Resources Secretariat Mr. Robin McLeod indicating how the outlined concerns will be addressed.</p> | <p>Through the EIS technical review, CNSC staff have assessed Denison's proposal and have received satisfactory responses on questions related to their assessment.</p> <p>With regards to economic benefits, Denison has provided detailed information regarding socio-economic impacts (both positive and negative) within the EIS to meet the provincial EA requirements, and the requirements of REGDOC 2.9.1. CNSC staff are satisfied with Denison's evaluation of potential impacts from the proposed project and their evaluation of socio-economic factors.</p> <p>CNSC staff understand that Denison has developed agreements with interested Nations and communities, where they have demonstrated to the proponent that they have the potential to be impacted by the project. This is outside the purview of the CNSC; however, CNSC staff have identified Indigenous Nations and communities who may have an interest and rights in relation to the project and provided each with a notice of the commencement of the EA, the opportunity to apply for participant funding and a copy of the project description and Denison's Draft EIS for comment. Additionally, CNSC staff have been and will continue to work through specific issues raised by each Indigenous Nation and community and will be assessing the potential impacts to rights in collaboration with those Nations and communities who have the potential to be impacted by the project. CNSC staff will continue to provide interested Indigenous Nations and communities with timely project updates and opportunities to review information and be consulted and engaged at key points during the EA process. This will include the upcoming review of CNSC's EA report and Commission Member Document (CMD), Denison's CMD, as well as an opportunity to present at the public Commission hearing.</p> |

Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement

| Number | Source | Reference to EIS ¹ , appendix, or TSD | Comment Summary (all original submissions can be found on Canadian Impact Assessment Registry reference: 80171) | Denison Response |
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| 1 | Lac La Ronge Indian Band (LLRIB) (February 9, 2023) | General | <p>Resource development projects in the Traditional Territory of LLRIB have had significant impact to community members and their traditional way of life. LLRIB is concerned about potential adverse impacts to the ability to hunt, fish and trap for food and/or carry out traditional uses including cultural, spiritual or other important sites near the proposed project area.</p> <p>LLRIB encourages Denison Mines to:</p> <ul style="list-style-type: none"> reach out to the LLRIB to engage LLRIB members and impacted land users. support the LLRIB Heritage Fund which enables community members to practice traditional activities reach out to LLRIB's economic development company, Kitsaki Management, to ensure local and Indigenous involvement | <p>The Lac La Ronge Indian Band ("LLRIB") hosted Denison Mines Corp. ("Denison") at the Lac La Ronge Indian Band ("LLRIB") Traditional Lands & Resources Advisory Committee ("TLRAC") meeting in Missinipe, on August 30, 2023. Denison appreciated the invitation to provide the TLRAC with an update on the Wheeler River Project ("Project"), including responding to the specific concerns raised by LLRIB in its February 9, 2023 letter to the Canadian Nuclear Safety Commission providing comments on Denison's comprehensive Environmental Impact Statement for the Project.</p> <p>As we affirmed during the meeting, the Project is located in the N-18 furblock for registered trappers and is outside the publicly available information regarding the LLRIB Traditionally Occupied Territory. Denison heard the TLRAC's information and perspective shared with us that there are LLRIB land users in the area, irrespective of furblock boundaries, and there remains general concern that land users could be impacted by the Project. As Denison explained during the meeting, we would welcome any specific information about land users in and around the Project area. From the evidence Denison is aware of so far, we are of the view that the outcome of Denison's comprehensive effects assessment in the areas of aquatic and terrestrial environments, and the associated potential impacts to the ability to exercise Indigenous Rights, leads to the conclusion that there will be no significant adverse residual effects to land use activities resulting from the Project. We recognize that this is an evolutionary process, such that if further information arises which indicates a different or more nuanced conclusion, we will review it and consider whether changes to our current direction are appropriate.</p> <p>In accordance with our Indigenous Peoples Policy, Denison is committed to collaborating with Indigenous peoples and communities to build long-term, respectful, trusting, and mutually beneficial relationships. With respect to using Kitsaki-owned businesses to support Denison's activities, Denison is proud of the work we have done to date with Kitsaki Management-owned companies including CanNorth and Northern Resource Trucking, and understand the opportunities for further work in the future as the Project progresses. As mentioned in the meeting, since 2019, Denison has spent more than \$1.1M dollars with Kitsaki-owned companies and has intentions to continue this positive trend as much as possible. Denison also understand the interests in general employment opportunities at the Project once approval is received to proceed, and are happy to have already received the contact information for the Community Relations Liaison Officer for Lac La Ronge Indian Band. This helpful contact will ensure that we have a fulsome listing of entities to which employment opportunities can be shared over the next while.</p> <p>Further, we understand as a company working in northern Saskatchewan, Denison wishes to respect and support efforts and initiatives that our neighbours, such as LLRIB and the TLRAC feel are important. As noted in your correspondence dated February 9, 2023 we understand that the Heritage Fund is such an initiative, and as such, Denison is pleased to contribute to the Heritage Fund for the amount of \$5,000. We trust that this contribution will continue to support and encourage community members to practice traditional activities.</p> |

¹Refers to EIS, unless otherwise noted above

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| 2 | Birch Narrows Dene Nation (BNDN) (February 28, 2023) | Section 5.7; 5.8.1 | <p>Comment #1: The Project is located within the treaty and ancestral lands of BNDN and maintains both current and historical significance to the community. BNDN Indigenous Knowledge, Land Use and Occupancy are not currently considered within the EIS. Should the Project proceed without the consideration of BNDN's Knowledge, Land Use and Occupancy, it may cause irreparable loss of culturally significant sites and access to resources that the community depends upon. It may also contribute to a loss in cultural transmission.</p> <p>Request/recommendation:</p> <p>a) Denison should provide BNDN with funds to conduct a community-led Indigenous Knowledge, Land Use and Occupancy Study for consideration within the EIS process. At minimum, the Study should consider BNDN's Indigenous Ecological Knowledge, commercial and non-commercial harvesting practices, and cultural occupation of the region (including historical sites). The Study should also consider cultural transmission, information about the history of the area and BNDN community members' perspectives on the Project.</p> <p>b) The community-led Indigenous Knowledge, Land Use and Occupancy Study should be a component of a broader process agreement between BNDN and Denison that serves as a pathway for obtaining BNDN's consent for the Project.</p> <p>c) Denison should work with BNDN to consider the appropriate integration of the results into all aspects of the EIS and management/monitoring plans, as well as any additional appropriate mitigation and/or accommodation measures.</p> <p>See Section 4.1 for additional information on this topic.</p> | <p>Denison's engagement with BNDN is consistent with the identification of BNDN as an Indigenous Community who has expressed an interest in the Project. However, Denison acknowledges and understands this information from BNDN. As such, over the past year(s), Denison has met with BNDN and has respectfully requested further information from BNDN in respect to the land use activities occurring in and around the Project in order to more meaningfully understand the potential for adverse impacts to BNDN and therefore consider the potential for further studies and/or integration into the EIS of such information. Denison remains of the perspective that receipt of this information from BNDN is a necessary first step in this process, and has not received information in this regard to date.</p> <p>Project effects have been mitigated for the most intensive resource user(s), irrespective of affiliation.</p> <p>Denison continues to work with its Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a community specific monitoring regime, suited to each of their interests and needs, in an agreed-upon fashion. Denison is committed to continual improvement in relation to such collaborative monitoring programs, in order to adapt to areas of interest which can change over time. It is expected that the data collected through such monitoring regimes would also be relevant to other Indigenous nations who may have interest in the Project. Therefore, Denison does not anticipate separate funding for BNDN at this time.</p> <p>Further, the assessment has been completed based on Valued Components (VCs), including the VC of Indigenous Land and Resource Use. Key indicators for Indigenous Land and Resource Use include:</p> <ul style="list-style-type: none"> • resource availability for harvesting subsistence resources (distribution and abundance of animals, plants, and wildlife for harvest and suitability of animals, plants, and wildlife for consumption); • land/water availability to practice traditional land use (TLU); and • perceived suitability of lands and resources therein. <p>Measurable parameters are identified for each of the key indicators, as presented in Table 11.1-1 of the EIS. The assessment does not take a distinctions based approach (i.e., the potential impact on each Indigenous community is not evaluated separately), but rather on the key indicators and associated measurable parameters.</p> <p>Mitigation to eliminate, reduce, or control potential adverse effects of the Project on Indigenous Land and Resource Use would apply to any BNDN uses proximal to the Project. Given proven mitigation is to be applied to traffic disturbances, noise, air quality, and increased competition for resources, the effects are expected to be minimal.</p> <p>As outlined in Denison's Indigenous Peoples Policy, Denison is committed to respecting Indigenous knowledge and values regarding environmental stewardship and Indigenous peoples' connection to the land, and to minimize potential effects, wherever possible.</p> |
| 3 | BNDN (February 28, 2023) | Heritage Baseline Study 2017 (Golder); Heritage Resource Impact Assessment 2020 (Golder); Heritage Resources Management Plan 2022 (Canada North) | <p>Comment #2: Archaeology as a profession has been dominated in North America by non-Indigenous researchers, despite most sites being Indigenous in origin. It is positive that Golder Associates made efforts to engage and involve Indigenous communities (by including an ERFN representative in fieldwork and by considering ERFN and Pinehouse Kineepik Metis land use maps) in their 2017 heritage baseline study and 2020 heritage resource impact assessment. Notwithstanding, the proposed Project area is within BNDN's treaty and ancestral lands and there may be heritage sites that the community is aware of. BNDN was not involved in either of these studies and BNDN may have Indigenous Knowledge of important heritage sites within the Study Area that should be considered.</p> <p>Request/recommendation:</p> <p>a) Denison should provide BNDN with funds to conduct a community-led Indigenous Knowledge, Land Use and Occupancy Study for consideration within the EIS process.</p> <p>b) The Heritage Resources Management Plan should be updated following the consideration</p> | <p>Denison's engagement with BNDN is consistent with the identification of BNDN as an Indigenous Community who has expressed an interest in the Project. However, Denison understands this information from BNDN. As such, over the past year(s), Denison has met with BNDN and has respectfully requested further information from BNDN in respect to the land use activities to occurring in and around the Project, in order to more meaningfully understand the potential for adverse impacts to BNDN and therefore consider the potential for further studies and / or integration into the EIS of such information. Denison remains of the perspective that receipt of this information from BNDN is a necessary first step in this process, and has not received information in this regard to date.</p> <p>Project effects have been mitigated for the most intensive resource user(s), irrespective of affiliation.</p> <p>Denison continues to work with its Indigenous Communities of Interest with reserves and</p> |

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| | | | <p>of Indigenous Knowledge, Land Use and Occupancy provided by BNDN. This may result in the requirement for further assessment and/or mitigation measures, which should be developed in consultation with BNDN.</p> <p>c) Denison should facilitate BNDN involvement in any additional archaeological fieldwork that takes place, including providing BNDN with capacity funding for members who participate. Terms to facilitate BNDN involvement in future archaeological work should be a component of a broader process agreement between BNDN and Denison.</p> <p>See Section 4.1 for additional information on this topic (p. 12-14).</p> | <p>residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a community specific monitoring regime, suited to each of their interests and needs, in an agreed-upon fashion. Denison is committed to continual improvement in relation to such collaborative monitoring programs, in order to adapt to areas of interest which can change over time. It is expected that the data collected through such monitoring regimes would also be relevant to other Indigenous nations who may have interest in the Project. Therefore, Denison does not anticipate separate funding for BNDN at this time.</p> <p>Following the implementation of the mitigation measures outlined in the Heritage Resource Management Plan (HRMP), the likelihood of residual effects is considered low and residual effects on Heritage Resources will occur infrequently and can be mitigated with the HRMP. Known archaeological resources identified in the Project Area were deemed to have low potential for archaeological interpretation and additional work or mitigation measures were not required for the sites; the Heritage Conservation Branch had no further concerns with these sites and work could proceed as planned. Should unknown archaeological and cultural resources be identified during the Project, effects will be mitigated using the HRMP. While effects to archaeological resources are irreversible, they can be mitigated by following the HRMP, by either avoiding additional damage to the resource by creating a buffer zone around the site, or by assessing the resource according to The Heritage Property Act to enable the full interpretation of the site before continuing with work. Furthermore, based on the low occurrence of known Heritage Resources in the Project Area (two), and the location of the Heritage Resources (near waterbodies, along an existing trail and away from the main developments), there is a low potential for the identification or disturbance of previously unknown archaeological sites throughout the life of the Project. Therefore, any residual effects (i.e., destruction of Heritage Resources) is considered to be negligible. Further, HRMP includes feedback from Indigenous nations with demonstrated significant land use activities in and around the Project.</p> <p>As outlined in Denison's Indigenous Peoples Policy, Denison is committed to respecting Indigenous knowledge and values regarding environmental stewardship and Indigenous peoples' connection to the land, and to minimize potential effects, wherever possible.</p> <p>Please see Section 11.3.2 Influence of Indigenous Knowledge, Local Knowledge, and Engagement on the Assessment for Heritage Resources. The Section describes how field assistants from local Indigenous communities were involved with the HRIA baseline studies, allowing for in-field consultation during the assessment to make sure that areas deemed to have potential by the land users were surveyed.</p> |
| 4 | BNDN (February 28, 2023) | Heritage Baseline Study 2017 (Golder) – methods; Heritage Resource Impact Assessment 2020 (Golder) – methods | <p>Comment #3: The methodology within both the 2017 and 2020 heritage studies included 'judgmental' shovel probing and initial troweling through soil to identify cultural heritage material. While the discretion of a professional archaeologist needs to be taken into account, relying subjectively on which areas to shovel test and not employing a systematic approach is not reproducible and may result in sites being missed; this is of particular concern given that large sections of the areas retaining potential were not subject to shovel testing. Further, troweling through soil rather than subjecting all excavated soil to sifting through 6mm mesh means that artifacts/ecofacts may easily be overlooked. Given that the north of Saskatchewan has not been thoroughly investigated archaeologically, and given that 76 sites and nine find areas were recorded just 35 km south of the Project area as part of Dr. David Meyer's multi-year archaeological investigation, the results of these assessments do not seem rigorous.</p> <p>Request/recommendation:</p> <p>a) BNDN recommends that Denison undertake further archaeological investigations based on the results of the BNDN TKLU study prior to construction of the project.</p> <p>b) Future archaeological assessment programs should be designed collaboratively with BNDN and other Impacted Indigenous Nations.</p> <p>See Section 4.1 for additional information on this topic (p. 12-14).</p> | <p>The 2017 and 2020 heritage studies were reviewed by the Heritage Conservation Branch. The HRIA was completed using standard pedestrian reconnaissance and visual inspection field techniques, complimented by the excavation of shovel probes and shovel tests and it was determined the site has limited interpretive potential. Please see Section 11.3.2 Influence of Indigenous Knowledge, Local Knowledge, and Engagement on the Assessment for Heritage Resources. The Section describes how field assistants from local Indigenous communities were involved with the HRIA baseline studies, allowing for in-field consultation during the assessment to make sure that areas deemed to have potential by the land users were surveyed. The details of monitoring and follow-up plans are being developed to support the separate process of Project licensing and permitting. The specific means by which provincial and federal authorities, and Indigenous Nations and communities will be engaged in developing the follow-up and monitoring program, including the information-sharing program, are currently under consideration with the Denison project team. It is noted that Section 4.2.1 of the draft EIS provides the variety of ways in which Denison has engaged with Interested Parties to date and it is assumed it would continue to use these means and others that may be identified to fulfill its key corporate principals for developing positive relationships (see draft EIS Section 4.2).</p> <p>Denison continues to work with its Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a community specific monitoring regime, suited to each of their interests and needs, in an agreed-upon fashion. Denison is</p> |

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| | | | | <p>committed to continual improvement in relation to such collaborative monitoring programs, in order to adapt to areas of interest which can change over time. It is expected that the data collected through such monitoring regimes would also be relevant to other Indigenous nations who may have interest in the Project. Therefore, Denison does not anticipate separate funding for BNDN at this time.</p> <p>Please see Section 11.3.2 Influence of Indigenous Knowledge, Local Knowledge, and Engagement on the Assessment for Heritage Resources. The Section describes how field assistants from local Indigenous communities were involved with the HRIA baseline studies, allowing for in-field consultation during the assessment to make sure that areas deemed to have potential by the land users were surveyed.</p> |
| 5 | BNDN (February 28, 2023) | Heritage Baseline Study 2017 (Golder) – methods; Heritage Resource Impact Assessment 2020 (Golder) – methods | <p>Comment #4: The presence of strandlines are noted as being an indicator of archaeological potential; however, it is unclear within the reports whether any strandlines are present within the Study Area. Most of the investigations and shovel probes that took place were around existing waterbodies.</p> <p>Request/recommendation: Please indicate whether strandlines are present anywhere in the Study Area.</p> <p>See Section 4.1 for additional information on this topic (p. 12-14).</p> | <p>Strandlines, like other linear landforms, do increase archaeological potential, however heritage resources are only directly effected by Project activities and there are no strandlines located in the Phoenix Site area (Government of Saskatchewan. N.d. 250K Surficial Geology Linear Landforms. Available at: https://geohub.saskatchewan.ca/datasets/saskatchewan::250k-surficial-geology-linear-landforms/explore?location=57.247957%2C-106.370278%2C6.33 [Accessed November 29, 2023]).</p> |
| 6 | BNDN (February 28, 2023) | Heritage Baseline Study 2017 (Golder) – methods; Heritage Resource Impact Assessment 2020 (Golder) – methods | <p>Comment #5: It is unclear whether the locations identified by other Indigenous communities in their Land Use maps were investigated archaeologically and subject where appropriate to shovel testing. Knowing this will give confidence to BNDN that areas they may identify as retaining potential may undergo further assessment if necessary.</p> <p>Request/recommendation: Please indicate whether the areas identified by other Indigenous communities in their Land Use maps were investigated archaeologically.</p> <p>See Section 4.1 for additional information on this topic (p. 12-14).</p> | <p>Please see Section 11.3.2 Influence of Indigenous Knowledge, Local Knowledge, and Engagement on the Assessment for Heritage Resources. The Section describes how field assistants from local Indigenous communities were involved with the HRIA baseline studies, allowing for in-field consultation during the assessment to make sure that areas deemed to have potential by the land users were surveyed.</p> <p>Even the most thorough investigations may not identify all archaeological materials that may be present. Denison advises that if unanticipated archaeological materials or features are encountered as a result of construction or reclamation activities, all work in the immediate area should cease and the Heritage Conservation Branch and local authorities (if applicable) contacted.</p> |
| 7 | BNDN (February 28, 2023) | Heritage Resources Management Plan 2022 (Canada North) – 4.0 | <p>Comment #6: The archaeological context provided is very Western/Scientific. Denison must also include historical/pre-historical accounts of Indigenous communities to provide an appropriate and comprehensive assessment of the archaeological context of the region.</p> <p>Request/recommendation: Denison must include a write-up of Indigenous historical and prehistorical accounts in consultation with relevant Indigenous communities. This write up must include historic context provided through oral history interviews as part of BNDN's community-led Indigenous Knowledge, Land Use and Occupancy Study for the Project.</p> <p>See Section 4.1 for additional information on this topic (p. 12-14).</p> | <p>Denison's engagement with BNDN is consistent with the identification of BNDN as an Indigenous Community who has expressed an interest in the Project. However, Denison understands this information from BNDN. As such, over the past year(s), Denison has met with BNDN and has respectfully requested further information from BNDN in respect to the land use activities to occurring in and around the Project, in order to more meaningfully understand the potential for adverse impacts to BNDN and therefore consider the potential for further studies and / or integration into the EIS of such information. Denison remains of the perspective that receipt of this information from BNDN is a necessary first step in this process, and has not received information in this regard to date.</p> <p>Project effects have been mitigated for the most intensive resource user(s), irrespective of affiliation.</p> <p>Denison continues to work with its Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a community specific monitoring regime, suited to each of their interests and needs, in an agreed-upon fashion. Denison is committed to continual improvement in relation to such collaborative monitoring programs, in order to adapt to areas of interest which can change over time. It is expected that the data collected through such monitoring regimes would also be relevant to other Indigenous nations who may have interest in the Project. Therefore, Denison does not anticipate separate funding for BNDN at this time.</p> <p>Following the implementation of the mitigation measures outlined in the Heritage Resource Management Plan (HRMP), the likelihood of residual effects is considered low and residual effects on Heritage Resources will occur infrequently and can be mitigated with the HRMP. Known archaeological resources identified in the Project Area were deemed to have low</p> |

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| | | | | <p>potential for archaeological interpretation and additional work or mitigation measures were not required for the sites; the Heritage Conservation Branch had no further concerns with these sites and work could proceed as planned. Should unknown archaeological and cultural resources be identified during the Project, effects will be mitigated using the HRMP. While effects to archaeological resources are irreversible, they can be mitigated by following the HRMP, by either avoiding additional damage to the resource by creating a buffer zone around the site, or by assessing the resource according to The Heritage Property Act to enable the full interpretation of the site before continuing with work. Furthermore, based on the low occurrence of known Heritage Resources in the Project Area (two), and the location of the Heritage Resources (near waterbodies, along an existing trail and away from the main developments), there is a low potential for the identification or disturbance of previously unknown archaeological sites throughout the life of the Project. Therefore, any residual effects (i.e., destruction of Heritage Resources) is considered to be negligible. Further, HRMP includes feedback from Indigenous nations with demonstrated significant land use activities in and around the Project.</p> <p>As outlined in Denison's Indigenous Peoples Policy, Denison is committed to respecting Indigenous knowledge and values regarding environmental stewardship and Indigenous peoples' connection to the land, and to minimize potential effects, wherever possible.</p> <p>Please see Section 11.3.2 Influence of Indigenous Knowledge, Local Knowledge, and Engagement on the Assessment for Heritage Resources. The Section describes how field assistants from local Indigenous communities were involved with the HRIA baseline studies, allowing for in-field consultation during the assessment to make sure that areas deemed to have potential by the land users were surveyed.</p> |
| 8 | BNDN (February 28, 2023) | Heritage Resources Management Plan 2022 (Canada North) – 5.1 1e & 1f | <p>Comment #7: BNDN notes that there has been limited engagement of our Nation as part of the archaeological baseline studies undertaken at the site. The Wheeler River Project is within our Treaty and Ancestral Lands where our members have deep ancestral ties and continue to exercise our rights to this day. As stewards of the land since time immemorial and holders of both Treaty and Aboriginal rights in the Project area, Denison must engage with us as partners on their activities on our lands. This includes their planning and decision-making related to archaeological materials to which our members have ancestral and spiritual ties.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - Indigenous communities should be consulted and engaged in decision making rather than merely informed if the archaeological material is expected to be Indigenous in origin. <p>See Section 4.1 for additional information on this topic (p. 12-14).</p> | <p>Please see Section 11.3.2 Influence of Indigenous Knowledge, Local Knowledge, and Engagement on the Assessment for Heritage Resources. The Section describes how field assistants from local Indigenous communities were involved with the HRIA baseline studies, allowing for in-field consultation during the assessment to make sure that areas deemed to have potential by the land users were surveyed.</p> <p>Even the most thorough investigations may not identify all archaeological materials that may be present. Denison advises that if unanticipated archaeological materials or features are encountered as a result of construction or reclamation activities, all work in the immediate area should cease and the Heritage Conservation Branch and local authorities (if applicable) contacted.</p> |
| 9 | BNDN (February 28, 2023) | Heritage Resources Management Plan 2022 (Canada North) – 5.1 7 | <p>Comment #8: Given the Ancestral and Treaty ties our members have to the project area, our members have valuable knowledge and context to inform the Heritage Resource Impact Assessment (HRIA) for the Project that must be considered prior to being reviewed or approved by any regulatory body.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - The draft HRIA should be reviewed by BNDN and other impacted Indigenous Nations prior to being submitted for regulatory approval. <p>See Section 4.1 for additional information on this topic (p. 12-14).</p> | <p>Denison's engagement with BNDN is consistent with the identification of BNDN as an Indigenous Community who has expressed an interest in the Project. However, Denison understands this information from BNDN. As such, over the past year(s), Denison has met with BNDN and has respectfully requested further information from BNDN in respect to the land use activities to occurring in and around the Project, in order to more meaningfully understand the potential for adverse impacts to BNDN and therefore consider the potential for further studies and / or integration into the EIS of such information. Denison remains of the perspective that receipt of this information from BNDN is a necessary first step in this process, and has not received information in this regard to date.</p> <p>Project effects have been mitigated for the most intensive resource user(s), irrespective of affiliation.</p> <p>Denison continues to work with its Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a community specific monitoring regime, suited to each of their interests and needs, in an agreed-upon fashion. Denison is committed to continual improvement in relation to such collaborative monitoring programs, in order to adapt to areas of interest which can change over time. It is expected that the data collected through such monitoring regimes would also be relevant to other Indigenous nations</p> |

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| | | | | <p>who may have interest in the Project. Therefore, Denison does not anticipate separate funding for BNDN at this time.</p> <p>Following the implementation of the mitigation measures outlined in the Heritage Resource Management Plan (HRMP), the likelihood of residual effects is considered low and residual effects on Heritage Resources will occur infrequently and can be mitigated with the HRMP. Known archaeological resources identified in the Project Area were deemed to have low potential for archaeological interpretation and additional work or mitigation measures were not required for the sites; the Heritage Conservation Branch had no further concerns with these sites and work could proceed as planned. Should unknown archaeological and cultural resources be identified during the Project, effects will be mitigated using the HRMP. While effects to archaeological resources are irreversible, they can be mitigated by following the HRMP, by either avoiding additional damage to the resource by creating a buffer zone around the site, or by assessing the resource according to The Heritage Property Act to enable the full interpretation of the site before continuing with work. Furthermore, based on the low occurrence of known Heritage Resources in the Project Area (two), and the location of the Heritage Resources (near waterbodies, along an existing trail and away from the main developments), there is a low potential for the identification or disturbance of previously unknown archaeological sites throughout the life of the Project. Therefore, any residual effects (i.e., destruction of Heritage Resources) is considered to be negligible. Further, HRMP includes feedback from Indigenous nations with demonstrated significant land use activities in and around the Project.</p> <p>As outlined in Denison's Indigenous Peoples Policy, Denison is committed to respecting Indigenous knowledge and values regarding environmental stewardship and Indigenous peoples' connection to the land, and to minimize potential effects, wherever possible.</p> <p>Please see Section 11.3.2 Influence of Indigenous Knowledge, Local Knowledge, and Engagement on the Assessment for Heritage Resources. The Section describes how field assistants from local Indigenous communities were involved with the HRIA baseline studies, allowing for in-field consultation during the assessment to make sure that areas deemed to have potential by the land users were surveyed.</p> |
| 10 | BNDN (February 28, 2023) | Heritage Resources Management Plan 2022 (Canada North) – 5.1.1 | <p>Comment #9: Discerning archaeological artifacts/ecofacts is difficult at times even to the trained eye; consequently, it is important to undergo training to understand what you could be looking for.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> a) Staff should undergo training regarding the cultural material they may encounter while on site b) BNDN and other Indigenous communities should be invited to attend this training <p>See Section 4.1 for additional information on this topic (p. 12-14).</p> | <p>Section 5.1.1 describes how all staff working on the Project should be informed of the possibility that they could encounter archaeological resources during their work or leisure time, which will include the proper procedure to follow in the case of a chance find. This could be facilitated by a short archaeological education section in the employee orientation, outlining the types of sites and artifacts that could be encountered in the area, as well as what to do when a potential artifact or site is found. If the chance find is deemed to be an archaeological site, then an HRIA is required and a qualified archaeologist must complete the assessment.</p> <p>Section 11.3.5 Mitigation Measures describes the management of archaeological resources and includes the assessment of the discovery by a qualified archaeologist and mitigation measures including avoidance of the site, shovel testing, systematic and intensive shovel testing, excavation, and/or construction monitoring. The HRMP outlines mechanisms for Indigenous engagement including the communities and implementation of appropriate cultural protocols.</p> |
| 11 | BNDN (February 28, 2023) | Heritage Resources Management Plan 2022 (Canada North) – 5.3 | <p>Comment #10: In numerous instances the Heritage Resources Management Plan (HRMP), Denison has used noncommittal language to describe future Indigenous engagement related to heritage resources. BNDN notes that engagement of impacted Nations is essential for proper heritage resource management and as such the language in the HRMP should reflect the necessity of this engagement.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - Throughout the HRMP, Denison must change the language of “should” to “will” where appropriate. For example: management options will be presented to the applicable Indigenous communities for feedback and will include consultation. <p>See Section 4.1 for additional information on this topic (p. 12-14).</p> | <p>The Heritage Resources Management Plan will be revisited for use of language 'should' to 'will' where appropriate.</p> |

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| 12 | BNDN (February 28, 2023) | Heritage Resources Management Plan 2022 (Canada North) – 5.3.1 | <p>Comment #11: BNDN notes that Section 5.3.1 does not confirm that impacted Indigenous Nations will have the opportunity to participate in future archaeological fieldwork. While BNDN understands that many impacted Nations will have arrangements directly with Denison to facilitate member participation, this should additionally be made available to all impacted Indigenous Nations as part of best practices at the Project.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - In addition to any provisions developed in a Project Agreement between BNDN and Denison for the Wheeler River Project, Denison should include a clause that confirms that all impacted Indigenous communities will be invited to have monitors participate in any additional fieldwork and that Denison will provide capacity funding for Nations that wish to participate. <p>See Section 4.1 for additional information on this topic (p. 12-14).</p> | <p>As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project. Denison does not anticipate separate funding for BNDN at this time.</p> <p>BNDN will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> <p>The details of monitoring and follow-up plans are being developed to support the separate process of Project licensing and permitting. The specific means by which provincial and federal authorities, and Indigenous Nations and communities will be engaged in developing the follow-up and monitoring program, including the information-sharing program, are currently under consideration with the Denison project team. It is noted that Section 4.2.1 of the draft EIS provides the variety of ways in which Denison has engaged with Interested Parties to date and it is assumed it would continue to use these means and others that may be identified to fulfil its key corporate principals for developing positive relationships (see draft EIS Section 4.2).</p> |
| 13 | BNDN (February 28, 2023) | Section 13.0 | <p>Comments #12, 14 and 15: BNDN is not included as a Local Study Area (LSA) Community despite being closer to the Project than other LSA Communities. The Project is situated on BNDN's ancestral lands. BNDN members currently and historically use the LSA for harvesting (commercial and personal) and ceremonial purposes.</p> <p>Without the LSA Community designation, BNDN members are less likely to be employed or trained through the Project. BNDN members are not entitled to priority training and employment provisions from Denison on the Project. Further, BNDN businesses and partnerships are not entitled to priority procurement provisions from Denison on the Project.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN must be identified as a LSA Community. BNDN members and businesses must be eligible for LSA priority status for employment, training, and contracting opportunities. The EIS should be revised accordingly. - A formal agreement between BNDN and Denison is required to outline socioeconomic offsetting measures and benefits should the Project move forward. This must include ways for BNDN businesses and member owned businesses to participate in the Project. Denison references a Human Resource Development Plan (HRDP) as a mitigation measure to ensure local and regional community members are hired in priority. However, Denison does not provide sufficient details to allow Birch to assess the adequacy of the HRDP. <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests the ability to review and comment on Denison's Human Resource Development Plan to provide input and recommendations to encourage community participation and employment in the Project. <p>See Section 4.2 for additional information on this topic (p. 19-23).</p> | <p>Spatial boundaries for the Economy VC were selected to reflect the geographic areas where economic impacts from the Project are likely to be detectable and measurable. These impacts are expected to be driven primarily by the relationship and interactions between the Project and the Communities of Interest ("COI"). Economic benefits surrounding Project employment (including income and training) are likely to be targeted toward the communities identified within the spatial boundaries. Economic impacts extending beyond the LSA are likely to be diffused and undetectable within the broader economy. The spatial boundaries were selected based on the consideration of communities where Project recruitment is likely to be prioritized, consideration of previous EAs conducted in the region, and consideration of information shared through key persons in the interview program. The LSA for the assessment of the economy includes the following communities: ERFN (including Indian Reserve Wapachewunak 192D and Indian Reserve La Plonge 192) and Patuanak, Northern Hamlet (Patuanak); Pinehouse Lake, Northern Village; and Beauval, Northern Village.</p> <p>Denison, through a Human Resource Development Plan, will initially prioritize Indigenous and non-Indigenous communities in the LSA in terms of employment and training opportunities (anticipated to be in institutions in northern Saskatchewan) and will work with the leadership of these communities to assist in determining hiring and training practices during all phases of the Project, which could include such items as on-the-job training and career counselling to help with advancement from foundational positions, advance sharing of job qualification requirements, clearly identifying training requirements and working with various training institutions to make sure such appropriate training is available, and creation of scholarship and support programs. Priority for employment and training will then focus on Indigenous and non-Indigenous residents of the RSA and then beyond the RSA.</p> |

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| 14 | BNDN (February 28, 2023) | Section 12.0 and 13.0 | <p>Comment #13: There is no BNDN specific Indigenous Knowledge or socioeconomic data presented in the EIS.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - Denison must conduct Indigenous Knowledge and Community well-being Study (or similar) to gather BNDN specific information. These studies will allow for a more fulsome assessment of the Project on BNDN rights and interests. Additionally, BNDN specific data will enhance Denison's baseline data and help to inform mitigation and monitoring measures. <p>See Section 4.2 for additional information on this topic (p. 19-22).</p> | <p>Denison's engagement with BNDN is consistent with the identification of BNDN as an Indigenous Community who has expressed an interest in the Project. However, Denison understands this information from BNDN. As such, over the past year(s), Denison has met with BNDN and has respectfully requested further information from BNDN in respect to the land use activities to occurring in and around the Project, in order to more meaningfully understand the potential for adverse impacts to BNDN and therefore consider the potential for further studies and / or integration into the EIS of such information. Denison remains of the perspective that receipt of this information from BNDN is a necessary first step in this process, and has not received information in this regard to date.</p> <p>Spatial boundaries for the Economy VC were selected to reflect the geographic areas where economic impacts from the Project are likely to be detectable and measurable. These impacts are expected to be driven primarily by the relationship and interactions between the Project and the COI. Economic benefits surrounding Project employment (including income and training) are likely to be targeted toward the communities identified within the spatial boundaries. Economic impacts extending beyond the LSA are likely to be diffused and undetectable within the broader economy. The spatial boundaries were selected based on the consideration of communities where Project recruitment is likely to be prioritized, consideration of previous EAs conducted in the region, and consideration of information shared through key persons in the interview program. The LSA for the assessment of the economy includes the following communities: ERFN (including Indian Reserve Wapachewunak 192D and Indian Reserve La Plonge 192) and Patuanak, Northern Hamlet (Patuanak); Pinehouse Lake, Northern Village; and Beauval, Northern Village.</p> <p>The spatial boundaries selected for Community Well-being were chosen because they permit baseline characterization in sufficient detail to enable potential interactions between the Project and the well-being of the community. These boundaries were developed in consideration of where interactions are likely to occur. The spatial boundaries were derived based on the consideration of communities where Project recruitment is likely to be prioritized, consideration of previous EAs conducted in the region, and consideration of information shared through key persons in the interview program. The LSA for the Community Well-being VC includes ERFN (including Indian Reserves Wapachewunak 192D and La Plonge 192) and Patuanak, Northern Hamlet; Pinehouse Lake, Northern Village; and Beauval, Northern Village.</p> |
| 15 | BNDN (February 28, 2023) | Section 12.0 | <p>Comment #16: While EIS does consider the effects of population changes related to the Project on social adaptability, demand for services and housing, it does not address the full range of potential impacts associated with a transient workforce. Significant research has been conducted to demonstrate the negative impacts of remote workers and work camps on Indigenous women and girls. This must be considered in the EIS.</p> <p>The EIS must include an assessment of all potential effects of a transient workforce and changes to population dynamics, including those disproportionately experienced by Indigenous women and girls, and other segments of the population. This must incorporate findings of research like the 2017 study completed by Lake Babine Nation and Nak'azdli Whut'en (Indigenous Communities and Industrial Camps), and/or related research in the context of the LSA.</p> <p>See Section 4.2 for additional information on this topic (p. 19-21).</p> | <p>Both the construction and operation camps will operate on a fly-in/out basis, meaning the opportunities for interactions between the workforce and Indigenous communities are limited as workers will be transported by air directly to the site. Section 12.2.4.2.1 provides the actions to minimize the extent the Project contributes to in- and out- migration in the LSA, including:</p> <ul style="list-style-type: none"> • Denison will initially prioritize the COI in terms of employment opportunities and will work with the leadership of these communities to assist in determining hiring practices during all phases of the Project. Priority for hiring will then focus on Indigenous and non-Indigenous residents of the RSA and then beyond the RSA. • Employees will not be permitted to commute to the site by any means other than the fly-in/fly-out worker rotation systems (i.e., they cannot drive to the site). • Pick-up and drop-off points are being planned at two locally central points in communities within the LSA, at one additional site in Saskatchewan (i.e., Saskatoon), and potentially at other locations. • Housing for workers will be provided at the camps with free accommodations and meals. <p>Although difficult to predict, communities in the LSA are not expected to experience any substantial population growth or change in demographics as a result of the Project, particularly with mitigation measures identified. Although the potential exists for some individuals to return to the COI, it is anticipated that this would be difficult to discern from existing in-/out-migration rates. As population and demographics are not expected to experience any change as a result of the Project, this pathway will not be carried forward to the residual effects assessment.</p> |

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| 16 | BNDN (February 28, 2023) | Section 12.0 and 13.0 | <p>Comment #17: BNDN notes that no specific management or monitoring plan has been included in the EIS documentation related to the verification of residual socio-economic impacts, both positive and negative, for the local economy.</p> <p>Request/recommendation:</p> <p>a) Denison must develop a Socio-Economic Monitoring Plan for the life of the Project to verify the effects assessment included in the EIS and to be included in the Project's approach to adaptive management. This Plan would include an approach, co-developed with Indigenous groups in the LSA (including BNDN), to monitoring the realization of the benefits and impacts of the Project (e.g., employment and procurement targets, training and capacity building, community investments, etc.) as mitigation and enhancement measures are implemented. Monitoring and subsequent regular evaluation would allow for the real-time adjustment of targets and/or an approach to adjusting enhancement measures or identifying offsetting benefits where targets are not met.</p> <p>See Section 4.2 for additional information on this topic (p. 19-21).</p> <p>[Additional questions on this topic directed to regulators or government entities are included in the CNSC table]</p> | <p>As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project. Denison does not anticipate separate funding for BNDN at this time.</p> <p>BNDN will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> <p>The details of monitoring and follow-up plans are being developed to support the separate process of Project licensing and permitting. The specific means by which provincial and federal authorities, and Indigenous Nations and communities will be engaged in developing the follow-up and monitoring program, including the information-sharing program, are currently under consideration with the Denison project team. It is noted that Section 4.2.1 of the draft EIS provides the variety of ways in which Denison has engaged with Interested Parties to date and it is assumed it would continue to use these means and others that may be identified to fulfil its key corporate principals for developing positive relationships (see draft EIS Section 4.2).</p> |
| 17 | BNDN (February 28, 2023) | Section 12.0 and 13.0 | <p>Comment #17: BNDN notes that no specific management or monitoring plan has been included in the EIS documentation related to the verification of residual socio-economic impacts, both positive and negative, for the local economy.</p> <p>Request/recommendation:</p> <p>b) The Crown must include the development of a Socio-Economic Monitoring Plan as a condition of approval for the Project.</p> <p>See Section 4.2 for additional information on this topic (p. 19-21).</p> <p>[Additional questions on this topic directed to the proponent are included in the CNSC table]</p> | <p>As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project. Denison does not anticipate separate funding for BNDN at this time.</p> <p>BNDN will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> <p>The details of monitoring and follow-up plans are being developed to support the separate process of Project licensing and permitting. The specific means by which provincial and federal authorities, and Indigenous Nations and communities will be engaged in developing the follow-up and monitoring program, including the information-sharing program, are currently under consideration with the Denison project team. It is noted that Section 4.2.1 of the draft EIS provides the variety of ways in which Denison has engaged with Interested Parties to date and it is assumed it would continue to use these means and others that may be identified to fulfil its key corporate principals for developing positive relationships (see draft EIS Section 4.2).</p> |
| 18 | BNDN (February 28, 2023) | Appendix 9B Section 2.5.1 Appendix 8E Table 4 | <p>Comment #18: In several instances in the draft EIS Denison has noted that Indigenous Nations are concerned with the possibility of mercury contamination from mining operations. BNDN shares these concerns with other Indigenous Nations. Due to the very low concentrations of mercury present in the Phoenix deposit, Denison has not meaningfully studied the potential impacts the Project may have on altering mercury biogeochemistry in the downstream environment.</p> <p>BNDN notes that background mercury concentrations can be elevated in many unexpected and remote locations due to atmospheric deposition (often due to coal plants) (Jackson, 1997). BNDN is very concerned that Denison has not analyzed for mercury as part of their baseline soil geochemistry assessments for the Project, especially in wetlands downstream of the Project. Mercury concentrations in wetland soils are sensitive to changes in water chemistry that can</p> | <p>Although baseline concentrations of total mercury in sediment were not collected during the baseline program, Denison will collect background information pertaining to sediment total and methyl mercury from LSA lakes and rivers prior to site development.</p> <p>As indicated in draft EIS Section 8.4.6.1, Residual Effects Characterization, mercury is not associated with the local geology and is not expected to be released in the effluent at measurable levels and was therefore not identified as a COPC. Denison notes that there is potential for increased methylmercury production in the receiving environment under a certain combination of factors to which the Project may contribute; however, prediction of methylmercury production is not practical. Denison commits to monitoring mercury and methylmercury in the aquatic environment over the life of the Project to determine the potential</p> |

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| | | | <p>lead to increased mercury methylation. This is especially acute from increases in nutrients and sulphates which can active sulfate reducing microorganisms that methylate mercury (Liu, Li, & Cai, 2012). Table 4 of Appendix 8e shows that the effluent discharged to Whitefish Lake will have mercury concentrations almost 5,700 times background concentrations. This dramatic increase in sulfate loading to Whitefish Lake may not exceed water quality objectives unto itself but may be sufficient to meaningfully change mercury biogeochemistry in downstream wetlands.</p> <p>BNDN is very concerned with the complete lack of assessment and analysis of baseline mercury concentrations and the potential changes to mercury cycling that could be induced by the Project.</p> <p>Request/recommendation:</p> <p>a) BNDN requests that Denison undertake baseline studies of mercury concentrations in soils, with a focus on baseline concentrations of mercury in organic wetland soils downstream of the project. Note that mercury sampling should sample total mercury and methylmercury in all analyses, as well as porewater total mercury and methylmercury. The study design and implementation should be undertaken collaboratively with BNDN.</p> <p>b) BNDN recommends that the CNSC requires Denison to undertake a baseline assessment of mercury in soils (with a focus on wetlands) prior to construction of the Project. This may be established as a condition of approval for the Project.</p> <p>c) Depending on the findings of the baseline mercury in soils and wetlands studies, the CNSC should include a condition of approval on the Project that requires Denison to monitor mercury biogeochemistry in the receiving environment over the life of mine.</p> <p>See Section 4.3 for additional information on this topic (p. 25-28).</p> <p>[Additional questions on this topic directed to regulators or government entities are included in the CNSC table]</p> | <p>changes in mercury concentrations in fish tissue over time. As the Project advances and operational monitoring is underway, Denison will assess health risks from fish consumption by comparing fish tissue data collected during operation from the monitoring program against Health Canada's mercury guideline of 0.5 ug/g wet weight. This is a human health risk-based maximum permissible concentration. Mercury data presented throughout the draft EIS represents total mercury. Denison agrees to include methylmercury as part of the constituents monitored in fish throughout all project phases.</p> <p>Engagement on licensing requirements, such as the development of the environmental monitoring program and the associated monitoring regime will occur to support Project permitting and licensing efforts.</p> <p>As the Project advances and operational monitoring is underway, Denison will assess health risks from fish consumption by comparing fish tissue data collected during operation from the monitoring program against applicable human health risk-based maximum permissible concentrations.</p> |
| 19 | BNDN (February 28, 2023) | Appendix 7C Section 3.5.6.2.1 Figures 7.6-10 and 7.6-11 | <p>Comment #19: Figure 7.6-10 and 7.6-11 of the draft EIS show the results of Denison's modelling of uranium mobility and adsorption from the ore body following the decommissioning of the mine. The figures show that the model indicates that all dissolved uranium will be effectively removed from solution within a short distance of the orebody via adsorption to clays present in the bedrock. In Section 3.5.6.2.1 of Appendix 7c of the draft EIS Denison notes that there is very limited literature available on uranium fate and transport, especially in similar environments to the Wheeler River Project. Denison's uranium speciation model relies almost entirely on a single academic article studying the partitioning of uranium in the alteration halo surrounding the Cigar Lake uranium deposit. Of very important note is that this paper is focused on the pre-mining environment at Cigar Lake and does not examine how uranium partitioning may be dramatically altered by ISR mining. Health Canada published a document on uranium in drinking water in 2017 literature review of uranium mobility, complexation and chemistry in groundwater which documents the widely varying behaviour of uranium in groundwater depending on redox conditions, pH, pressure, and other ions available for complexation which may increase or decrease uranium mobility (Health Canada, 2017).</p> <p>Uranium will be present in extremely high concentrations (100 mg/l) in the restoration solution. Many other anions and cations which uranium is known to form complexes with will also be present in the solution at very high concentrations. The limited literature upon which Denison has developed their models to predict uranium mobility post- decommissioning is insufficient to confidently assert that the very concentrated restoration solution will behave as predicted. Uranium is a common groundwater contaminant around the world and is known to be stable in dissolved forms in groundwater in many locations. Furthermore, some studies have indicated that the effectiveness of adsorption as a mechanism for attenuation of uranium in solution is significantly overstated, especially in environments where there is competition from other ions, as there will be in the restoration solution (Gandhi, Sampath, & Maliyekkal, 2022).</p> <p>BNDN is very concerned that Denison has portrayed their groundwater contamination model in Appendix 7c with an inappropriate level of confidence given the level of uncertainty reasonably inferred from the lack of foundational literature relevant to the circumstances at Wheeler River and the well- understood complexity of uranium fate and transport in groundwater. It is not impossible to imagine that surface water contamination could eventually occur, especially given the exceptionally high concentrations of uranium in the restoration solution. By consenting to the Wheeler River Project, BNDN is supporting a process that will be irreversible</p> | <p>Denison's engagement with BNDN is consistent with the identification of BNDN as an Indigenous Community who has expressed an interest in the Project. As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation (ERFN) and Kineepik Métis Local (KML) on details and updates to the decommissioning plan which includes mining area remediation plans and associated post-decommissioning modelling of groundwater from the remediated mining area, suited to each of their interests and needs. As part of these updates, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. It is expected that updates to the decommissioning plan and groundwater modelling would also be relevant to other Indigenous nations who may have an interest in the Project. As such, Denison will not be developing a process agreement with the BNDN to address concerns raised about pertaining to long-term groundwater quality for the Wheeler River Project. This comment is also applicable to other comments where the same request was made by the BNDN. The balance of this response pertains to groundwater quality and the numerical groundwater model presented in draft EIS will focus on the technical content of the concerns raised.</p> <p>Denison's groundwater SME and author of the modelling report (Appendix 7C) acknowledges that the modelling report did not include a lengthy discussion of uranium speciation and mobility. However, the reactive transport modelling done using the PHREEC geochemical code was carefully informed by relevant literature, and was certainly not restricted to consideration of one study (Cigar Lake). In Section 3.5.3 of Appendix 7C we reference important studies pertaining to uranium complexation in solution by carbonate species (Guillaumont et al. 2003; Gorman-Lewis et al., 2008; Grenthe et al., 2020) and ternary complexes of uranium with calcium and magnesium and carbonates in solution (Dong and Brooks, 2006). These complexation reactions were added into the Project-specific PHREEQC database developed as part of the work presented in Appendix 7C. The database was updated to include solution-phase complexes of uranium in Guillaumont, 2003, which is a comprehensive summary of known reaction constants for uranium with dissolved-phase ligands. Further, the consideration of sorption of uranium-carbonate complexes to quartz, goethite and illite is shown in Appendix E of Appendix 7C, and relies on information from multiple publications. The reactive transport modelling was done using piChem (FELOW + PHREEQC) because of the ability of that approach to carefully consider speciation of uranium, and the potential interactions of uranium with other species in solution.</p> |

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| | | | <p>once it commences and may be very difficult to manage should the underlying modeling assumption prove to be inaccurate by a significant margin. As a Nation whose members put a very high emphasis on the protection of groundwater resources, BNDN requires substantially greater reassurance through dialogue with Denison and further studies to have confidence that the Project will not irreparably degrade the natural environment in our Ancestral Lands.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - Denison must develop a process agreement with BNDN to work through our concerns related to long-term groundwater contamination from the Project. This process agreement would lay out the pathway to obtaining BNDN consent for the Project through providing our Nation with confidence that the groundwater and surface water near to the project will not be irreparably contaminated. The process agreement will include additional studies and consultation activities with BNDN that Denison must undertake. The satisfaction of all terms in the process agreement would be defined by the signing of a Project Agreement between Denison and BNDN. - BNDN recommends that Denison commit to funding bench-scale studies to validate the outputs from their FEFLOW and PHREEQC modelling. The bench-scale studies should be undertaken by an independent academic. <p>See Section 4.3 for additional information on this topic (p. 25-28).</p> | <p>The comment to which the BNDN refer in Section 3.5.6.2.1 of Appendix 7C is: "[t]o the best of our knowledge, there is very little information published about the solid-phase speciation of uranium and other constituents associated with ore bodies and the overlying and underlying rocks in the Athabasca basin". This is not speaking specifically to the speciation of uranium in the solid phase. Experimental work that provide information on solid-phase speciation include sequential extraction schemes and spectroscopic studies, such as recent work by Bayle et al., 2023 (https://pubmed.ncbi.nlm.nih.gov/37417589/). Research on the solid-phase speciation of uranium is not addressed in Health Canada (2017). As indicated, we were not able to find research pertaining to sequential extractions of spectroscopic studies of uranium in the solid phase for relevant materials/conditions. It is for this reason that we presented results of solid-phase uranium speciation in the available study by Percival 1989. It is acknowledged that this study was for Cigar Lake. The relevance of the work for the Wheeler River Project is high.</p> |
| 20 | BNDN (February 28, 2023) | Section 7.6.2.1 Appendix 7C Section 4.6 | <p>Comment #20: In Section 7.6.2.1 of the draft EIS, Denison mentions that they anticipate the outward migration of lixiviant as is observed at other ISR operations globally, and has incorporated their assumed concentrations of metals and the extent of area affected by flare from the ISR operations. Section 4.6 of Appendix 7c states that the flare zone is expected to extend 11 to 13 m but have modelled with a "conservative 50 m flare zone. It is not clear how Denison derived their assessment that the flare zone would extend 11 to 13 m and that a 50 m flare zone is considered conservative for the purposes of modelling. BNDN requires further information to have confidence that the design is as conservative as the Proponent has suggested.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests that Denison provide further information on how the size of the area above the deposit affected by flare was calculated and how they determined that 50% restoration solution was determined as the appropriate concentration to base water quality modelling. This item would be best addressed and resolved with BNDN through the process agreement to address BNDN's concerns related to long term groundwater contamination from the Project. See Section 4.3 for additional information on this topic (p. 25-28). | <p>Groundwater modelling and flow path analysis calibrated to field conditions have evaluated upward solution migration and demonstrated that the maximum height that injected fluids will migrate upwards from the ore zone during active mining is likely between 11 to 13 m (Section 2 of the draft EIS). For conservatism, a 50-m vertical zone above the deposit was assumed to be potentially disturbed by mining activities. Denison specified 50m flare threshold based on their commitment to maintain inward hydraulic gradients, and or adding extraction wells as necessary to limit the migration of the flare.</p> <p>With the engineered controls described above, flare is not anticipated above 11-13 m. However, the decision was made to assume 50% of the restored solution uniformly between 15 and 50 m above the mineralized zone because there will be a natural gradient from 100% restored solution to 0% restored solution (i.e., baseline conditions) over this distance. The uncertainty associated with this decision was addressed in the uncertainty analysis presented in Section 4.7 of Appendix 7C, where 100% restored solution was assumed to be present over the entire 50 m height above the ore zone. The results of the model under both scenarios was consistent: no water quality effects above groundwater screening criteria, apart from those that reflect natural conditions, in Whitefish Lake.</p> <p>Over the life of the Project, groundwater quantity and quality monitoring activities will be completed to assess the performance of various components of the Project associated with engineering mining designs and performance and infrastructure designs to protect groundwater. A detailed Groundwater Monitoring Plan (GWMP) will be prepared to support licensing. The GWMP will include an Excursion Contingency Plan, and measures for adaptive management. The GWMP will be informed by the understanding of existing groundwater conditions at the Project Area (Appendix 7-A), the reactive transport modelling of groundwater COPCs associated with the restored mining area (Appendix 7-C), and the commitments made within the Geology and Groundwater section of the EIS.</p> <p>Please refer to the first part of Denison's response to BNDN comment #19 in regard to BNDN's suggestion of a process agreement.</p> |

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| 21 | BNDN (February 28, 2023) | Appendix 7C Section 3.2.2.1 | <p>Comment #21: Section 3.2.2.1 of Appendix 7C of the draft EIS describes the natural redox conditions in the ore zone as naturally reducing. The operation of the wellfield will result in the groundwater in the ore zone becoming oxidizing. Post decommissioning, the groundwater in the ore zone can be reasonably anticipated to return to baseline (reducing) redox conditions. BNDN notes that as redox conditions becoming increasingly reducing post closure, adsorption kinetics of contaminants adsorbed to clays could shift so that contaminants desorb from clays and are remobilized into solution. It is not clear to BNDN that the evolution of redox geochemistry and its implication on adsorption kinetics has been adequately considered by Denison.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests further information on how increasingly reducing groundwater conditions post decommissioning may impact adsorption kinetics of contaminants expected to adsorb to clays. <p>This item would be best addressed and resolved with BNDN through the process agreement to address BNDN's concerns related to long term groundwater contamination from the Project. See Section 4.3 for additional information on this topic (p. 25-28).</p> | <p>Solution-phase concentrations of metals and uranium are what influence the desorption of these elements from clays over time; but the BNDN is correct that there may be hysteresis, or a kinetic component to desorption to equilibrium conditions. Re-establishment of reducing redox conditions - primarily through scavenging of residual oxidant with pyrite - with progressive movement of natural groundwater through the mining area in the Decommissioning period is anticipated to result in concentrations of metals and uranium at baseline conditions because the same mineral phases as are present now are expected to control the solubility of those elements. Secondary minerals may influence concentrations for a small number of constituents. In all cases, concentrations of these elements will not exceed those assumed in the model.</p> <p>In the model as presented, desorption from clays was taken into account for protons that had sorbed to chlorite in the mining area as a sensitivity analysis. The desorption of protons did not have an adverse effect on the water quality in Whitefish Lake. See draft EIS Appendix 7-C Sections 3.5.6.4 and 4.7.</p> <p>Please refer to the first part of Denison's response to BNDN comment #19 in regard to BNDN's suggestion of a process agreement.</p> |
| 22 | BNDN (February 28, 2023) | Appendix 7C Section 3.4 | <p>Comment #22: In Section 3.4 of Appendix 7C Denison reports that they have excluded colloids from their post- decommissioning geochemical modelling. Denison has also noted that colloids would serve to enhance mobility of contaminants and they could precipitate out of solution. BNDN is concerned that by excluding the precipitation of colloids with adsorbed contaminants as a pathway for contaminant transport, Denison has significantly underestimated the mobility of contaminants and the consequent risks to the receiving environment.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests that Denison prepare an additional geochemical model that considers the roles that colloids could potentially contribute to contaminant transport. The findings of this additional model (along with the other models) should be reviewed with BNDN. <p>This item would be best addressed and resolved with BNDN through the process agreement to address BNDN's concerns related to long term groundwater contamination from the Project. See Section 4.3 for additional information on this topic (p. 25-28).</p> | <p>The authors acknowledged in Appendix 7C the potential for transport of COPCs in association with colloids was possible, and used previous research in a highly relevant system (Cigar Lake) to make the professional judgement that this process would not significantly alter the results of the numerical model. Colloid transport is not included routinely in reactive transport modelling because of the difficulty in a) accurately measuring the colloidal fraction in groundwater under existing conditions as the basis for the numerous assumptions that would need to be made to include them in numerical modelling and b) the challenges with applying modelling approaches that have been developed at the scale of regional models (e.g., Molnar et al., https://www.pure.ed.ac.uk/ws/portalfiles/portalf/109261315/109261203_Molnar_PFV.pdf). Refinement of the mining area decommissioning objectives and associated modelling will be done as the Project progresses through updates to the Decommissioning Plan; nevertheless, the objectives as they may evolve will be bound by the objectives evaluated in the EIS, which as shown are protective of aquatic biota in Whitefish Lake. The final acceptable mining area decommissioning objectives will be developed prior to initiation of groundwater remediation, as part of the Detailed Decommissioning Plan (DDP). Prior to executing decommissioning activities, Denison shall prepare and submit the DDP to regulators for acceptance. In this case the DDP would reflect input that will be solicited from Indigenous Nations and communities and others prior to its submission and would also be informed by conditions on the ground at the site at that time, operational experience that has been gained and the regulatory landscape at that time. As is highlighted above, the decommissioning plan will evolve over time and the plan will become more refined as the Project advances.</p> <p>Please refer to the first part of Denison's response to BNDN comment #19 in regard to BNDN's suggestion of a process agreement.</p> |
| 23 | BNDN (February 28, 2023) | Appendix 7C Section 4.0 | <p>Comment #23: In Section 4.0 of Appendix 7c of the draft EIS, Denison reports that the composition of restoration solution 1 and restoration solution 2 were derived from metallurgical testing. While this is likely the best, BNDN notes that the initial solution used in the geochemical modelling is enormously consequential in the accuracy of the modelling and require further confirmation and confidence that the restoration solutions are accurate to within a reasonable margin of error for the geochemical modelling.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests that Denison provide further information on how the chemistry in restoration solution 1 and restoration solution 2 were derived and any evidence they can provide that gives them confidence that these solutions are an accurate reflection of what will be observed in the wellfield. <p>This item would be best addressed and resolved with BNDN through the process agreement to address BNDN's concerns related to long term groundwater contamination from the Project. See Section 4.3 for additional information on this topic (p. 25-28).</p> | <p>Further information on how the chemistry in restoration solutions #1 and #2 were derived and evidence providing confidence that the reflect conditions that are expected in the mining area with remediation of the mining area is provided in the Denison Feasibility Report (2023) and a summary is attached as part of Denison's response to Federal Indigenous Review Team (FIRT) information requirement #67.</p> <p>Please refer to the first part of Denison's response to BNDN comment #19 in regard to BNDN's suggestion of a process agreement.</p> |

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| 24 | BNDN (February 28, 2023) | Appendix 7C | <p>Comment #24: BNDN notes that Denison has not provided any discussion on the extent to which the lixiviant and the solution used to flush the wellfield at the end of operations will interact with the underlying paleo weathered bedrock. BNDN notes that it is possible that there are mineral phases within the paleo weathered bedrock that are also readily soluble when exposed to the lixiviant. While BNDN recognizes that the paleo weathered bedrock has a low permeability, it is unclear to BNDN as to whether the lixiviant will contribute to mobilization of contaminants from the paleo weathered bedrock that requires consideration in the post-decommissioning groundwater model.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests that Denison provide any available information on how the bedrock may be altered (through dissolution of soluble mineral phases) by the lixiviant and the flushing of the wellfield during decommissioning, and whether this has been factored into their post-decommissioning groundwater model. <p>This item would be best addressed and resolved with BNDN through the process agreement to address BNDN's concerns related to long term groundwater contamination from the Project. See Section 4.3 for additional information on this topic (p. 25-28).</p> | <p>In the modelling presented in Appendix 7-C, the mining area is assumed to span the entirety of the depth of the paleoweathered zone within the area of the freeze wall, as described in Section 4.6. Thus, in the Decommissioning period, the water quality in that entire portion of the paleoweathered zone was assumed to be equivalent to that of the "restored solution". This reflects, as the BNDN notes, the dissolution of soluble minerals associated with the paleoweathered zone due to interaction with the mining solutions. This assumption is conservative because the whole of the paleoweathered zone does not have the uranium mineralization of the ore zone, nor the concentrations of other COPC-containing mineral phases.</p> <p>Some alteration of the clays is expected, as is some bleaching (loss of iron-rich minerals); however, there is uncertainty with respect to the specific changes in the nature of the paleoweathered zone that have continued to be explored by Denison through experimental/metallurgical work. The decision was made in the numeric modelling to treat the portion of the paleoweathered zone within the freeze as geochemically unreactive - meaning that no sorption to clays or desorption from clays (with the exception of chlorite in the "pH tail" scenario (Section 3.5.6.4) was assumed for this zone. Thus, sorption of COPCs to clays in the paleoweathered zone within the numeric model occurred only outside of the freeze wall footprint, where the minerals will not have been exposed to mining solutions and will not have been altered.</p> <p>Please refer to the first part of Denison's response to BNDN comment #19 in regard to BNDN's suggestion of a process agreement.</p> |
| 25 | BNDN (February 28, 2023) | Appendix 7C Section 5.2.2 | <p>Comment #25: In section 5.2.2 of Appendix 7c of the draft EIS Denison reports the assumptions built into their post- decommissioning groundwater modelling. BNDN notes that Denison has assumed that adsorption reaction sites are assumed to be available uniformly throughout the subsurface parameter zones. The presence of sufficient adsorption sites is a primary variable which determines the outcomes of the groundwater modelling, as adsorption of ions out of solution is the primary means by which contaminant transport is attenuated in Denison's modelling. BNDN is concerned that the presence of a variable that is so consequential to the findings of the model is based primarily on assumptions with limited information to base the assumptions upon.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests that Denison provide justification for the assumption that adsorption sites will be uniformly available throughout the sub-surface parameter zones. BNDN requests that Denison provide information on how they estimated the extent to which adsorption sites are already saturated prior to mining. <p>This item would be best addressed and resolved with BNDN through the process agreement to address BNDN's concerns related to long term groundwater contamination from the Project. See Section 4.3 for additional information on this topic (p. 25-28).</p> | <p>We note the uncertainty assessment in the draft EIS tests conditions where less sorption sites are available (1/10th of the characterized amount). Further, refinement of the mining area decommissioning objectives and associated modelling will be done as the Project progresses through updates to the Decommissioning Plan; nevertheless, the objectives as they may evolve will be bound by the objectives evaluated in the EIS, which as shown are protective of aquatic biota in Whitefish Lake. The final acceptable mining area decommissioning objectives will be developed prior to initiation of groundwater remediation, as part of the Detailed Decommissioning Plan (DDP). Prior to executing decommissioning activities, Denison shall prepare and submit the DDP to regulators for acceptance. In this case the DDP would reflect input that will be solicited from Indigenous Nations and communities and others prior to its submission and would also be informed by conditions on the ground at the site at that time, operational experience that has been gained and the regulatory landscape at that time. As is highlighted above, the decommissioning plan will evolve over time and the plan will become more refined as the Project advances. Denison is committed to continue to engage with Indigenous Nations and communities to solicit input.</p> <p>Please refer to the first part of Denison's response to BNDN comment #19 in regard to BNDN's suggestion of a process agreement.</p> |
| 26 | BNDN (February 28, 2023) | Appendix 7C Table 3-10 | <p>Comment #26: Table 3-10 of Appendix 7c of the draft EIS shows the expected adsorbing mineral properties of the mineral phases to which contaminants are expected to adsorb out of solution. BNDN notes that the lixiviant and restoration solution could affect the ability of adsorption. In particular, the clays immediately surrounding the orebody are within the freeze wall and will be directly exposed to the lixiviant during operations, which may impact the clays ability to adsorb contaminants out of solution.</p> <p>BNDN notes that the clays immediately surrounding the orebody may be soluble in the presence of the lixiviant or may be altered to have a lower capacity to adsorb metals. BNDN requires further information from Denison to have confidence that the clay phases which play a crucial role in contaminant attenuation will not have their adsorptive capacity impacted by the operation of the wellfield.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests that Denison provide available information on whether clay mineral phases are anticipated to dissolve through the ISR mining process, and whether the restoration solution will impact the ability of clays to effectively adsorb contaminants. <p>This item would be best addressed and resolved with BNDN through the process agreement to address BNDN's concerns related to long term groundwater contamination from the Project. See Section 4.3 for additional information on this topic (p. 25-28).</p> | <p>Please see Denison's response above to BNDN Comment #24. Sorbing phases including clays were excluded from the mining area in the numeric model. Sorption occurs only to materials outside of the mining area that are not exposed to, and thus no altered by interaction with the mining solutions.</p> <p>Please refer to the first part of Denison's response to BNDN comment #19 in regard to BNDN's suggestion of a process agreement.</p> |

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| 27 | BNDN (February 28, 2023) | Section 1.1.1 | <p>Comment #26: In Section 1.1.1 of the Draft EIS, Denison notes that “the Gryphon deposit is not amenable to ISR mining and, accordingly, is not included in the EIS”. Denison has previously reported that the Gryphon deposit has nearly as much uranium as the Phoenix deposit. While the Gryphon deposit is not amenable to ISR, it is potentially still an economic resource which Denison may wish to mine.</p> <p>While the Gryphon deposit is not in scope for this environmental assessment, BNDN expects to be kept informed of future potential mining activities on the Wheeler River Project which Denison may be considering, including additional exploration on the Property, as future activities on the Property will also have impacts on our Treaty and aboriginal rights and interests.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - Given the potential longer term mining activities at the Wheeler River project beyond the Phoenix deposit, BNDN requests that any project agreement between BNDN and Denison include terms for ongoing dialogue related to future exploration and project development activities at the Wheeler River Project and at all Denison Projects on BNDN Ancestral Lands. <p>See Section 4.3 for additional information on this topic (p. 25-28).</p> | Denison acknowledges that, if development of the Gryphon deposit as an underground mine is proposed in the future, this would require additional regulatory review and approval as well as engagement with Indigenous Communities of Interest. Please also refer to the first part of Denison's response to BNDN comment #19 in regard to BNDN's suggestion of a process agreement. |
| 28 | BNDN (February 28, 2023) | Section 2.3.3.1.3 | <p>Comment #28: In Section 2.3.3.1.3 of the draft EIS Denison describes the proposed decontamination, demolition and disposal activities at the Project. BNDN notes that Denison has described a detailed process for decommissioning the injection and recovery wells but has not described how the freeze wells will be decommissioned. BNDN notes that the freeze well holes may serve as preferential pathways for contaminated groundwater movement. Given the proximity of freeze wells to the orebody and the number of freeze wells proposed to be drilled, proper closure of freeze wells is also important for protection water quality long term.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> a) BNDN request that Denison clarify the process by which they will decommission the freeze wells. b) BNDN requests that Denison decommission the freeze wells using the same process as is proposed for the decommissioning of the injection and recovery wells. <p>See Section 4.3 for additional information on this topic (p. 25-28).</p> | The freeze holes will be decommissioned in the same manner as the ISR wellfield injection and recovery wells. All wells once decommissioned will undergo a mechanical integrity and leak off test prior to being grouted and sealed internally preventing interaction of surface water from the underlying aquifer at the mineralized depth. The freeze pipes, which will be located inside the freeze holes, will simply be unthreaded and removed from site after the freeze wall is no longer required. |
| 29 | BNDN (February 28, 2023) | Section 2.3.3.1.3 | <p>Comment #29: Denison describes the thawing of the freeze wall as part of the decommissioning of the mine. BNDN notes that water expands when frozen and could potentially be capable of expanding pre-existing joints and fractures within the host rock. BNDN is concerned that the thawing of the freeze wall could lead to expanded joints and fractures which would allow for far more rapid contaminant transport away from the ore body and restoration solution than is modelled in the post-decommissioning groundwater model.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN request that Denison provide evidence from academic literature or other mine sites employing freeze wall technology to determine the extent the freeze wall could expands joints and fractures within the rock once thawed, including at unconformities or other pre-existing structural weaknesses within the host rock. <p>See Section 4.3 for additional information on this topic (p. 25-28).</p> | Please refer to the Attachment to IR-10 for information on the freeze wall integrity and basis for the design, which relies on site field data and lived experience from several existing Saskatchewan mining operations. |
| 30 | BNDN (February 28, 2023) | Figure 2.2-15 Section 2.2.3 | <p>Comment #30: Denison notes that they have made the conservative assumption that no water would be recycled as mining solution as part of their water balance calculations. BNDN agrees that this conservative assumption is appropriate for assessment of potential impacts of the Project. While this assumption is appropriate for the environmental assessment, BNDN wishes to understand the proportion of industrial wastewater that may be recycled on site and any commitments Denison is willing to make regarding continual refinement of the water treatment process to increase the proportion of water that is recycled.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> a) BNDN requests that Denison commit to continual refinement of the Industrial Waste Water Treatment Plant (IWWTP) treatment process to maximize the amount of water that is recycled to the deposit. b) BNDN recommends that the Crown include a condition of approval for the project regarding continual improvement of water treatment to maximize recycling. c) BNDN requests that Denison share available information on the proportion of water that they currently anticipate being able to recycle. <p>See Section 4.3 for additional information on this topic (p. 25-28).</p> <p>[Additional questions on this topic directed to regulators or government entities are included in the CNSC table]</p> | The EIS carried forward two options for the source of freshwater: 1) surface water and 2) groundwater. This freshwater will meet all Project needs for potable water, drilling, and process water and allow Denison to obtain the water from groundwater wells or from the surface water (Whitefish lake). The effluent quality and volume predictions in the EIS provide a bounding scenario of the basis of the assessment of Project effects. Denison is undertaking a sequential EA and licensing process under the Nuclear Safety and Control Act. For context, the EA process for a Project under CEAA 2012 and the Saskatchewan Environmental Assessment Act is long and complex. As such, the inputs and outputs (including IWWTP water recycle volumes and effluent quality) developed for the IWWTP were necessary and determined by Denison's Project engineers early in the EA process to allow for the EIS biophysical and human assessments to advance. Detailed design information on the IWWTP, including recycle volumes, were not available, which is standard for engineering and EA sequencing for major projects. Denison intends to continue to refine effluent quality and volume predictions as part of the BATEA assessment and licensing phase of the Project. The predictions provided in the EIS will continue to bound the assessment, and provide a conservative representation of risk to human health and the environment. Further, more detailed information regarding the design and operation of the IWWTP and water management infrastructure (including discharge rates, recycle rates among many other things), as informed in part by the BATEA assessment, will be included with |

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| | | | | Denison's application for the license to operate which will provide opportunity for review and comment by Interested Parties. For reference, the IWWTP would be commissioned prior to the Operation phase as no discharge of treated effluent would occur until that time. |
| 31 | BNDN (February 28, 2023) | Figure 2.2-15 Section 2.2.3.2 | <p>Comment #31: In Section 2.2.3.2 and Figure 2.2-15 of the draft EIS, Denison describes their water balance for the project and anticipated water needs to operate the ISR wellfield. BNDN notes that the EIS does not describe how Denison derived their estimate for the quantity of water required to operate the ISR wellfield. BNDN is concerned that the volume of water required to operate the wellfield may be substantially greater than is estimated in the draft EIS. Utilizing greater volumes of water in the wellfield would have cascading effects throughout the water balance, including greater demand on the IWWTP, greater storage volumes required in the process water storage pond, greater UBS holding pond capacity and greater volumes of effluent discharge to Whitefish Lake. BNDN is concerned with the potential cascading risks associated with an inaccurate assessment of the volume of water required to operate the ISR wellfield. BNDN also wishes to understand whether it is possible that Denison will be required to operate the wellfields at a higher pressure, even if only temporarily. BNDN notes that operating wells at higher pressure come with additional workplace and environmental hazards, especially when dealing with a strongly acidic lixiviant.</p> <p>Request/recommendation:</p> <p>a) To demonstrate that Denison has not significantly underestimated the volume of water required to operate the wellfield, BNDN requests that Denison provide evidence that the volume of water required to operate the wellfield is accurate. This should include an assessment of their level of confidence they have in their estimated water consumption.</p> <p>b) BNDN requests that Denison provide BNDN with information on potential contingency measures (such as constructing additional process water pond capacity) should their estimated water consumption be underestimated</p> <p>c) Denison must commit to updating their mixing zone assessment should they find it necessary to discharge greater quantities of effluent to Whitefish Lake than is estimated in the draft EIS.</p> <p>d) Denison must document the implications of operating the wellfield at a substantially higher pressure than currently expected.</p> <p>See Section 4.3 for additional information on this topic (p. 25-28).</p> | <p>a) Based on Denison's site-specific drilling, development, and pumping requirements over several years of exploration activities, the wellfield drilling water estimates presented in the EIS water balances are achievable. Denison's recently released feasibility study reaffirms the EIS assumptions related to water use and water recycle abilities.</p> <p>b) A key aspect of Denison's management system will be ongoing evaluation of the Project's performance compared to EIS predictions as well as continual improvement and adaptive management, as required. Should water consumption needs fall below those outlined in the EIS, Denison will follow all required permitting, licensing, and engagement with Indigenous nations and communities to describe and assess what those contingency measures would be.</p> <p>c) The near-field analysis (Section 8.2.4.2.3) identified that under all flow regime scenarios (i.e., 7Q10, monthly low, and monthly average), constituents are expected to be well mixed within Whitefish Lake (LA-5) and below the most restrictive criteria for the protection of aquatic life (Table 8.2-10; Appendix 8-C and Appendix 8-D). Additionally, the extent of the mixing zone in Whitefish Lake is estimated to be less than 5 m under all flow scenarios assessed (Table 8.2-11). Denison will comply with the Water Security Agency's Guidelines for Effluent Mixing Zones and Denison would update modeling if the base assumptions associated with the discharge of treated effluent to Whitefish Lake were changed, as needed.</p> <p>d) Wellfield pressures were described in the draft EIS, Sections 2.2.1.4.2 and 2.2.1.4.3. In terms of pressures, ISR mining is planned at nominal pressures of 100 psi and intermittent pressures of up to 250 psi.</p> |
| 32 | BNDN (February 28, 2023) | Table 2.3-3 | <p>Comment #32: Table 2.3-3 of the draft EIS shows Denison's proposed mining area decommissioning objectives, which are the groundwater quality objectives for the residual water in the ore zone following the flushing of the system during mine decommissioning. BNDN is surprised to see that relatively high concentrations of metals are expected to remain in the restoration solution as a final objective, such as 100 mg/l uranium and 2 mg/l cobalt, amongst many other metals.</p> <p>BNDN notes that potential risks to groundwater and surface water could be dramatically reduced through more stringent mining area decommissioning objectives. It is also feasible that processing efficiencies and high uranium prices may allow for substantially lower concentrations of uranium to be mined economically. The long-term contamination of groundwater from the high concentration of metals in the restoration solution is one of BNDN's primary concerns with the Wheeler River Project, and BNDN would strongly prefer that Denison strive to minimize the residual contamination remaining in groundwater following decommissioning to the greatest extent possible.</p> <p>Request/recommendation:</p> <p>a) BNDN requests that Denison provide documentation that estimates the time, efforts and costs associated with reducing concentrations of metals in the restoration solution by 1 order of magnitude and 2 orders of magnitude. Note that these calculations should include costs that could be recovered by processing subeconomic UBS.</p> <p>b) BNDN requests that Denison work with BNDN through terms defined in a BNDN project</p> | <p>Groundwater remediation targets provided in the draft EIS were derived from metallurgical test results completed from 2017 to 2021 with over 125 kg of material recovered from Phoenix deposit that underwent leaching and neutralization test work (see response to IR-67). In 2022 and 2023, metallurgical test work continued to further optimize remediation and strategies and confirm test work results presented in the draft EIS. It is expected that metallurgical test work will continue in the future to further optimize remediation targets, and this will be advanced through updates to the Decommissioning Plan. The Feasibility Field Test (FFT) provided additional confirmation that pH target and remediation targets could be met. Data gathered during the neutralization phase of the FFT provide confidence that groundwater targets proposed in the draft EIS can be met technically and economically. Based on laboratory testing and the results of the 2022 field testing, subsurface remediation is planned to consist of rinsing the ore zone with 35 pore volumes of fresh water, slowly raising the pH and then pumping about 75 pore volumes of basic solution through the same portion of the ore zone. This basic solution will in effect further raise the pH to a level that impedes further leaching of the deposit and reduces aqueous concentrations of contaminants of concern to below their environmental target levels.</p> <p>Refinement of the mining area decommissioning objectives and associated modelling will be done as the Project progresses through updates to the Decommissioning Plan; nevertheless, the objectives as they may evolve will be bound by the objectives evaluated in the EIS, which as shown are protective of aquatic biota in Whitefish Lake. The final mining area decommissioning</p> |

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| | | | <p>agreement to establish achievable decommissioning objectives that would be satisfactory to BNDN.</p> <p>c) BNDN requests that the Crown place a condition of approval upon the Wheeler River Project that Denison is required to work with BNDN to establish mutually agreeable mining area decommissioning objectives.</p> <p>d) BNDN requests that Denison undertake a study of ISR operations elsewhere in the world to determine the lowest concentrations of UBS that could be processed economically utilizing industry best practices and commit to exceeding global standards.</p> <p>See Section 4.3 for additional information on this topic (p. 25-28).</p> <p>[Additional questions on this topic directed to regulators or government entities are included in the CNSC table]</p> | <p>objectives will be developed prior to initiation of groundwater remediation as part of the Detailed Decommissioning Plan (DDP). Prior to executing decommissioning activities, Denison shall prepare and submit the DDP to regulators for approval. The DDP would reflect input that will be solicited from Indigenous Nations and communities and others prior to its submission and would also be informed by conditions on the ground at the site at that time, operational experience that has been gained and the regulatory landscape at that time. As is highlighted above, the decommissioning plan will evolve over time and the plan will become more refined as the Project advances.</p> <p>As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project. Denison does not anticipate separate funding for BNDN at this time.</p> |
| 33 | BNDN (February 28, 2023) | Section 2.2.2.2.2 Figure 2.2-18 | <p>Comment #33: In Figure 2.2-18 of the draft EIS, Denison shows the proposed design of the double composite liner system for the ponds on site and the uranium bearing solution (UBS) holding area. BNDN notes that the risks associated with temporary storage of UBS is much greater than other contact water on site which is proposed to be stored in a similar means. As such, BNDN is concerned that the proposed UBS holding area does not have adequate leak detection given the additional risk associated with the UBS relative to contact water on site. BNDN also notes that open air storage of UBS presents the risk of incidental interactions with wildlife near to the project (such as birds), which would potentially be acutely toxic. BNDN is also concerned that there is no leak detection system below the secondary HDPE geomembrane and geosynthetic clay liner. Should the secondary containment layers also become compromised, Denison does not have a system planned to detect this.</p> <p>Request/recommendation:</p> <p>a) BNDN requests that Denison commit to storing UBS in appropriate tanks as opposed to open air storage.</p> <p>b) BNDN requests that Denison include a leak detection pipe in the prepared subgrade below the secondary containment as well as between the primary and secondary containment layers. BNDN also requests that the prepared subgrade be engineered to facilitate maximum utility of the leak detection below the secondary containment.</p> <p>See Section 4.3 for additional information on this topic (p. 25-28).</p> | <p>As outlined in draft EIS Section 2.2.2.2.2, Denison will evaluate options to use tanks instead of holding area as engineering advances. It is also important to note that Denison is completing a sequential EA and licensing process for the Project (see draft EIS Section 1). Denison considers the EA to be a planning and decision-making tool that assesses the potential effects of the Project in a careful and precautionary manner and integrates results of engagement with Indigenous nations and communities. The details requested by BNDN will be developed to support licensing and will be included in Management System programs / plans including for example the Groundwater Monitoring Plan and the Emergency Response and Preparedness Plan.</p> |
| 34 | BNDN (February 28, 2023) | Figure 2.3-1 | <p>Comment #34: Denison shows an additional ore body to the Southwest of Phase 5. Denison has not included this additional ore body in the mine plan in the draft EIS and has not discussed whether they have intentions to mine this ore body or undertaking a project change at a later date to include this additional ore body.</p> <p>It is unclear whether this additional ore body has any implications for the long term groundwater quality modelling either through the additional orebody altering anticipated groundwater chemistry, or the restoration solution dissolving metals in the additional orebody increasing overall metal loading. Given the probable difference in groundwater and mineral geochemistry in the additional orebody relative to the overlying sandstone and underlying basement rock, there is likely to be interaction between the restored solution and the additional orebody post-closure.</p> <p>Request/recommendation:</p> <p>a) BNDN requests that Denison clarify whether they are considering adding the additional orebody to the southwest of Phase 5 into the mine plan, including clarifying whether the additional ore body is amenable to ISR mining.</p> <p>b) BNDN requests that Denison clarify what the anticipated permitting associated with the additional ore body would be.</p> <p>c) BNDN requests that the post- decommissioning groundwater modelling for the Project include interactions between the additional ore body and the restoration solution to understand if the ore body poses a risk of additional metal loading to groundwater.</p> <p>See Section 4.3 for additional information on this topic (p. 25-28).</p> | <p>a) and b) The small deposit to the SW of Phase 5 is amendable to ISR, but is of lower grade than the areas targeted in mining phases 1 through 5 and mining of that low grade areas is not being considered at this time. It is noted that The Project mining and milling capacity will be bound by the assumptions in the EIS, which includes a production rate higher than the current reserves. The Project would be reviewed to determine what if any changes to the design basis would be anticipated and then what permitting would be required, should additional mining beyond what is contemplate by the EA be considered in the future.</p> <p>c) The additional modelling recommended by the review comment is unnecessary at this time. The low grade area is not considered in the mine plan at this time. Should that change, as noted above, the Project would be reviewed to determine what if any changes to the design basis would be anticipated and then what permitting would be required. Such modeling as envisioned by the review comment would be done that time as may be required. Hydrogeological investigations have been ongoing in the field and in laboratories since 2014. Packer, open hole, and cross hole tests have been completed in conjunction with exploration drilling programs. As well, permeability tests have been completed on sections of available competent core within the Phoenix deposit. Open hole water level surveys have been completed across the site in 2015, 2017, 2021 and 2022. Data gathered during the field tests have been utilized for both the EA groundwater model as well as the mining model. The primary direction of groundwater flow at depth is to the north east, which means restored solutions will move away from the small deposit to the SW. Additionally, as noted in the response to BNDN Comment #32, the restored solution will be basic and will further raise the pH to a level that impedes further leaching of the</p> |

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| | | | | deposit and reduces aqueous concentrations of contaminants of concern to below their environmental target levels. |
| 35 | BNDN (February 28, 2023) | Section 2.2.1.3 Section 7.6.2.1 | <p>Comment #35: Denison intends to use a freeze wall as tertiary containment for the operation of the wellfield during operations. In general BNDN is supportive of this containment measure but requires further information to have confidence that the freeze walls will operate as designed. In particular, BNDN notes that while the freeze wall will be continuous from the ground surface all the way into the basement rocks underlying the orebody, the freeze wall is by far the most consequential immediately around the ore body itself. The orebody is approximately 400 m below the ground surface (where the earth would be significantly warmer) and the lixiviant is expected to be at least 10 degrees warmer than the surrounding groundwater would be. Considering that the cold brine will need to be injected nearly half a kilometer into the earth where warm lixiviant will be injected into the wellfield, BNDN is concerned that the freeze wall may be ineffective in and around the ore body where it is required. Furthermore BNDN is concerned that the monitoring system for assessing the stability of the freeze wall may not adequately detect the continuity of the freeze wall at depth. As such, BNDN is concerned that the freeze wall may be ineffective and in fact obscure our ability to recognize contamination of the surrounding groundwater from the freeze wall operating ineffectively.</p> <p>Request/recommendation:</p> <p>a) BNDN requests that Denison provide information to demonstrate that the freeze wall will in fact be frozen in and around the ore body. If there is any doubt that the freeze wall will indeed be frozen around the ore body, Denison should describe further measures they can undertake to ensure that the freeze wall is frozen as intended around the ore body.</p> <p>b) Denison must provide BNDN with further information on how they will monitor the performance and continuity of the freeze wall.</p> <p>c) BNDN requests further information on the proposed groundwater monitoring program around the wellfield.</p> <p>d) BNDN requests the opportunity to review the groundwater monitoring plan and to review groundwater monitoring data as part of a BNDN-Denison environmental committee developed through a BNDN-Denison project agreement.</p> <p>See Section 4.3 for additional information on this topic (p. 25-28).</p> | <p>a) Please refer to the Attachment to IR-10 for information on the freeze wall integrity and basis for the design, which relies on site field data and lived experience from several existing Saskatchewan mining operations.</p> <p>b) The following explains how the continuous freeze wall will be monitored. The alignment of the freeze wall is located 25 m offset from the lateral extent of the recoverable ore and the freeze wall will grow in thickness both towards the ore and away from the ore. The freeze wall will solidify all liquid porewater and develop into a contiguous impermeable barrier many metres thick. Ground temperature monitoring will be installed through a series of continuous fiberoptic temperature and pressure wells from surface to the depth of impermeable basement rock below the unconformity. Such monitoring wells/systems will be installed on both the ore (inside) and non-ore (outside) sides of the freeze wall to confirm the thickness of frozen ground. There will be sufficient operational controls in place to verify that the freeze plant is operating, to measure the temperature in the ore zone, and to measure the temperature on opposite sides (inside and outside) of the freeze wall so that early detection of any upset conditions can be identified and addressed. Options for addressing issues include: lowering the temperature of the freeze system to draw more heat out; increasing the freeze coolant flow rates in freeze wells nearer to active ISR cells; and/or to adaptively manage the lixiviant injection and recovery rates in cells located nearest to the freeze wall.</p> <p>c) Regarding the monitoring program: A framework for the groundwater monitoring plan was provided in Section 7.8.2 of the draft EIS and is commensurate with the level of development of the Project. Further details regarding the Environmental Management Program and its associated plans (of which the groundwater monitoring plan is one) will be developed later in 2023 and 2024 as part of the licensing process. Engagement on licensing requirements, including on program and plan documentation will occur at that time.</p> <p>d) As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on monitoring regimes, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project, such as BNDN. Denison does not anticipate separate funding for BNDN at this time.</p> |
| 36 | BNDN (February 28, 2023) | Section 2.9.1.3.1 | <p>Comment #36: Denison documents their conceptual level environmental protection program, including several proposed management and monitoring plans which they will develop to manage operations on site.</p> <p>The environmental protection measures which Denison undertakes at the Project site are highly consequential to BNDN, and BNDN requires the opportunity to provide our knowledge and input into environmental protection measures developed for activities within our Ancestral Lands.</p> <p>Request/recommendation:</p> <p>a) BNDN requests that Denison commit to involving BNDN in the development, review and approval of all environmental monitoring plans developed for the Project. Details of BNDN involvement in the development of environmental monitoring plans should be undertaken within an Environmental Committee, with specific terms defined within a BNDN-Denison Project Agreement for the Wheeler River Project</p> <p>b) BNDN requests that the CNSC impose a condition of approval on the project which states</p> | <p>As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project. Denison does not anticipate separate funding for BNDN at this time.</p> <p>BNDN will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce</p> |

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| | | | <p>the requirement for Denison to consult with BNDN on all environmental management and monitoring plans for the project.</p> <p>See Section 4.3 for additional information on this topic (p. 25-28).</p> <p>[Additional questions on this topic directed to regulators or government entities are included in the CNSC table]</p> | <p>effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> <p>The details of monitoring and follow-up plans are being developed to support the separate process of Project licensing and permitting. The specific means by which provincial and federal authorities, and Indigenous Nations and communities will be engaged in developing the follow-up and monitoring program, including the information-sharing program, are currently under consideration with the Denison project team. It is noted that Section 4.2.1 of the draft EIS provides the variety of ways in which Denison has engaged with Interested Parties to date and it is assumed it would continue to use these means and others that may be identified to fulfil its key corporate principals for developing positive relationships (see draft EIS Section 4.2).</p> |
| 37 | BNDN (February 28, 2023) | Section 7.6.2.3 | <p>Comment #37: In Section 7.6.2.3 of the draft EIS and the geology and groundwater summary table in Appendix 16A, Denison states that they expect no residual effects to groundwater quality during the operations, decommissioning or future centuries period of the Project. Denison has also not placed a significance determination on the impacts to groundwater quality based on the findings of the draft EIS due to groundwater being considered an intermediate VC. BNDN disagrees with both the residual effects assessment and the fact that groundwater quality has been assessed solely as an intermediate VC. The protection of groundwater resources is highly important to BNDN. Our members place immense value on clean spring water and the protection of groundwater more generally. The advancement of the Wheeler River Project will permanently impair groundwater resources in and around the Wheeler River Project. The contamination of groundwater at the Project will have a significant impact on our members' connection to the land and ability to exercise our Treaty and Aboriginal rights. BNDN see the limited interpretation of residual effects and the lack of inclusion of groundwater quality as a receptor VC as a significant oversight in the assessment of impacts of the Project on the environment and BNDN Treaty and Aboriginal rights. This must be corrected to properly assess the Project and thus ensure that project impacts are appropriately mitigated and accommodated.</p> <p>Request/recommendation:</p> <p>a) Denison must apply a significant determination to groundwater quality and quantity for all projects phases, including the future centuries period. The significance determination must be developed following consultation and engagement with BNDN.</p> <p>b) Denison must re-evaluate the residual effects of the project on groundwater quality including the future centuries period. This re-evaluation must be following consultation and engagement with BNDN.</p> <p>c) BNDN requests that the CNSC work with our Nation to understand the significant impacts that the permanent contamination of groundwater caused by the project will have on our Treaty and Aboriginal rights.</p> <p>See Section 4.3 for additional information on this topic (p. 25-28).</p> <p>[Additional questions on this topic directed to regulators or government entities are included in the CNSC table]</p> | <p>The Groundwater Quality VC was carried through the EIS as an intermediate VC. The shallow and deeper groundwaters are not considered to be a potable water source currently nor in the future within the LSA (defined in Section 7.1.3.1), as detailed in Section 7.1.1.1. Within the LSA, the Groundwater VC was considered an intermediate VC as it is a pathway to the aquatic environment and considered in the future centuries period in Section 8. It is also important to note that the mining area is 400 m below surface and the existing/baseline groundwater quality in the ore zone area is poor (e.g., high in iron and uranium compared to shallower groundwater; Figure 7.3-11). Section 7.6 describes the residual effects evaluation for geology and groundwater, including for the life of mine (0 to 38 years) and the future centuries period. It is Denison's opinion that the approach associated with evaluating Project effects to groundwater quality is appropriate and reasonable for the reasons presented in the draft EIS.</p> <p>Denison continues to work with its Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a community specific monitoring regime, suited to each of their interests and needs, in an agreed-upon fashion. One of the key goals of such collaboration with each Indigenous nation will be to provide the information necessary to the communities such that it provides confidence to community members regarding the impacts from the Project to the aspects of the environment which matter the most to them. Denison is committed to continual improvement in relation to such collaborative monitoring programs, in order to adapt to areas of interest which can change over time. It is expected that the data collected through such monitoring regimes would also be relevant to other Indigenous First Nations who may have interest in the Project.</p> <p>The details of monitoring and follow-up plans are being developed to support the separate process of Project licensing and permitting. The specific means by which provincial and federal authorities, and Indigenous Nations and communities will be engaged in developing the follow-up and monitoring program, including the information-sharing program, are currently under consideration with the Denison project team. It is noted that Section 4.2.1 of the draft EIS provides the variety of ways in which Denison has engaged with Interested Parties to date and it is assumed it would continue to use these means and others that may be identified to fulfil its key corporate principals for developing positive relationships (see draft EIS Section 4.2).</p> |
| 38 | BNDN (February 28, 2023) | Section 7.8.2 | <p>Comment #38: Section 7.8.2 of the draft EIS documents the groundwater monitoring proposed for the surface facilities and the ISR recovery area. It also describes a conceptual excursion contingency plan wherein Denison has proposed their plans to manage situations where groundwater contamination occurs beyond what is predicted in the EIS. BNDN notes that Section 7.8.2 lacks information on the involvement of Indigenous Nations related to groundwater monitoring.</p> <p>As stated previously, BNDN is highly concerned with the level of impact the Project will have on groundwater resources. As such BNDN requires Denison to communicate excursions of groundwater and the consequent management of excursions to our Nation.</p> <p>Request/recommendation:</p> <p>a) BNDN requests that Denison revise Section 7.8.2 to include Indigenous engagement and input for groundwater monitoring results and the management of observed groundwater excursions. The manner in which Denison engages BNDN on groundwater monitoring and management will likely occur through an Environmental Committee, which should be defined in a BNDN-Denison Project Agreement.</p> <p>b) BNDN requests that the CNSC impose a condition of approval on the Project that clarifies</p> | <p>Denison agrees with BNDN's comment that groundwater monitoring will be an important component of the Project as it advances.</p> <p>As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project. BNDN will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> |

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| | | | that Denison is required to engage with impacted Indigenous Nations such as BNDN on groundwater monitoring and management. See Section 4.3 for additional information on this topic (p. 25-28). [Additional questions on this topic directed to regulators or government entities are included in the CNSC table] | The details of monitoring and follow-up plans are being developed to support the separate process of Project licensing and permitting. The specific means by which provincial and federal authorities, and Indigenous Nations and communities will be engaged in developing the follow-up and monitoring program, including the information-sharing program, are currently under consideration with the Denison project team. It is noted that Section 4.2.1 of the draft EIS provides the variety of ways in which Denison has engaged with Interested Parties to date and it is assumed it would continue to use these means and others that may be identified to fulfil its key corporate principals for developing positive relationships (see draft EIS Section 4.2). |
| 39 | BNDN (February 28, 2023) | Appendix 8D | Comment #39: In Appendix 8d, Denison documents their baseline aquatic studies undertaken for the Wheeler River EIS. Denison has included some lakes and rivers upstream of the Project as background sites for understanding project impacts to the aquatic environment. BNDN notes that there are many additional sites throughout our Ancestral Lands which would benefit from ongoing aquatic monitoring and would be potentially suitable for the Project as background sampling sites. Request/recommendation: - BNDN requests that Denison work with our Nation to identify potential additional background sampling sites within our Ancestral Lands for aquatic monitoring for the life of Project. The details of such should be defined in the BNDN-Denison project agreement. See Section 4.3 for additional information on this topic (p. 25-28). | Denison appreciates and acknowledges the recommendation. At this time Denison believes suitable candidate reference areas are available upstream of the Project site in areas located in the same drainage system / watershed. While proximity to the Project is only one of many considerations for suitable reference area selection in this case the ability to be able to compare relevant measurement endpoints between "reference" vs "potentially influence" sampling locations where the primary difference between locations is the point source discharge is compelling rationale. Additionally, data that have been collected from upstream areas as part of baseline programs provides the opportunity to implement aquatic monitoring according to a Before After Control Impact (BACI) design, that will provide the ability to monitor change temporally (among sampling periods) and spatially (among sampling areas), thereby providing a more robust means by which to assess potential mine related effects, which is a powerful means by which to assess and isolate potential mine related effects from natural environmental change. Given the above, Denison does not see that there is rationale for investigating lakes over a regional extent to establish reference areas for aquatic monitoring as is suggested. |
| 40 | BNDN (February 28, 2023) | Section 2.2.1.4.2 | Comment #40: In Section 2.2.1.4.2 of the Draft EIS Denison discusses the operation of the wellfield during the operations phase of the mine. BNDN notes that many of the details in this section are conceptual in nature and thus could require significant refinements in design to achieve the desired recovery consistently throughout the life of mine. Amongst other concerns related to operations of the ISR wellfield, BNDN is concerned that Denison may alter the chemical composition of the lixiviant used in the ISR wellfield which could cause inadequately understood changes in potential effects of the Project to the environment. These effects could include significant changes to the final restorative solution at the end of mine life or significant changes in the treatment requirements for the IWWTP that impact the ability of Denison to achieve effluent quality criteria for significant periods of time. Request/recommendation: a) BNDN requests that Denison provide information on: - The likelihood of the chemical composition of the lixiviant changing throughout the life of project - Potential changes to the lixiviant composition - The implications for long term groundwater quality and effluent treatment from changes in lixiviant chemistry b) BNDN requests that Denison commit to ongoing communications and engagement with BNDN regarding changes to the wellfield operation throughout the life of mine. The terms of engagement should be defined in a BNDN-Denison project Agreement. See Section 4.3 for additional information on this topic (p. 25-28). | a) It is important to note that Denison is completing a sequential EA and licensing process for the Project (see draft EIS Section 1). Detailed ISR mining-related information needed to support licensing and permitting has not been included in the EIS; it will be provided to regulators as part of permitting and licensing. For the EIS, an initial understanding of the mine plan and mining area remediation was needed to initiate the assessment of migration of constituents of potential concern in groundwater out of this area in the post-decommissioning period. The findings and conclusions of the EIS were also used, in turn, to inform and bound the engineering and feasibility work. As part of the metallurgical test program, over 125kg of core from the Phoenix deposit has been leached in a variety of settings, including bottle rolls, column tests, and intact core tests. This has helped to predict concentrations of both the lixiviant as well as the production solutions. The lixiviant (mining solution) concentrations will vary depending on each individual well production profile. To ensure reagent consumption is effective and efficient it will be varied during the life of each well dependent on its characteristics. The initial acidification of the well requires a lower acid content to ensure the formation does not plug due to precipitation, whereas during periods of high production the well can accept a higher acid concentration. Towards the end of the recovery curve, the uranium is more difficult to access and therefore the strength of the acid or the flow rate to the well need to be optimized to ensure efficient use of reagents. It is expected that the lixiviant concentrations will vary between 0-60 g/L H2SO4, and 0-20g/L H2O2 and will be situationally dependent. There is also the capability to add Fe2(SO4)3, however it is not expected that this will be required in significant concentration due to the natural abundance of iron in the deposit. b) Please see response to Comment #19 for Denison's response on a Project agreement. |
| 41 | BNDN (February 28, 2023) | Appendix 8E Table 4 | Comment #41: Table 4 of Appendix 8e of the draft EIS shows the predicted site discharge concentrations of the contaminants of potential concern (COPCs). BNDN notes that the concentrations of a number of COPCs do not achieve water quality objectives that is the best available technology economically achievable (BATEA). Example COPCs include copper, molybdenum, selenium, uranium, vanadium, zinc and ammonia. BNDN requires proponents operating on our Ancestral Lands to, at a minimum, achieve BATEA standards for effluent treatment and discharge. This takes reasonable and appropriate precaution without imposing unreasonable costs on the operation. Request/recommendation: a) BNDN requests that Denison commit to achieving BATEA criteria for all COPCs in their effluent. | a) Denison is undertaking a sequential EA and licensing process under the NSCA. For context, the EA process for a Project under CEAA 2012 and the Saskatchewan Environmental Assessment Act is long and complex. As such, the inputs and outputs (e.g., effluent quality) needed for the EIS were developed by Denison's Project engineers early in the EA process to allow for the biophysical and human assessments to advance. An example of one of these outputs is the IWWTP effluent quality. The effluent quality predictions in the EIS provide a bounding scenario of the basis of the assessment of Project effects. As stated in the Draft REGDOC 2.9.2 Denison understands that a BATEA assessment be conducted to determine the predicted design release characteristics as part of the licence application for a new facility or activity. Outside of the EIS process, the Project detailed engineering is progressing, including the design of the IWWTP and associated refinement of effluent quality predictions. Denison is |

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| | | | <p>b) Denison must work with BNDN to identify mutually agreeable and appropriate effluent discharge criteria for their effluent. BNDN expects that identifying suitable effluent discharge criteria will be undertaken through an Environmental Committee with a terms of reference defined in a BNDN-Denison project agreement</p> <p>c) BNDN requests that the CNSC impose a condition of approval on the Project that BNDN is engaged.</p> <p>See Section 4.3 for additional information on this topic (p. 25-28).</p> <p>[Additional questions on this topic directed to regulators or government entities are included in the CNSC table]</p> | <p>following Draft REGDOC 2.9.2 to arrive at a treatment option that remains within the bounds of the EA, which ultimately predicts no significant impacts to the receiving environment. The maximum design release characteristics for the IWWTP will be provided as part of Denison's licence application to the CNSC.</p> <p>b) As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to engagement with English River First Nation and Kineepik Métis Local as it relates to effluent discharge criteria, suited to each of their interests and needs. Denison does not anticipate working closely with BNDN on this topic.</p> |
| 42 | BNDN (February 28, 2023) | Appendix 8E Table 7 | <p>Comment #42: Table 7 of draft EIS Appendix 8e shows the anticipated size of the mixing zone under 3 different flow conditions, including the calculated 7Q10 flow. While BNDN understands that Denison expects to discharge relatively small volumes of effluent to Whitefish Lake compared to a conventional open pit or underground mining operation, BNDN is concerned that the mixing zone assessment underestimates the magnitude of impact that the project will have on Whitefish Lake.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests that Denison undertake a plume delineation study and provide BNDN the opportunity to review the findings of the study through the BNDN-Denison Environmental Committee for the Wheeler River Project. <p>See Section 4.3 for additional information on this topic (p. 25-28).</p> | <p>The prediction uncertainty analysis (i.e., "sensitivity analysis") presented in Appendix 7-C included an evaluation of the change in the model prediction (i.e., plume migration) with respect to changes in the conductivity of materials along the flow path to the receptor, Whitefish Lake (i.e., Scenarios 4, 5, and 6) as well as regarding the hydraulic conductivity of the mined-out ore zone. As such we feel that the work requested by the reviewer has already been completed and reported upon within the draft EIS. In addition, the uncertainty of the Intermediate Sandstone Aquifer was evaluated (see IR55), where higher hydraulic conductivity within the Intermediate Sandstone Aquifer were found to reduce the proportion of water from the ore zone reaching Whitefish Lake, which would have the effect of further reducing (i.e., diluting) concentrations simulated and presented in the EIS documentation. As such, the conditions documented in the draft EIS are already conservative with respect to the uncertainty in these parameters. The near-field analysis (Section 8.2.4.2.3) identified that under all flow regime scenarios (i.e., 7Q10, monthly low, and monthly average), constituents are expected to be well mixed within Whitefish Lake (LA-5) and below the most restrictive criteria for the protection of aquatic life (Table 8.2-10; Appendix 8-C and Appendix 8-D). Additionally, the extent of the mixing zone in Whitefish Lake is estimated to be less than 5 m under all flow scenarios assessed (Table 8.2-11). Denison will comply with the Water Security Agency's Guidelines for Effluent Mixing Zones.</p> <p>The above notwithstanding in-field confirmation of the extent of the effluent mixing zone is anticipated following commissioning of the IWWTP and effluent discharge system during the Operation phase of the Project.</p> <p>As a result of the continued technical review until October 2024, Denison will conduct a sensitivity analysis of low flows and high flows to assess how low and high flows may change under future climate conditions and the potential implications on water quality predictions made during the EA phase.</p> <p>As a result of the continued technical review until October 2024, Denison has made the commitment that the final diffuser configuration will not change the environmental assessment conclusions of risk to aquatic receptors and that the water quality will remain below guideline</p> |
| 43 | BNDN (February 28, 2023) | Appendix 10A | <p>Comment #43: BNDN notes that the environmental risk assessment (draft EIS Appendix 10a) makes no mention of potential impacts the project may have on mercury biogeochemical cycling and the consequent risks to the environment and human health. This is unsurprising given the lack of baseline sampling of mercury in sediments and soils, especially wetland soils. The lack of baseline sampling of mercury is a significant oversight given the significant impact that mining operations can have on mercury biogeochemistry, including mercury methylation, and mobility of mercury species within the environment.</p> <p>BNDN is very concerned with the complete lack of assessment of this important consideration for the project and the consequent inability for our members to adequately understand the potential risks to our Treaty and Aboriginal rights from these risks. Note that the absence of baseline information gathered can be reasonably considered an impact on our Treaty and Aboriginal rights as our members will avoid exercising our rights if BNDN lack the information to have confidence that it is safe to do so.</p> | <p>Although baseline concentrations of total mercury in sediment have not been collected during baseline sampling to date, Denison will collect background information pertaining to sediment total and methyl mercury from LSA lakes and rivers prior to site development.</p> <p>As indicated in EIS Section 8.4.6.1, Residual Effects Characterization, mercury is not associated with the local geology and is not expected to be released in the effluent at measurable levels and was therefore not identified as a COPC. Denison notes that there is potential for increased methylmercury production in the receiving environment under a certain combination of factors to which the Project may contribute; however, prediction of methylmercury production is not practical. Denison commits to monitoring mercury and methylmercury in the aquatic environment over the life of the Project to determine the potential changes in mercury concentrations in fish tissue over time.</p> <p>As the Project advances and operational monitoring is underway, Denison will assess health risks from fish consumption by comparing fish tissue data collected during operation from the monitoring program against Health Canada's mercury guideline of 0.5 ug/g wet weight. This is a human health risk-based maximum permissible concentration. Mercury data presented</p> |

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| | | | | <p>throughout the draft EIS represents total mercury. Denison agrees to included methylmercury as part of the constituents monitored in fish throughout all project phases.</p> <p>As the Project advances and operational monitoring is underway, Denison will assess health risks from fish consumption by comparing fish tissue data collected during operation from the monitoring program against applicable human health risk-based maximum permissible concentrations.</p> |
| 44 | BNDN (February 28, 2023) | Table 2.2-4 | <p>Comment #44: In Table 2.2-4 of the Draft EIS, Denison documents their planned chemical used for the project. BNDN notes that Denison intends to use zero-valent iron (ZVI) in the IWWTP, but not as part of the remediation solution for the mine. BNDN notes that ZVI is used to treat contaminants in groundwater around the world. Denison has not discussed whether they have investigated the possibility of utilizing ZVI to remediate the wellfield during decommissioning. Protection of groundwater is of exceptional importance to BNDN. BNDN is concerned that Denison has not made a complete or comprehensive effort to understand how to minimize negative impacts to groundwater from the project using proven technologies that may be suitable for remediating the restoration solution in the wellfield during the decommissioning phase of the mine.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests that Denison investigate the suitability of using zero-valent iron to remediate the groundwater within the wellfield as part of the decommissioning process. <p>See Section 4.3 for additional information on this topic (p. 25-28).</p> | <p>Refinement of the mining area decommissioning objectives and associated modelling will be done through updates to the Decommissioning Plan, and will be bounded by the objectives evaluated in the EIS. The use of zero-valent iron will be evaluated, as applicable.</p> |
| 45 | BNDN (February 28, 2023) | 8.2.4.1.1 Site Water Management | <p>Comment #45: BNDN is concerned that the small volume of Effluent Monitoring and Release Ponds may create a lack of operational flexibility. For example, in the EIS, it is stated that: "Treated water from the IWWTP will be pumped to the three Effluent Monitoring and Release Ponds (each 3,300 m3). These ponds will be designed to hold effluent for 72 hours for testing before discharge to the environment." – EIS, pp 723</p> <p>If water quality in these ponds exceeds discharge criteria then there may be a need to store water so that additional treatment and monitoring can occur prior to discharge. However, only having capacity for three days of storage means it is unlikely the Proponent would be able to adequately treat water prior to reaching storage capacity, resulting in a need for emergency release of poor- quality water.</p> <p>Request/recommendation:</p> <p>a) BNDN requests that additional storage capacity be included as part of the design for water management system. This must include adequate storage capacity to ensure Denison has the ability to retain water for sufficient time to allow treatment, in the event that exceedances of water quality discharge criteria occur. Alternatively, Denison can commit to halting discharge (and operations if required) should water quality exceed discharge criteria. Discharge into Whitefish Lake would resume once water quality in the Effluent Monitoring and Release Ponds has been returned to below discharge criteria.</p> <p>b) BNDN requests that the CNSC impose a condition of approval for the Project that requires Denison to must meet effluent discharge criteria prior to discharge and must halt operations if treated effluent in the monitoring and release ponds does not meet effluent discharge criteria. See Section 4.4 for additional information on this topic (p. 48-51).</p> <p>[Additional questions on this topic directed to regulators or government entities are included in the CNSC table]</p> | <p>a) During Construction, no effluent is expected to be released to the aquatic environment. Contact water stored in the Clean Waste Rock Pond during Construction will be held onsite until the Industrial Wastewater Treatment Plant (IWWTP) is commissioned. At that time the water from the pond would be conveyed to the IWWTP, treated, and released to Whitefish Lake per permit / license requirements. The sequence for Construction activities will occur in a logical manner based on Project execution plans. For example, construction of the wellfield runoff pond will be prioritized during the early part of Construction and it will able to hold 38,200 m3 of water. This will provide contingency and additional water storage capacity if contact water produced exceeds estimates or the volume available in the Clean Waste Rock Pond. Other secondary contingency measures are also available should the volume of water requiring management exceed site infrastructure storage volume. This could include use a hydrovac for offsite disposal.</p> <p>Section 2 Project Description, Section 2.2.3.9 Treated Effluent Monitoring and Release Ponds of the draft EIS outlines Denison's commitment to test effluent prior to discharge to Whitefish Lake, to ensure it meets federal and provincial discharge limits. Any pond not meeting the criteria will be recycled back to the Industrial Wastewater Treatment Plant via the process water pond.</p> <p>b) Denison expects the Provincial Approval to Operate a Pollutant Control Facility will contain specific effluent quality limits and monitoring to confirm effluent quality meets the approved limits. Denison will also be required to meet conditions in CNSC licensing documentation, as well as MDMER effluent discharge criteria.</p> |
| 46 | BNDN (February 28, 2023) | Appendix 8D Aquatic Environment Baseline Study | <p>Comment #46: Fish community sampling is an important component of baseline studies for many reasons, including identifying species present (including any species at risk) and evaluating relative abundance (e.g. CPUE). A robust program should include multi- season and multi-year approach. This allows improved characterization of seasonal habitat use and accounts for natural variability.</p> <p>In the baseline aquatic assessments, the Proponent has focused fish community sampling in fall 2016, with some limited additional sampling of in spring 2017. This low level of effort will make it difficult to draw meaningful comparisons with monitoring work that will occur during the life of mine.</p> <p>Furthermore, CPUE has only been reported for electrofishing effort. As a result, there is very</p> | <p>It is Denison's and their aquatic SME's opinion that the baseline fish community sampling efforts, including information provide from Indigenous and local resource users, provide a sufficient basis for conducting an effects assessment (draft EIS Section 8.3 Fish and Fish Habitat). Based on the information collected there is a good understanding of fish species presence / absence, relative abundance, fish habitat characteristics including areas that contribute to important life history stages (e.g., spawning areas) and fish habitat use. Denison does not believe further extensive baseline collection are needed to support the environmental assessment process but will implement targeted aquatic surveys prior to site development (see below).</p> |

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| | | | <p>limited information available for relative abundance of fish in important waterbodies, including Whitefish Lake, McGowan Lake, and Russell Lake.</p> <p>**BNDN notes that a raw representation of total effort is provided in table A-13 of Appendix 8D but requests that an assessment of total effort, total catch, and CPUE be presented in the EIS for each capture method/location**</p> <p>Request/recommendation:</p> <p>a) BNDN requests that the Proponent build on the existing data for fish community sampling by collecting an additional round of spring and fall sampling.</p> <p>b) BNDN requests that an assessment of total effort, total catch, and CPUE be provided for each capture method/location where fish sampling has occurred.</p> <p>See Section 4.4 for additional information on this topic (p. 48-51).</p> | <p>With respect to inclusion of the additional information requested the following is noted. Both detailed and summary data are presented in the Baseline Aquatic Environment Report that was provided as an appendix to the draft EIS. Effort and catch by sampling gear type by sampling location are shown for example in Table A-13 of the Baseline Aquatic Environment Report and metrics such as CPUE and total catches can be derived from these data if desired. Denison does not see the need to derive these metrics for presentation in the final version of the EIS (and supporting documents). This is in part related to the fact that the aquatic effects assessment did use abundance / relative abundance metrics such as CPUE as measurable parameters (MPs; a parameter or metric associated with a key indicator that can be used to detect and measure Project-related changes) to represent the fish and fish habitat VC, nor would it have been practical to use them for this purpose. There would be no practical or reliable way to derive such a prediction of change relative to Protect-aquatic habitat interactions.</p> <p>While abundance / relative abundance metrics may be reported during future monitoring they would not likely be seen as a key measurable parameters for fish monitoring. More subtle measures of fish health would be used for this purpose - it is reasonable to assume that fish health measures will be more sensitive to change than abundance measures and provide an earlier indication of potential Project-related effects. This is what is envisioned and required by the MDMER EEM program, whereby measures of fish health (e.g., growth, reproduction, condition) are used to assess potential effects. As noted above, Denison will implement targeted aquatic surveys prior to site development. At this time it is envisioned that a pre-development EEM program survey following guidance provided in the Metal Mining Technical Guidance Document will be implemented at the site, with sampling at future effluent exposed and reference areas. Best practice is to undertake an analysis of candidate reference areas using the existing baseline information and investigate their utility as controls prior to project development. Execution of the pre-development EEM represents a Before-After-Control-Impact (BACI) design for aquatic monitoring, that will provide the ability to monitor change temporally (among sampling periods) and spatially (among sampling areas), thereby providing a more robust means by which to assess potential mine related effects.</p> |
| 47 | BNDN (February 28, 2023) | 8.2.5 Mitigation Measures | <p>Comment #47: The Proponent has identified one mitigation measure that includes sharing of monitoring results to assess performance of water management system (EIS, pp 8-90, 8.2.5 Mitigation Measures). BNDN is supportive of this type of information sharing and believes that it can be an important component of transparency and trust- building between the Proponent and other parties. However, it is important that information sharing be done in a way that is accessible to community members.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests involvement in discussions with Denison about sharing of information related to water quality monitoring (and environmental monitoring more broadly). Some methods of communication that may support accessibility of data include: <ul style="list-style-type: none"> o Public-facing summary reports on a regular schedule (e.g. quarterly or annually) o Real-time access to environmental monitoring data through online database portals. o Semi-regular community meetings hosted in Turnor Lake (e.g. every 12-18 months, as decided in conjunction with BNDN leadership within a Project Agreement with BNDN). o Presentations to BNDN staff, leadership, and/or community members by BNDN Environmental Monitors. The specific methods used for information sharing and appropriate levels of support from Denison can be determined through consultation with BNDN. <p>See Section 4.4 for additional information on this topic (p. 48-51).</p> | <p>Denison agrees with BNDN that water quality monitoring will be interest to Indigenous nations and communities. As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. It is expected that the data collected through such monitoring regimes would also be relevant to other Indigenous nations who may have interest in the Project. BNDN will be informed throughout the monitoring program design and implementation process. Further details on the Public Information Program and Public Disclosure will form part of the documentation submitted in support of the CNSC licensing for the Project. It is also noted for further reference that there are existing, non-Denison monitoring programs such as the CNSC's Independent Environmental Monitoring Program (https://nuclearsafety.gc.ca/eng/resources/maps-of-nuclear-facilities/iemp/index.cfm), and the Eastern Athabasca Regional Monitoring Program (www.earmmp.ca/). Results from these programs provide relevant information and can complement Denison's Project-specific monitoring program. One forum for discussion of monitoring results is the Northern Saskatchewan Environmental Quality Committee(https://www.saskatchewan.ca/residents/first-nations-citizens/saskatchewan-first-nationsmetis-and-northern-initiatives/northern-saskatchewan-environmental-quality-committee).</p> <p>Please see response to Comment #19 for Denison's response on a Project agreement.</p> |

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| 48 | BNDN (February 28, 2023) | 8.5 Fish Health | <p>Comment #48: The Proponent has completed predictive modelling for concentrations of contaminants in fish tissue. For example, results of modeling for selenium indicate that concentrations will fluctuate throughout operations but remain below the recommended criterion of 2.83 mg/kg wet weight (from the US EPA). Should the Project proceed, information on contaminants in fish tissues will be highly relevant for BNDN and land users who eat fish from the area.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests that results of fish tissue monitoring (e.g. EEM studies) be shared in a publicly available and accessible way. This must include comparisons with guidelines and information on other contaminants of importance (e.g. mercury). Discussions regarding how this information can be shared with BNDN should occur alongside the discussions related to water quality monitoring results (see comment above). <p>See Section 4.4 for additional information on this topic (p. 48-51).</p> | <p>Denison agrees with BNDN that results of fish tissue monitoring will be interest to Indigenous nations and communities. As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. It is expected that the data collected through such monitoring regimes would also be relevant to other Indigenous nations who may have interest in the Project. BNDN will be informed throughout the monitoring program design and implementation process. Further details on the Public Information Program and Public</p> <p>Disclosure will form part of the documentation submitted in support of the CNSC licensing for the Project. It is also noted for further reference that there are existing, non-Denison monitoring programs such as the CNSC's Independent Environmental Monitoring Program (https://nuclearsafety.gc.ca/eng/resources/maps-of-nuclear-facilities/iemp/index.cfm), and the Eastern Athabasca Regional Monitoring Program (www.earmp.ca/). Results from these programs provide relevant information and can complement Denison's Project-specific monitoring program. One forum for discussion of monitoring results is the Northern Saskatchewan Environmental Quality Committee(https://www.saskatchewan.ca/residents/first-nations-citizens/saskatchewan-first-nationsmetis-and-northern-initiatives/northern-saskatchewan-environmental-quality-committee).</p> <p>Please see response to Comment #19 for Denison's response on a Project agreement.</p> |
| 49 | BNDN (February 28, 2023) | 8.3 Fish and Fish Habitat | <p>Comment #49: Increased fishing pressure in Whitefish Lake from employees working at the Project site and increased ability for visitors due to improved access could negatively impact fish populations.</p> <p>Preferred species, large-bodied fish, and older individuals are most likely to be targeted. This may have negative consequences on the population structure of fish in the lake as well as the ability of BNDN members to exercise fishing rights.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN recommends that the policies Denison sets related to staff and contractors fishing while on site are determined collaboratively with BNDN through the Environmental Committee defined in a BNDN-Denison project agreement. <p>See Section 4.4 for additional information on this topic (p. 48-51).</p> | <p>Please note that the Project will not change public access to the area. The existing gate on Highway 914 near Cameco's Key Lake Operation will remain in place and no changes to the gate and the process for controlling access to Highway 914 north of the Key Lake Operation are proposed as part of the Wheeler River Project. As described in the draft EIS, workforce members will be transported to/from site via a fly-in/fly-out rotation and will, therefore, not use ground travel options during shift changes, which will eliminate fishing on local lakes during commutes to/from the site and during time off work. Denison site vehicles will not be available for recreational purposes. While at the Project site and off duty, workers may opt to fish local waterbodies. To protect sustainable use of resources, only catch and release of fish will be encouraged, and fish storage or cooking facilities will not be provided. To prevent entry of land users from entering the Project Area, Denison will control access to the property with both a north and south security gate. Overall, given a lack of resources to access fishing locations and store fish harvests, workforce fishing is expected to cause minimal disturbances to local users. Section 11 of the draft EIS provides the assessment of potential Project effects on Indigenous Land and Resource Use (Section 11.1) and Other Land and Resource Use (Section 11.2). The mitigation measures proposed in the aquatic and terrestrial assessments translated into undetectable changes in resource availability to existing and future users and rightsholders. The assessment does not take a distinctions based approach (i.e., the potential impact on each Indigenous community is not evaluated separately), but rather on the key indicators and associated measurable parameters. Mitigation to eliminate, reduce, or control potential adverse effects of the Project on Indigenous Land and Resource Use would apply to any uses proximal to the Project. Given proven mitigation is to be applied to traffic disturbances, noise, air quality, and increased competition for resources, the effects are expected to be minimal. As outlined in Denison's Indigenous Peoples Policy, Denison is committed to respecting Indigenous knowledge and values regarding environmental stewardship and Indigenous peoples' connection to the land, and to minimize potential effects, wherever possible.</p> <p>Detailed Project plans and programs related to staff and contractor fishing will be developed to support Project permitting and licensing efforts.</p> |

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| 50 | BNDN (February 28, 2023) | 8.3.4 Assessment of Project- related Effects | <p>Comment #50: The EIS provides very few details regarding how spills, leaks, and other accidents and malfunctions will be managed to mitigate the impacts on fish and fish habitat. Over the life of the mine there will inevitably be accidents and malfunctions. One of the most common environmental issues that will be encountered is leaks and spills. These can typically be managed through good monitoring and preparedness, though if they occur near water, the ability to clean them quickly is difficult and can result in harm to aquatic communities. Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN request additional information regarding the development of spill prevention programs, emergency management procedures, and monitoring and remediation programs for accidents and malfunctions. Representatives from BNDN need to be included in the planning and execution of monitoring and remediation activities to provide community perspectives in Project activities. One method through which BNDN can be involved in these discussions is through the development of an Environmental Committee (see comment #51 also). See Section 4.4 for additional information on this topic (p. 48-51). | <p>A standalone Accidents and Malfunctions (A&M) assessment was completed and is summarized in Section 14 of the EIS (full report is Appendix 14-A of the EIS). The A&M assessment considered almost 70 accident scenarios including many that would relate to the unplanned release of chemicals and radiation to the environment with potential to effect country foods. Specific scenarios including the release of chemicals and radiation to the aquatic environment and to the terrestrial environment adjacent to the ERFN and KML culture camps located along Hwy 914. The overall risks in consideration of likelihood and consequence were characterized as low. The assessment concluded that with planned engineering / environmental design features, mitigation measures, and emergency response, as well as implementing industry best practices that the risks to the environment from accidents and malfunctions can be reduced to levels that are as low as reasonably practical.</p> <p>Section 2.9.1.3 of the draft EIS provides Denison's commitment to develop an Environmental Management System, which includes an Emergency Preparedness and Response Program (EPRP) and an Environmental Protection Program (EPP; including an Environmental Monitoring Plan). The EPRP would be established to identify how the Project will prepare for and addresses emergencies that may affect the health and safety of persons, the environment, and the protection of property. The EPRP would be developed in a manner that aligns with guidance provided by CNSC in REGDOC-2.10.1. The EPP would be established to provide an overarching framework for key environmental monitoring and management plans and to ensure a means to demonstrate compliance with applicable environmental regulatory requirements and other performance targets that Denison may set. As noted on the draft EIS, Denison has opted to execute the overall Project approvals process - that is, the environmental assessment and licensing / permitting processes - in series and not simultaneously. As such, the details of these programs and plans will be developed during the licensing / permitting phase and will be available for review at that time rather than as part of the final EIS. The level of information provided in the draft EIS is appropriate for the current stage of the Project approvals process.</p> <p>As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project. Denison does not anticipate any funding to BNDN at this time. BNDN will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: programs will meet regulatory requirements, programs will confirm the effectiveness of mitigation measures and predictions made in the assessment, programs will be implemented in an adaptive management framework (if/where applicable) to reduce effects during the lifetime of the Project, and program spatial boundaries will be sufficiently extensive to measure EIS predictions.</p> |
| 51 | BNDN (February 28, 2023) | 8.3.8 Monitoring and Follow-up | <p>Comment #51: There is no discussion on how Indigenous communities, such as BNDN, will be included in environmental management, emergency management, monitoring, and remediation. This includes issues related to ongoing permitting or specific remediation such as in the case of an accident or malfunction. Request/recommendation:</p> <ul style="list-style-type: none"> - To support BNDN's ongoing participation in monitoring and oversight of the Project, BNDN request the establishment of an Environmental Committee or similar oversight mechanism. The purpose of the committee will be to review monitoring data and monitoring reports produced during the life-of-mine to ensure that the environmental protection is sufficient for all VCs. The committee can also participate in permitting throughout the life-of-mine for all relevant applications (e.g. Fisheries Act Authorizations, water permits, Closure Plan updates etc.) and provide input to management plans (e.g. EPPs, Surface Water Management Plan, Environmental Monitoring Plans, etc.). The specific details of such a committee can be developed through consultation with BNDN and must be formalized through a BNDN-Denison project agreement. See Section 4.4 for additional information on this topic (p. 48-51). | <p>As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project. Denison does not anticipate separate funding for BNDN at this time.</p> <p>BNDN will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> |

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| | | | | <p>The details of monitoring and follow-up plans are being developed to support the separate process of Project licensing and permitting. The specific means by which provincial and federal authorities, and Indigenous Nations and communities will be engaged in developing the follow-up and monitoring program, including the information-sharing program, are currently under consideration with the Denison project team. It is noted that Section 4.2.1 of the draft EIS provides the variety of ways in which Denison has engaged with Interested Parties to date and it is assumed it would continue to use these means and others that may be identified to fulfil its key corporate principals for developing positive relationships (see draft EIS Section 4.2).</p> |
| 52 | BNDN (February 28, 2023) | 8.3.5 Mitigation Measures | <p>Comment #52: Mitigation measures are an important component of Project management which are critical for environmental protection. Upon review of the suggested mitigation measures, BNDN has identified some opportunities for additional mitigation.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN request that the following standard mitigation measures be included as part of the list described in Section 8.3.5: <ul style="list-style-type: none"> o Maintain vegetated buffers of at least 100m with all waterbodies wherever practical; o All equipment must be inspected prior to use on-site to ensure that they are clean and free of soil or other contaminants; o Maintain spill kits on all vehicles used on-site; o All machinery will be kept in good working order and inspected regularly for drips, leaks, and spills; o In the event of a spill, Denison will take all necessary actions, where it is safe to do so, to immediately stop the spill, contain contaminants, clean up and dispose of contaminated materials; o Denison will maintain a record of all spills and report upon each spill within 48 hours, including information on spill response, cleanup, and remediation; o Vehicle refueling will occur at a distance of at least 100m; o Fuel tanks will be located in areas that are lined and contained; o Fuel tanks will be located at least 500m from known waterbodies. <p>See Section 4.4 for additional information on this topic (p. 48-51).</p> | <p>Denison acknowledges the input and will consider the suggestions as the project moves forward. The draft EIS contains a number of mitigations referenced in different biophysical and human environment assessments; these mitigations together form Denison's fulsome commitment list of Project mitigation measures moving forward. Many of the proposed additional mitigation measures are already included in the draft EIS. A few examples are provided here:</p> <ul style="list-style-type: none"> - Section 2.2.7.6: No fuels, oils, or other hazardous substances will be stored within 100 m of any water body. No equipment maintenance or re-fuelling will be conducted within 100 m of a water body. - Section 2.8: Fuel storage and distribution infrastructure will be constructed in accordance with applicable legislation requirements; Fuels will be stored in approved, above-ground, double-walled storage tank(s) equipped with secondary containment in accordance with provincial regulations and standards; Stationary and mobile equipment will be fueled with a fuel-dispensing truck. - Section 9.2.5.2.7: Standard operating procedures will be employed, and regular inspections of equipment and machinery will be completed to verify they are in good working order; Vehicles and equipment will be maintained in good working condition (e.g., no leaks) and furnished with industry-standard spill response kits. <p>Denison also notes that Section 2.9.1.3 of the draft EIS provides Denison's commitment to develop an Environmental Management System, which includes an Emergency Preparedness and Response Program (EPRP) and an Environmental Protection Program (EPP; including an Environmental Monitoring Plan). The EPRP would be established to identify how the Project will prepare for and addresses emergencies that may affect the health and safety of persons, the environment, and the protection of property. The EPRP would be developed in a manner that aligns with guidance provided by CNSC in REGDOC-2.10.1. The EPP would be established to provide an overarching framework for key environmental monitoring and management plans and to ensure a means to demonstrate compliance with applicable environmental regulatory requirements and other performance targets that Denison may set. As noted on the draft EIS, Denison has opted to execute the overall Project approvals process - that is, the environmental assessment and licensing / permitting processes - in series and not simultaneously. A such, the details of these programs and plans will be developed during the licensing / permitting phase and will be available for review at that time rather than as part of the final EIS. The level of information provided in the draft EIS is appropriate for the current stage of the Project approvals process.</p> <p>As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project. Denison does not anticipate any funding to BNDN at this time. BNDN will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> |

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| 53 | BNDN (February 28, 2023) | 8.3 Fish and Fish Habitat | <p>Comment #53: Unfortunately, due to the nature of planning and licensing for complex projects such as the Wheeler River mine, there are many documents, plans, licenses and approvals which may not be available for review during the environmental assessment process or which will take place subsequent to completion of the assessment. For example, Denison will be preparing important documentation governing environmental management of the Project following the Environmental Assessment. While these are not currently available, there is a need to engage with BNDN to obtain input on these documents as planning progresses.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests that Denison consult with our staff members and advisors on important environmental documentation/plans/licenses that are not available as part of the EA process. <p>This list includes, but is not limited to:</p> <ul style="list-style-type: none"> o Surface Water Management Program o Erosion and Sediment Control Plan o Fish Salvage Plan o Spill Response Plan o MDMER approvals and EEM plans o Saskatchewan Water Security Agency permits for o Aquatic habitat protection o Operating a waterworks o Operating a sewage works o Effluent Monitoring Plan o Environmental Monitoring Plan(s) o Decommissioning and Reclamation Plan <p>Engagement with BNDN on these plans should occur through an Environmental Committee or similar oversight mechanism (see above). The specific details of such a committee can be developed through consultation with BNDN and must be formalized through a BNDN- Denison project agreement for the Wheeler River Project.</p> <p>See Section 4.4 for additional information on this topic (p. 48-51).</p> | <p>As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project. Denison does not anticipate separate funding for BNDN at this time.</p> <p>BNDN will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> <p>The details of monitoring and follow-up plans are being developed to support the separate process of Project licensing and permitting. The specific means by which provincial and federal authorities, and Indigenous Nations and communities will be engaged in developing the follow-up and monitoring program, including the information-sharing program, are currently under consideration with the Denison project team. It is noted that Section 4.2.1 of the draft EIS provides the variety of ways in which Denison has engaged with Interested Parties to date and it is assumed it would continue to use these means and others that may be identified to fulfil its key corporate principals for developing positive relationships (see draft EIS Section 4.2).</p> |
| 54 | BNDN (February 28, 2023) | 8.4.3.1 Methodology and Metrics | <p>Comment #54: The collection of sediment samples was completed using cores and grab petit Ponar in three upstream reference locations (LA-7A, LA-8, and LA-9), Whitefish Lake (LA-5 and LA-6), McGowan Lake (LA-1), and Russell Lake (LAB-1 and LAB-2). Sediment quality testing was conducted to characterize COPC including nutrients, metals, and radionuclides.</p> <p>Only the top 2 cm of cores of grab samples were analyzed in the lab. It is not clear in the methodology why laboratory analysis was limited to the top 2 cm.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests additional information on the rationale for only analyzing COPC within the top 2 cm of sediment samples. This should include information on whether this limited data will negatively affect the ability to evaluate potential impacts of groundwater contamination entering Whitefish Lake from below during operations, decommissioning, and future centuries. <p>See Section 4.4 for additional information on this topic (p. 48-51).</p> | <p>Baseline sediment chemistry was conducted on the 0-2cm horizon as this is the area in contact with surface water and the zone inhabited by benthic invertebrates. It is also the sediment layer in which changes in sediment chemistry would be expected to change in response to Project-related inputs and thus provides the most appropriate data for comparison to follow-up monitoring.</p> <p>As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project.</p> <p>BNDN will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> <p>The details of monitoring and follow-up plans are being developed to support the separate process of Project licensing and permitting. The specific means by which provincial and federal authorities, and Indigenous Nations and communities will be engaged in developing the follow-up and monitoring program, including the information-sharing program, are currently under consideration with the Denison project team. It is noted that Section 4.2.1 of the draft EIS provides the variety of ways in which Denison has engaged with Interested Parties to date and it is assumed it would continue to use these means and others that may be identified to fulfil its key corporate principals for developing positive relationships (see draft EIS Section 4.2).</p> |

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| 55 | BNDN (February 28, 2023) | 8.4.3.2.3 Metals | <p>Comment #55: Despite significant concerns regarding the presence of mercury in water and sediment, the Proponent has elected not to test sediments for it. BNDN acknowledges that the mining process does not use mercury and it is present in low levels in the background environment. However, for the purposes of good stewardship, communications, and trust, having an assessment of the background levels of mercury is important to BNDN.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests that the proponent sample sediments for mercury to establish background levels. This is information that is culturally important given the potential harm and the psychological toll of mercury in aquatic ecosystems. Background levels can then be compared with ongoing monitoring throughout the life of mine. <p>See Section 4.4 for additional information on this topic (p. 48-51).</p> | Denison will collect background information pertaining to sediment total and methyl mercury from LSA lakes and rivers prior to site development. |
| 56 | BNDN (February 28, 2023) | Table 8.5-2: Baseline Fish Tissue Chemistry Summary | <p>Comment #56: In Section 8.5 Fish Health, the Proponent has included a summary table with information on contaminants in fish tissue and bone tissue. The information provided does not include total number of samples.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests table 8.5-2 be updated with information on total number of fish (n) samples for each location. <p>See Section 4.4 for additional information on this topic (p. 48-51).</p> | The requested information is presented in Appendix 8-D in the draft EIS. |
| 57 | BNDN (February 28, 2023) | 9.2.5.2 Additional Vegetation- specific Mitigation Measures | <p>Comment #57: The Proponent has committed to using seed that is certified weed-free, with a valid "Certificate of Seed Analysis" for the revegetation process.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN recommends that, in addition to using weed-free certified seeds, consultation occur with Indigenous communities, including BNDN, to select an appropriate seed mix that closely mimics the pre- construction plant community and includes plants of medicinal and traditional importance. This could be done by either sourcing seed mix from a local seed distributor, or using wild seed propagated from plants collected from the Project Area. In addition, the seed mix should contain native plant species only. <p>See Section 4.5 for additional information on this topic (p. 59-60).</p> | <p>Specific details of the seed mixture and overall reclamation plan will be developed through updates to the Decommissioning Plan, on which Interested Parties will be provided opportunity for review and input. The decommission plan in the EIS is a conceptual plan. A preliminary decommissioning plan will be included with licence application and reviewed and updated during operations. Prior to executing Decommissioning activities, Denison shall prepare and submit a detailed decommissioning plan to regulators for acceptance, which builds on the preliminary decommissioning plan.</p> <p>Additionally, Denison has partnered with the University of Saskatchewan and Northwest Communities Environmental Services (an Indigenous-owned environmental company) under the Developing Eco-Restoration Together (DERT) program. This unique project aims to co-create ecological restoration practices that centre Indigenous peoples, worldviews, and values while also braiding knowledge from the land, Indigenous knowledge, and western science. The project is supported by the three partners but is ultimately guided by the Indigenous Project Advisory Board, and the Community Liaison/Education Coordinator. Through restoration trials, community engagement, and various planting techniques, Denison, with their partners are seeking to return ecosystem functions in areas where they have been previously disturbed (e.g., exploration cutlines). Through collaboration with community members, University of Saskatchewan, industry partners, two graduate students, and local youth, this project is expected to ultimately inform the creation of a framework for effective restoration practices in northern Saskatchewan that centre on caribou and Indigenous communities.</p> |
| 58 | BNDN (February 28, 2023) | 9.3.4.2.1 Alteration and/or Loss of Habitat Figure 9.3-9 Available Habitat for Moose | <p>Comment #58: The EIS uses a 500 m buffer around the Project Area to define indirect habitat alteration for moose (Figure 9.3-9). This includes habitat alteration from sensory disturbance such as anthropogenic noises, vehicle traffic, aircraft traffic, and increased predator access. However, the EIS references scientific research that states that roads and vehicle traffic can affect moose habitat selection, resulting in habitat avoidance up to 1 km from roads (Shanley and Pyare 2011).</p> <p>Furthermore, the EIS acknowledges uncertainty concerning the available background and baseline information used to identify available moose habitat in this assessment. Without considering a larger avoidance buffer (as demonstrated in various research) around proposed anthropogenic disturbances, BNDN believe that the EIS underestimates the potential extent of moose habitat alteration. To be more conservative, a 1000 m buffer should be used surrounding the Project area.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN recommends using a 1000 m buffer surrounding the Project Area to measure the extent of moose habitat alteration. BNDN believe this analysis will provide a more accurate and conservative outcome with respect to potential project impacts to moose. <p>See Section 4.5 for additional information on this topic (p. 59-60).</p> | It is Denison's and their terrestrial SME's opinion that the approach used to characterize moose habitat alteration provided a sufficient basis for conducting the ungulate (VC) moose (KI) effects assessment (draft EIS Section 9.3). The Project Area had a 500 m buffer applied to account for indirect effects/habitat alteration; this area is within the wildlife LSA. Availability of habitat is not a key limiting factor for moose populations. |

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| 59 | BNDN (February 28, 2023) | 9.3.5.2.7 Mitigation Measures | <p>Comment #59: One of the mitigation measures implemented to protect ungulates, furbearers, and Woodland Caribou includes de-icing the Project roads for winter traction, which will result in fewer wildlife collisions.</p> <p>Salt used for de-icing is likely to attract ungulates, including moose, to roadways to satisfy their mineral requirements (Rea et al 2021).</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests that the Proponent revise this mitigation measure to explicitly state that salt will not be used for de-icing Project roads to avoid attracting ungulates to the Project Area. This mitigation measure can be found in section 9.3.5.2.7 Road and Traffic Management. <p>See Section 4.5 for additional information on this topic (p. 59-60).</p> | Denison has committed to using alternative measures on Project roads for de-icing and winter traction (e.g., sand, gravel) or dust suppression (e.g., water) whenever practicable (Section 12.0). |
| 60 | BNDN (February 28, 2023) | 9.3.6.4.1 Alteration and/or Loss of Habitat Figure 9.3-14 | <p>Comment #60: The EIS uses a 500 m buffer around the Project Area to define Woodland Caribou habitat alteration from sensory disturbance. However, scientific research expects up to 5 km (or greater) of Caribou avoidance around mining Projects, and that related semi-permeable barriers, such as roads, likely exacerbate this effective habitat loss [(Smith et al. 2000; Dyer et al. 2001; Courtois et al. 2008; Vistnes and Nellemann 2008; Nagy 2011; Polfus et al. 2011; Leblond et al. 2011, 2013; CPAWS Wildlands League 2013; Johnson et al. 2015)]. Without considering a larger avoidance buffer (as demonstrated in various research) around proposed anthropogenic disturbances, we believe that the EIS underestimates the potential extent of Caribou habitat alteration.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests that the Proponent present the extent of caribou habitat alteration/loss from the proposed Project within a range of uncertainty informed by scientific research. <p>Specifically, the percent alteration of habitats must be presented using a 500 m (low end) up to a 5,000 m (high end) buffer. BNDN believe this analysis will provide a more accurate range of outcomes with respect to potential project impacts to caribou.</p> <p>See Section 4.5 for additional information on this topic (p. 59-60).</p> | <p>It is Denison's and their terrestrial SME's opinion that the approach used to characterize caribou habitat alteration provided a sufficient basis for conducting the caribou effects assessment (draft EIS Section 9.3). The Project Area had a 500 m buffer applied to account for indirect effects/habitat alteration; this area is within the wildlife LSA (refer to Figure 9.3-9 for a map showing the spatial areas). The 500 m buffer for habitat alteration was selected in accordance with ECCO's assessment of disturbed areas, which buffered (500 m) anthropogenic disturbances to evaluate the habitat. The alteration of available habitat is quantified in this EIS by applying a buffer of 500 m around the Project Area in which Project effects in the form of sensory disturbance are likely to affect available the habitat and make it functionally unavailable for use.</p> <p>Following submission of the draft EIS in October 2022, Denison has met with Saskatchewan Ministry of Environment (SK ENV) staff to develop a framework for future woodland caribou offset. This information has been presented to the provincial and federal review teams as part of the response to federal information requirements in August 2023 as the Conceptual Caribou Mitigation Plan. The Conceptual Caribou Mitigation Plan (the Plan), developed proactively by Denison, has a different objective than the draft EIS. The Plan builds on the assessment of potential Project effects and commitments to consider additional mitigation (offset) to account for non-significant residual effects highlighted in the draft EIS. The Plan is expected to be advanced with ongoing consultation with the SK ENV, as SK ENV finalize the caribou range plan for SK1. The EIS is a conservative planning tool, whereas the Plan is a practical, living document designed to define management works associated with caribou. The Plan is not a requirement for EA determination per se, but is provided as a guidance document to help Denison proactively describe and inform the development and implementation of appropriate mitigation measures related to caribou and their habitat. The Plan is an evergreen document. It will be consistent with the management goals of SK ENV for the SK-1 caribou conservation unit (once available) and will be developed/refined in consultation with local communities including English River First Nation and Kineepik Métis Local in Pinehouse and SK ENV. Denison is continuing to work with SK ENV to estimate habitat offset scenarios based on the current Project design which will be refined as the Project advances. A boreal caribou habitat offset calculator is under development by SK ENV and Denison is collaborating with SK ENV to define key scenario attributes.</p> |
| 61 | BNDN (February 28, 2023) | 9.4.3.3 Bird Species at Risk Appendix 9-B | <p>Comment #61: Incidental observations of Barn Swallow (<i>Hirundo rustica</i>) occurred during baseline studies (Appendix 9-B). This bird SAR was not included as a Key Indicator for this Valued Component. Instead, the EIS represents the Barn Swallow using two other SAR birds including the Olive-sided Flycatcher (<i>Contopus cooperi</i>), and Common Nighthawk (<i>Chordeiles minor</i>). This does not make ecological sense because Barn Swallows use distinct habitat and exhibit distinct breeding behaviour from these other SAR. Therefore, the barn swallow should be its own key indicator because it will have unique levels of habitat alteration/loss and levels of mortality than the other species.</p> <p>In addition, Barn Swallows have a higher likelihood of being impacted by project activities than the other representative SAR, because they nest directly on artificial structures. The EIS states that species that nest on buildings are more susceptible to entrapment in Project components. This species is listed as Threatened on SARA Schedule 1. In Canada, the Migratory Birds Convention Act, 1994 protects Barn Swallow, its nests, and eggs.</p> <p>Request/recommendation:</p> <ol style="list-style-type: none"> BNDN requests that the Barn Swallow is included as its own key indicator for the VC Bird SAR within the EIS. Additional surveys should be conducted to confirm the presence of any Barn Swallow nests | The process and rationale for selection of VCs and establishment of KIs and associated MPs is described in Section 5.3 in Section 5. Raptors, Migratory Breeding Birds, and Bird Species at Risk VCs were selected based on their likelihood of interaction with the Project, as well as their contributing roles to biodiversity and ecosystem function. The methodology for the habitat-based assessment appropriately evaluated potential adverse effects on avian species using the accepted VC and KI approach for focus of the assessment. As described in the EIS, the Common Nighthawk (similar to the Barn Swallow) is an aerial insectivore that uses a variety of habitats, including anthropogenically disturbed and cleared areas (Section 9.4.3.3.1). As such, effects on these anthropogenically disturbed areas were appropriately assessed in the habitat-based EA methodology. Since Barn Swallows nest almost exclusively on human-made structures, specific Barn Swallow exclusion methods will be added as mitigation measures to the EIS (Section 9.4.5). If Barn Swallow nests should be encountered, any subsequent activities would be conducted in accordance with the 2022 Migratory Birds Regulations. The habitat-based approach for the assessment supports the use of surrogates that are known to utilize the same habitat types. Habitat loss and alteration were assessed for the Key Indicator species included in this Valued Component. A conservative approach of identifying available habitat for these species was chosen to include habitat for those species not directly assessed (i.e., Barn |

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| | | | <p>on all buildings in the Project Area prior to commencement of construction.</p> <p>c) If Barn Swallow nests are located, contact the SK MOE for regulatory advice on the appropriate actions given the specific situation.</p> <p>d) The Proponent should monitor all barn swallow nests found within the Project Area to confirm their continued usage throughout the lifecycle of the mine. If avoidance of nests is observed near Project activities, the Proponent should adopt an adaptive management approach and provide additional nesting sites elsewhere. Specifically, the Proponent could consider installing nesting structures in suitable areas to provide alternative nesting options for Barn Swallows.</p> <p>e) Staff should be trained to identify and report barn swallows and their nests.</p> <p>f) Future monitoring programs during the life of the project must include the barn swallow. See Section 4.5 for additional information on this topic (p. 59-60).</p> | <p>Swallow through Common Nighthawk habitat).</p> <p>Subsequent to filing the draft EIS, Denison has developed a new Species at Risk appendix to Section 9 which will be included in the final EIS (a new SAR appendix (new Appendix 9-D). It has been included as to Attachment IR-131. This new EIS appendix lists all SAR species potentially occurring in the Project study areas, with links to applicable and appropriate mitigation measures described in the draft EIS. The new appendix also includes a summary of the life history requirements, the expected Project effects, proposed mitigation measures, and anticipated residual effects on barn swallow.</p> <p>As a result of the continued technical review until October 2024, the additional specific commitment has been made: Denison has committed to pre-construction and pre-clearing surveys for multiple species. Surveys will be completed by a qualified professional biologist that will refer to available guidance and protocols.</p> |
| 62 | BNDN (February 28, 2023) | 9.4.3.3 Bird Species at Risk Appendix 9-B | <p>Comment #62: Incidental observations of Horned Grebe (<i>Podiceps auratus</i>) occurred during baseline studies (Appendix 9- B). This species is listed as Special Concern on SARA Schedule 1. The Horned Grebe was not included as a Key Indicator for this Valued Component. Instead, the EIS represents this species with two other bird SAR, Yellow Rail (<i>Coturnicops noveboracensis</i>), and Rusty Blackbird (<i>Euphagus carolinus</i>). The Horned Grebe uses distinct habitat from these other species. Therefore, the Horned Grebe should be its own key indicator because it will have different levels of habitat alteration/loss and levels of mortality.</p> <p>Request/recommendation:</p> <p>a) BNDN requests that the Horned Grebe is included as its own Key Indicator for the VC Bird SAR within the EIS.</p> <p>b) b. Future monitoring programs during the life of the Project must include the Horned Grebe. See Section 4.5 for additional information on this topic (p. 59-60).</p> | <p>The process and rationale for selection of VCs and establishment of KIs and associated MPs is described in Section 5.3 in Section 5. Raptors, Migratory Breeding Birds, and Bird Species at Risk VCs were selected based on their likelihood of interaction with the Project, as well as their contributing roles to biodiversity and ecosystem function. While Horned Grebe was not included as a avian SAR in the draft EIS, the EIS identified Yellow Rail and Rusty Blackbird as a surrogate species. To focus the effects assessment on key species, it was decided to use the provincially listed Yellow Rail (and Rusty Blackbird) as surrogates for Horned Grebe. Horned Grebe use similar wetland habitat types for nesting, foraging and protective cover as Yellow Rail. The habitat-based approach for the assessment supports the use of surrogates that are known to utilize the same habitat types. Habitat loss and alteration were assessed for the Key Indicator species included in this Valued Component. A conservative approach of identifying available habitat for these species was chosen to include habitat for those species not directly assessed (i.e., Horned Grebe through Yellow Rail and Rusty Blackbird habitat). As such, potential effects on these habitat types were assessed appropriately in the draft EIS.</p> <p>Subsequent to filing the draft EIS, Denison has developed a new Species at Risk appendix to Section 9 which will be included in the final EIS (a new SAR appendix (new Appendix 9-D). It has been included as Attachment to IR-131. This new EIS appendix lists all SAR species potentially occurring in the Project study areas, with links to applicable and appropriate mitigation measures described in the draft EIS. The new appendix also includes a summary of the life history requirements, the expected Project effects, proposed mitigation measures, and anticipated residual effects on Horned Grebe.</p> <p>As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project.</p> |
| 63 | BNDN (February 28, 2023) | 9.4.3.3 Bird Species at Risk | <p>Comment #63: The Bank Swallow (<i>Riparia riparia</i>), a bird SAR may be present within the terrestrial RSA. This species was not included in the EIS as a key indicator for bird SAR. This species is listed as Threatened on SARA Schedule 1.</p> <p>The breeding range of the Bank Swallow (<i>Riparia riparia</i>) overlaps with the terrestrial RSA. Bank swallows breed in varying natural and artificial habitat with sand-silt substrates including vertical banks, riverbanks, bluffs, stockpiles, aggregate pits, and roadcuts (COSEWIC 2013). Suitable habitat may be present because soil surface textures across the RSA are predominantly sand textured (sand, loam sand/sandy loam and silty sand). The creation of soil stockpiles during construction may create suitable breeding habitat for this species.</p> <p>Request/recommendation:</p> <p>a) BNDN requests a justification for excluding the Bank Swallow from the EIS.</p> <p>b) If a valid justification does not exist, BNDN requests this species be added as a Key Indicator for bird SAR unless it can be proven not present in the RSA.</p> <p>c) All soil stockpiles should be monitored for Bank Swallow nesting activity before the stockpiles are disturbed when needed for site reclamation.</p> | <p>The process and rationale for selection of VCs and establishment of KIs and associated MPs is described in Section 5.3 in Section 5. Raptors, Migratory Breeding Birds, and Bird Species at Risk VCs were selected based on their likelihood of interaction with the Project, as well as their contributing roles to biodiversity and ecosystem function. Subsequent to filing the draft EIS, Denison has developed a new Species at Risk appendix to Section 9 which will be included in the final EIS (a new SAR appendix (new Appendix 9-D). It has been included as Attachment to IR-131. This new EIS appendix lists all SAR species potentially occurring in the Project study areas, with links to applicable and appropriate mitigation measures described in the draft EIS. The new appendix also includes a summary of the life history requirements, the expected Project effects, proposed mitigation measures, and anticipated residual effects on bank swallow.</p> |

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| | | | <p>d) If Bank Swallow nests are located, contact the SK MOE for regulatory advice on the appropriate actions given the specific situation. See Section 4.5 for additional information on this topic (p. 59-60).</p> | |
| 64 | BNDN (February 28, 2023) | 9.4.3.3.2 Information from Indigenous Knowledge, Local Knowledge, and Engagement | <p>Comment #64: The EIS states that knowledge providers reported that multiple Whooping Cranes (<i>Grus americana</i>) have been observed along the Wheeler River, Moore River, and along the Cree River (outside of the terrestrial RSA) (19-LK-ERFNTrip- 134.169) (19-LK- ERFNTrip-134.170). Whooping Cranes are listed as Endangered on SARA Schedule 1. The EIS does not include this species as a key indicator for SAR birds, nor does it include an explanation why this species was omitted despite being reported by a knowledge provider from English River First Nation. Request/recommendation: a) BNDN requests an explanation for excluding this species despite being reported by a Trapper from English River First Nation. If a valid justification does not exist, the species Whooping Crane (<i>Grus americana</i>), should be included as a key indicator for SAR birds. b) Future monitoring programs during the life of the Project must include surveys for the Whooping Crane. See Section 4.5 for additional information on this topic (p. 59-60).</p> | <p>The process and rationale for selection of VCs and establishment of KIs and associated MPs is described in Section 5.3 in Section 5. Raptors, Migratory Breeding Birds, and Bird Species at Risk VCs were selected based on their likelihood of interaction with the Project, as well as their contributing roles to biodiversity and ecosystem function. The local trapper's observation of Whooping Crane was outside of the avian RSA. The rationale for the selection of the SAR Key Indicators was provided in draft EIS Section 9.4.1. For these reasons, Whooping Crane was not included as a SAR Key Indicator in the draft EIS. for further reference as noted above subsequent to filing the draft EIS, Denison has developed a new Species at Risk appendix to Section 9 which will be included in the final EIS (a new SAR appendix (new Appendix 9-D). It has been included as Attachment to IR-131. This new EIS appendix lists all SAR species potentially occurring in the Project study areas, with links to applicable and appropriate mitigation measures described in the draft EIS. The new appendix also includes a summary of the life history requirements, the expected Project effects, proposed mitigation measures, and anticipated residual effects on bank swallow</p> <p>As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project.</p> |
| 65 | BNDN (February 28, 2023) | 9.4.3.3.3 Baseline Studies | <p>Comment #65: Short-eared Owls (<i>Asio flammeus</i>) were not observed during the baseline surveys (Appendix 9-B). This is likely because targeted surveys for this species were not conducted. The detection probability of Short-eared Owls is very low at sunrise when the breeding songbird point count surveys were conducted. Short-eared Owls are most detectable from one hour before sunset to half an hour after sunset. Request/recommendation: a) BNDN requests that short-eared Owls continue to be assumed present within suitable habitat, unless proven otherwise by a qualified biologist using the Short-Eared Owl Survey Protocol (Saskatchewan Ministry of Environment 2015). b) Future monitoring programs should utilize the protocol developed by the Saskatchewan Ministry of Environment to better (2015) understand whether this species is present. See Section 4.5 for additional information on this topic (p. 59-60).</p> | <p>The process and rationale for selection of VCs and establishment of KIs and associated MPs is described in Section 5.3 in Section 5. Raptors, Migratory Breeding Birds, and Bird Species at Risk VCs were selected based on their likelihood of interaction with the Project, as well as their contributing roles to biodiversity and ecosystem function. Short-eared Owl were included as a KI of the Bird SAR VC in the EIS. A review of life history requirements and discussion on effects assessment are included in the EIS (Section 9.3). In the EIS, Short-eared Owl were assumed to be present and breeding in the Project study areas. As described in the EIS, pre-construction surveys will be conducted prior to the commencement of any vegetation clearing or soil disturbance. Avian species will also be routinely monitored throughout the life of the Project. Results from the surveys and monitoring activities are expected to inform the adaptive management process to update Project design and identify the need for additional mitigation measures, if required.</p> <p>As a result of the continued technical review until October 2024, the additional specific commitment has been made: Denison has committed to pre-construction and pre-clearing surveys for multiple species. Surveys will be completed by a qualified professional biologist that will refer to available guidance and protocols.</p> |
| 66 | BNDN (February 28, 2023) | 9.4.3.3.3 Baseline Studies | <p>Comment #66: Yellow Rail (<i>Coturnicops noveboracensis</i>) were not observed during the baseline surveys (Appendix 9-B). This is likely because targeted surveys for this species were not conducted. The Yellow Rail is nocturnal; therefore, survey effort must take place between 23:00-3:00. Therefore, this species would not have been observed when the breeding songbird point count surveys were conducted. Request/recommendation: a) BNDN requests that Yellow Rail should continue to be assumed present within suitable habitat, unless proven otherwise by a qualified biologist using the Yellow Rail Survey Protocol (Saskatchewan Ministry of Environment 2014). b) Future monitoring programs should utilize the protocol developed by the Saskatchewan</p> | <p>The process and rationale for selection of VCs and establishment of KIs and associated MPs is described in Section 5.3 in Section 5. Raptors, Migratory Breeding Birds, and Bird Species at Risk VCs were selected based on their likelihood of interaction with the Project, as well as their contributing roles to biodiversity and ecosystem function. Yellow Rail were included as a KI of the Bird SAR VC in the EIS. A review of life history requirements and discussion on effects assessment are included in the EIS (Section 9.3). In the EIS, Yellow Rail were assumed to be present and breeding in the Project study areas. As described in the EIS, pre-construction surveys will be conducted prior to the commencement of any vegetation clearing or soil disturbance. Avian species will also be routinely monitored throughout the life of the Project. Results from the surveys and monitoring activities are expected to inform the adaptive</p> |

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| | | | Ministry of Environment (2014) to better understand whether this species is present. See Section 4.5 for additional information on this topic (p. 59-60). | management process to update Project design and identify the need for additional mitigation measures, if required. As a result of the continued technical review until October 2024, the additional specific commitment has been made: Denison has committed to pre-construction and pre-clearing surveys for multiple species. Surveys will be completed by a qualified professional biologist that will refer to available guidance and protocols. |
| 67 | BNDN (February 28, 2023) | Appendix 9-B | Comment #67: Two bat species, Little Brown Bat (<i>Myotis lucifugus</i>) and Northern Myotis (<i>Myotis septentrionalis</i>) were detected during passive acoustic surveys in 2019 (Appendix 9- b). These species are listed as Endangered by COSEWIC and SARA schedule. Despite being present, bats were completely excluded from the EIS. Areas that will be cleared for mine development and operations could contain maternity roost trees. Based on Appendix 9-b, this habitat was not adequately evaluated through field surveys. Request/recommendation: a) BNDN requests justification for excluding bat species from the EIS despite two Endangered species confirmed present. b) BNDN also request the Proponent put protocols in place to identify and assess bat maternity roost trees prior to clearing and employ mitigation measures such as retaining maternity roost trees, modifying the timing of clearing, and offsetting for the destruction of habitat for endangered species. See Section 4.5 for additional information on this topic (p. 59-60). | Subsequent to filing the draft EIS, Denison has developed a new Species at Risk appendix to Section 9 which will be included in the final EIS and has been included in the response to YNLR (a new SAR appendix (new Appendix 9-D) will be added to Section 9 of the final EIS. It has been included here as Attachment IR-131. This new EIS appendix lists all SAR species potentially occurring in the Project study areas, with links to applicable and appropriate mitigation measures described in the draft EIS. The new appendix also includes a summary of the life history requirements, the expected Project effects, proposed mitigation measures, and anticipated residual effects on bats. As a result of the continued technical review until October 2024, the additional specific commitment has been made: Denison will conduct additional bat baseline surveys prior to commencing any work/activities at the project site. Denison will use the baseline data to verify the EA predictions. |
| 68 | BNDN (February 28, 2023) | 9 Terrestrial Ecology 9.1.8 Monitoring and Follow-up 9.2.8 Monitoring and Follow-up 9.3.8 Monitoring and Follow-up 9.4.8 Monitoring and Follow-up | Comment #68: Denison's proposed terrestrial ecology mitigations described are generalized and conceptual in the EIS. With the level of detail provided in the EIS, it is not possible for BNDN to comment on the adequacy or effectiveness of the proposed mitigation measures or whether proposed mitigations will meaningfully diminish Project impacts on BNDN rights and interests. Request/recommendation: - BNDN holds invaluable indigenous knowledge related to terrestrial ecology topics including traditional and medicinal plants, ungulates, furbearers, game birds etc. within the RSA. BNDN must be meaningfully involved in the development and implementation of the various management and monitoring plans mentioned throughout Chapter 9 of the EIS to ensure that proposed impacts are sufficiently reduced. These plans include but are not limited to the wildlife monitoring plan, avian monitoring, and Woodland Caribou Management Plan. The role that BNDN will have in developing management and monitoring plans should be defined within a project agreement between BNDN and Denison. See Section 4.5 for additional information on this topic (p. 59-60). | As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project. Denison does not anticipate separate funding for BNDN at this time. BNDN will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions. The details of monitoring and follow-up plans are being developed to support the separate process of Project licensing and permitting. The specific means by which provincial and federal authorities, and Indigenous Nations and communities will be engaged in developing the follow-up and monitoring program, including the information-sharing program, are currently under consideration with the Denison project team. It is noted that Section 4.2.1 of the draft EIS provides the variety of ways in which Denison has engaged with Interested Parties to date and it is assumed it would continue to use these means and others that may be identified to fulfil its key corporate principals for developing positive relationships (see draft EIS Section 4.2). |
| 69 | BNDN (February 28, 2023) | Section 6.0 | Comment #69: Denison's air dispersion model does not include any receptor locations related to BNDN traditional land and resources use (TLRU) and Indigenous Knowledge (IK) sites. BNDN members use the lands and waters in the Project area for TLRU and ceremonial purposes. Request/recommendation: - BNDN TLRU and IK sites should be considered in Denison's air quality assessment. The geographic locations for TLRU and IK should be inputted into the air dispersion model as special receptors. This will provide site specific data for BNDN land users who use the LSA so they can effectively assess the Project's impact on land use and rights. See Section 4.6 for additional information on this topic (p. 67-71). | Scoping of the air quality assessment followed a conservative approach and described where modelled concentrations returned to background levels. The air quality assessment included human receptors in the Project Area and Local Study Area (refer to draft EIS, Figure 6.1-3). These receptor locations are consistent with what was presented in the ERA (Section 10.1 and Appendix 10-A). |

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| 70 | BNDN (February 28, 2023) | Section 6.0 | <p>Comment #70: Denison states in the EIS “the Cameco McArthur River Operation and Key Lake sites are currently in Care and Maintenance mode; therefore, there is currently no truck traffic between the sites on Highway 914. When these sites are to become operational again, there is potential for a cumulative effect at sensitive locations near the highway.” On November 28th, 2022, operations resumed at Cameco’s McArthur River Uranium Mine and Key Lake Mill. Denison did not model Cameco related air emissions in their air dispersion model. The EIS model does not account for any of Cameco’s air emissions from the mill, mine, and associated truck traffic between sites. Without this data included in the model, the EIS does not adequately account for the cumulative effects of Cameco’s McArthur River Mine and Key Lake Mill on the atmospheric environment.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - Denison must redo air dispersion modeling to account for the Cameco McArthur River Uranium Mine and Key Lake Mill which have resumed operations since the EIS was released. Without this data included in the model the EIS does not accurately capture baseline conditions or cumulative effects on the atmospheric environment. <p>Fugitive dust and uranium emissions (and potentially other contaminants) have increased potential for exceedances with the resumption of Cameco’s operations, as exceedances are already predicted with the Wheeler River Project alone.</p> <p>See Section 4.6 for additional information on this topic (p. 67-71).</p> | <p>Please refer to Section 6.1.3.2 and 6.1.7. The regional SK MOE data presented in Table 6.1-12 were conservatively used to represent background concentrations of TSP, PM10, PM2.5, CO, SO2, and NO2 for the Wheeler River Project air quality assessment. While traffic associated with Cameco Operations was not modelled, conservative regional background concentrations from the Saskatchewan Air Quality Modelling Guideline (SK MOE 2012a) and the La Loche monitoring station were used for particulate matter, NO2, SO2, and CO (see Section 6.1.3.2.5 and Appendix 6-A). The La Loche monitoring station is located near anthropogenic sources, while the Project is in a remote area removed from anthropogenic sources. Accordingly, emissions to air from traffic associated with Cameco’s operations are captured by the regional background concentrations used in the air dispersion model and are considered in the assessment of Project-related effects discussed in Section 6.1.4. Model predictions of COPC concentrations and depositions were added to background levels and compared to the available standards summarized in Table 6.1-5 at receptors located outside the property boundary.</p> <p>To confirm the residual effects of the Project on Air Quality and demonstrate compliance with provincial ambient air quality standards, an adaptive air quality management program will be implemented. The air quality management program will contain various plans which will be finalized during permitting and licensing. The plans within the air quality management program will incorporate monitoring requirements directed by provincial and federal regulators and by Indigenous groups and other Interested Parties as requested.</p> |
| 71 | BNDN (February 28, 2023) | Section 6.0 | <p>Comment #71: The Project is predicted to produce exceedances for TSP of 313% over the regulatory limit. 24-hour TSP concentrations exceed the criterion 28% of the time during Construction, 21% of the time during Operations. These exceedance conditions do not include TSP emissions from Cameco’s McArthur River Mine and Key Lake Mill which have now resumed operations. There is also the potential for wildfire smoke to further exacerbate dust emissions. TSP exceedances represent a potential health risk for land users and workers near the Project site. Especially for at-risk groups such as elders, youth, and people with existing respiratory conditions.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> a) Denison must employ additional mitigation measures to reduce TSP emissions on site including enhanced dust suppression efforts. b) Denison must remodel TSP to include emissions from Cameco’s McArthur River Mine and Key Lake Mill. c) Please provide information on how TSP will be monitored during the Project and how Denison will know when exceedance conditions are occurring. d) Please provide information on how adaptive management will be used when a TSP exceedance is discovered. Including discussion on how the Project will be managed during poor air quality events caused by wildfire smoke. e) Please provide information on how exceedances conditions near the Project site will be communicated to the public. <p>See Section 4.6 for additional information on this topic (p. 67-71).</p> | <p>a) A change in a measurable parameter is not a significant effect, per the EA methodology outlined in Section 5. This threshold approach is both transparent and reasonable with the context of the assessment, though it is acknowledged that some level of change in the VC (or more precisely its measurable parameter) is deemed acceptable on condition that the change is not of a magnitude from which negative effects could accrue. Denison directs BNDN to Table 6.1-19 to 6.1-21 for the complete residual effect characterization for TSP exceedances. This includes a consideration of the residual effect related to TSP in the full context of direction, magnitude, geographic extent, duration, frequency, reversibility, context, and likelihood. In Section 10.1 of the draft EIS, the SMEs concluded that while there were predicted exceedances of air quality criteria for particulate matter, they were not identified for further assessment in the HHRA—these COPCs are unlikely to be associated with a human health or environmental risk, and any exposures to people at elevated concentrations would be infrequent, short-term, and highly localized.</p> <p>b) Please refer to Section 6.1.3.2. The regional SK MOE data presented in Table 6.1-12 were conservatively used to represent background concentrations of TSP, PM10, PM2.5, CO, SO2, and NO2 for the Wheeler River Project air quality assessment. While traffic associated with Cameco Operations was not modelled, conservative regional background concentrations from the Saskatchewan Air Quality Modelling Guideline (SK MOE 2012a) and the La Loche monitoring station were used for particulate matter, NO2, SO2, and CO (see Section 6.1.3.2.5 and Appendix 6-A). The La Loche monitoring station is located near anthropogenic sources, while the Project is in a remote area removed from anthropogenic sources. Accordingly, emissions to air from traffic associated with Cameco’s operations are captured by the regional background concentrations used in the air dispersion model and are considered in the assessment of Project-related effects discussed in Section 6.1.4. Model predictions of COPC concentrations and depositions were added to background levels and compared to the available standards summarized in Table 6.1-5 at receptors located outside the property boundary.</p> <p>c) and d) To confirm the residual effects of the Project on Air Quality and demonstrate compliance with provincial ambient air quality standards, an adaptive air quality management program will be implemented. The air quality management program will contain various plans which will be finalized during permitting and licensing. The plans within the air quality management program will incorporate monitoring requirements directed by provincial and federal regulators and by Indigenous groups and other Interested Parties as requested. In terms of worker health and safety while forest fire smoke is present, Denison will consider this through the Occupational Health and Safety Program. Information on how the Project will prepare for and addresses emergencies that may affect the health and safety of persons, the environment, and the protection of property related to forest fires will be included in the Emergency Preparedness and Response Program.</p> |

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| | | | | <p>e) As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project. BNDN will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> |
| 72 | <p>BNDN (February 28, 2023)</p> | Section 6.0 | <p>Comment #72: The Project is predicted to produce exceedances for PM10 of 232% over the regulatory limit. 24- hour PM10 concentrations exceed the criterion 17% of the time during Construction, 12% of the time during Operations.</p> <p>These exceedance conditions do not include PM10 emissions from Cameco's McArthur River Mine and Key Lake Mill which have now resumed operations. There is also the potential for wildfire smoke to further exacerbate dust emissions.</p> <p>PM10 exceedances represent a potential health risk for land users and workers near the Project site. Especially for at-risk groups such as elders, youth, and people with existing respiratory conditions.</p> <p>Request/recommendation:</p> <p>a) Denison must employ additional mitigation measures to reduce PM10 emissions on site including enhanced dust suppression efforts.</p> <p>b) Denison must remodel PM10 to include emissions from Cameco's McArthur River Mine and Key Lake Mill.</p> <p>c) Please provide information on how PM10 will be monitored during the Project and how Denison will know when exceedance conditions are occurring.</p> <p>d) Please provide information on how adaptive management will be used when a PM10 exceedance is discovered. Including discussion on how the Project will be managed during poor air quality events caused by wildfire smoke.</p> <p>e) Please provide information on how exceedances conditions near the Project site will be communicated to the public.</p> <p>See Section 4.6 for additional information on this topic (p. 67-71).</p> | <p>a) A change in a measurable parameter is not a significant effect, per the EA methodology outlined in Section 5. This threshold approach is both transparent and reasonable with the context of the assessment, though it is acknowledged that some level of change in the VC (or more precisely its measurable parameter) is deemed acceptable on condition that the change is not of a magnitude from which negative effects could accrue. Denison directs BNDN to Table 6.1-22 and 6.1-23 for the complete residual effect characterization for PM10 exceedances. This includes a consideration of the residual effect related to PM10 in the full context of direction, magnitude, geographic extent, duration, frequency, reversibility, context, and likelihood. In Section 10.1 of the draft EIS, the SMEs concluded that while there were predicted exceedances of air quality criteria for particulate matter, they were not identified for further assessment in the HHRA—these COPCs are unlikely to be associated with a human health or environmental risk, and any exposures to people at elevated concentrations would be infrequent, short-term, and highly localized.</p> <p>b) Please refer to Section 6.1.3.2. The regional SK MOE data presented in Table 6.1-12 were conservatively used to represent background concentrations of TSP, PM10, PM2.5, CO, SO2, and NO2 for the Wheeler River Project air quality assessment. While traffic associated with Cameco Operations was not modelled, conservative regional background concentrations from the Saskatchewan Air Quality Modelling Guideline (SK MOE 2012a) and the La Loche monitoring station were used for particulate matter, NO2, SO2, and CO (see Section 6.1.3.2.5 and Appendix 6-A). The La Loche monitoring station is located near anthropogenic sources, while the Project is in a remote area removed from anthropogenic sources. Accordingly, emissions to air from traffic associated with Cameco's operations are captured by the regional background concentrations used in the air dispersion model and are considered in the assessment of Project-related effects discussed in Section 6.1.4. Model predictions of COPC concentrations and depositions were added to background levels and compared to the available standards summarized in Table 6.1-5 at receptors located outside the property boundary.</p> <p>c) and d) To confirm the residual effects of the Project on Air Quality and demonstrate compliance with provincial ambient air quality standards, an adaptive air quality management program will be implemented. The air quality management program will contain various plans which will be finalized during permitting and licensing. The plans within the air quality management program will incorporate monitoring requirements directed by provincial and federal regulators and by Indigenous groups and other Interested Parties as requested. In terms of worker health and safety while forest fire smoke is present, Denison will consider this through the Occupational Health and Safety Program. Information on how the Project will prepare for and addresses emergencies that may affect the health and safety of persons, the environment, and the protection of property related to forest fires will be included in the Emergency Preparedness and Response Program.</p> <p>e) As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations</p> |

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| | | | | who may have interest in the Project. BNDN will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions. |
| 73 | BNDN (February 28, 2023) | Section 6.0 | <p>Comment #73: The Project is predicted to produce exceedances for uranium of 148% over of the regulatory limit.</p> <p>These exceedance conditions do not include uranium emissions from Cameco's McArthur River Mine and Key Lake Mill which have now resumed operations.</p> <p>Uranium exceedances represent a potential health risk for land users and workers near the Project site. Additionally, uranium deposition in the aquatic and terrestrial environment can cause effect pathways to humans through the food chain through the consumption of edible/medicinal plants, berries, fish, and wildlife.</p> <p>Request/recommendation:</p> <p>a) Denison must employ additional mitigation measures to reduce uranium emissions on site including enhanced scrubber systems and containment measures.</p> <p>b) Denison must remodel uranium to include emissions from Cameco's McArthur River Mine and Key Lake Mill.</p> <p>c) Please provide information on how uranium emissions will be monitored during the Project and how Denison will know when exceedance conditions are occurring.</p> <p>d) Please provide information on how adaptive management will be used when a uranium exceedance is discovered.</p> <p>e) Please provide information on how exceedance conditions near the Project site will be communicated to the public.</p> <p>See Section 4.6 for additional information on this topic (p. 67-71).</p> | <p>a) A change in a measurable parameter is not a significant effect, per the EA methodology outlined in Section 5. This threshold approach is both transparent and reasonable with the context of the assessment, though it is acknowledged that some level of change in the VC (or more precisely its measurable parameter) is deemed acceptable on condition that the change is not of a magnitude from which negative effects could accrue. Denison directs BNDN to Table 6.1-27: Air Quality – Summary of the Characteristics Ratings for Residual Effect 9 (Operation, 24-hour Uranium Exceedances) for the complete residual effect characterization. This includes a consideration of the residual effect (24-hour U exceedance during operation) in the full context of direction, magnitude, geographic extent, duration, frequency, reversibility, context, and likelihood. Further, in Section 10.1 of the draft EIS, all relevant radionuclides were assessed in the HHRA in terms of their contribution to the total radiological dose to human and ecological receptors and COPCs identified for air were radionuclides (U-238, U-234 and radon); refer to Table 10.1-7 for a summary of human health exposure pathways. The HHRA estimated dose and risk during all Project phases to the following receptors: camp worker, seasonal resident, recreational fisher/hunter, fisher/trapper. The incremental radiation dose to all human receptors during all Project phases is predicted to be below the regulatory public dose limit of 1 mSv/yr and the dose constraint of 0.3 mSv/yr during all Project phases. Overall, since the radiation dose estimates would be below the public dose limit, no discernable health effects are anticipated due to exposure of these receptors to radioactive releases from the Project.</p> <p>b) Please refer to Section 6.1.3.2. The Key Lake data from camp high volume air samplers from 2009 to 2018 (Table 6.1-13) were selected to represent background concentrations of uranium, arsenic, and nickel for the Wheeler River Project air quality assessment. Model predictions of COPC concentrations and depositions were added to background levels and compared to ambient air quality standards and criteria.</p> <p>c) and d) To confirm the residual effects of the Project on Air Quality and demonstrate compliance with provincial ambient air quality standards, an adaptive air quality management program will be implemented. The air quality management program will contain various plans which will be finalized during permitting and licensing. The plans within the air quality management program will incorporate monitoring requirements directed by provincial and federal regulators and by Indigenous groups and other Interested Parties as requested.</p> <p>e) As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project. BNDN will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> |

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| 74 | BNDN (February 28, 2023) | Section 6.0 | <p>Comment #74: The Saskatchewan MOE Air Quality Modelling Guidelines specifies that the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) should be used for assessments in Saskatchewan. Denison opted to use the CLAMET/CALPUFF dispersion model for the EIS.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> Please provide additional rationale for the selection of the CALPUFF model over the provincially recommended AERMOD. <p>See Section 4.6 for additional information on this topic (p. 67-71).</p> | <p>As described in Section B.1 of Appendix 6-A, staff at the Saskatchewan Ministry of Environment (Air Quality Branch) were consulted on the selection of CALPUFF and development of the CALMET meteorological data set, beginning in 2019. The CALMET consultation included an initial discussion about the general approach, and once the CALMET runs were completed, two technical memos were produced and reviewed by Ministry staff including: 1) a memo completed in March 2020 summarizing the general CALMET approach and results (e.g., wind roses, temperature data, precipitation data); and 2) a follow-up memo completed in May 2021, which answered specific questions posed by Ministry staff. Ministry staff also completed a review and provided feedback on the CALPUFF model setup in August 2021. The specific rationale for the use of CALPUFF in lieu of AERMOD as documented in the March 2020 memo was as follows: the domain size needed to generate inputs for the human health and ecological risk assessment (HHERA) is estimated to be 60 km by 60 km. The Saskatchewan Air Modelling Guide recommends CALPUFF for long-range transport (i.e., > 50 km); CALPUFF includes wet and dry removal processes and chemical transformation algorithms that are needed to generate inputs for the HHERA and the terrestrial and aquatic assessments; and, the approach is consistent with other uranium mines in the area.</p> |
| 75 | BNDN (February 28, 2023) | Appendix 6-C Climate Baseline and Greenhouse Gas Emissions Report | <p>Comment #75: Carbon dioxide emissions related to air travel for Project personnel were not included in the GHG emissions calculations. Project related emissions from air travel would be significant source due to the remote nature of the site. The GHG emission estimate included in EIS Appendix 6-C does not provide a fulsome representation of Project related GHG emissions.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> Denison must include emissions from air travel for project personnel in the GHG emissions calculations. This will provide a more accurate representation of project-related GHG emissions. <p>See Section 4.6 for additional information on this topic (p. 67-71).</p> | <p>Assessment of upstream or Scope 3 GHGs under Environment and Climate Change Canada's Strategic Assessment of Climate Change guide are only required for projects that are likely to exceed the upstream threshold of 500 kt of CO₂e per year. The upstream GHG emissions for the Project are expected to be well below this threshold (draft EIS Section 2.5) and in the range of 25 to 31 kt of CO₂e.</p> |
| 76 | BNDN (February 28, 2023) | Section 6.0 | <p>Comment #76: Denison acknowledges the Project's contribution to climate change through GHG emissions but does not outline a plan to offset GHG emissions. Other mines in Canada, including the Canadian Malartic Mine in Quebec have GHG offset plans in which carbon emissions are tracked and offsetting activities are developed in collaboration with local First Nations (Canadian Malartic, 2014).</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> Denison must develop a GHG/Carbon offsetting plan to mitigate potential impacts of the Project to climate change. Denison could work with BNDN and other local First Nations on initiatives that help to offset the Project's GHG emissions (e.g. tree planting, wetland restoration, carbon offsets). This would demonstrate a commitment to corporate social responsibility, climate stewardship and reconciliation on Denison's behalf. <p>See Section 4.6 for additional information on this topic (p. 67-71).</p> | <p>Denison anticipates being subject to ECC's reporting requirements for emitters over 10,000 tonnes CO₂e and the information is collected under section 26 of the Canadian Environmental Protection Act. In order to meet these reporting requirement, Denison will be tracking Scope 1 and 2 GHG emissions. Options to offset the Project's GHG emissions will be considered as the Project advances. In draft EIS Section 2.5 Greenhouse Gas Emissions Denison has committed to looking for opportunities to optimize energy management and improve the energy intensity of the Project where practical.</p> |
| 77 | BNDN (February 28, 2023) | Section 6.0 | <p>Comment #77: The Project is reliant on burning diesel for construction, supplementary power generation, mine processing activities, and mine equipment. The GHG intensive nature of the Project's construction and operation phases are a concern for BNDN and not consistent with federal or provincial directives to reduce GHGs. Cleaner technology and fuel sources are available to reduce the Project's GHG emissions. For a project based around supplying fuel for the energy transition, a more progressive approach that utilizes Best Available Technology is required in order to reduce GHG emissions.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> Where feasible Denison must implement the use of low carbon technology and fuels in the final Project design to reduce GHG emissions. Specifically, Denison should redesign the Project to: <ul style="list-style-type: none"> Replace all diesel electricity generation with LNG/CNG generators (and add in renewables where feasible) for construction phase Replace all diesel powered mine equipment and vehicles with electric or LNG/CNG models Use renewable energy sources for electricity generation (e.g. wind, solar) as early in the project lifecycle as possible <p>See Section 4.6 for additional information on this topic (p. 67-71).</p> | <p>Thank you for the comment. The EIS is a planning tool and the details of Project design including use of fuels will be evaluated by Denison as the Project advances. However, we note that in Section 2.5 Greenhouse Gas Emissions of the draft EIS that Denison will look for opportunities to optimize energy management and improve the energy intensity of the Project where practical.</p> <p>In terms of EIS scoping for the basis of effects assessments, Denison took a conservative approach to estimating combustion products use by assuming back-up diesel generators were running continually (worst-case scenario). This is expected to bound actual Project fuel use.</p> |

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| 78 | BNDN (February 28, 2023) | Section 6.0 | <p>Comment #78: Denison does not specify how it will monitor air contaminant concentrations during all phases of the Project. Continuous on-site ambient air monitoring for all COPCs (including particulates, metals, and radon) is the only way to truly assess the Project's impact on air quality and compliance with government standards.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - Denison must conduct continuous on-site monitoring for all contaminants of concern (including particulates, metals, and radon) in order to assure regulatory compliance and verify the accuracy of air dispersion models and EIS predictions. <p>See Section 4.6 for additional information on this topic (p. 67-71).</p> | <p>To confirm the residual effects of the Project on Air Quality and demonstrate compliance with provincial ambient air quality standards, an adaptive air quality management program will be implemented. The air quality management program will contain various plans which will be finalized during permitting and licensing. The plans within the air quality management program will incorporate monitoring requirements directed by provincial and federal regulators and by Indigenous groups and other Interested Parties as requested.</p> |
| 79 | BNDN (February 28, 2023) | Section 6.0 | <p>Comment #79: Denison does not specify how BNDN will be involved in air quality monitoring during construction, operations and decommissioning phases of the Project.</p> <p>Request/recommendation:</p> <ol style="list-style-type: none"> BNDN requests the implementation of robust and long-term environmental monitoring to verify protection of the environment, including community-led monitoring during Construction and Operations of the Project. Denison must develop specific roles and responsibilities to BNDN members in relation to air quality monitoring and site wide environmental monitoring. This should include, at a minimum, one environmental monitor position for BNDN. This would provide increased transparency and confidence to Denison's environmental management practices and performance. <p>See Section 4.6 for additional information on this topic (p. 67-71).</p> | <p>As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project. Denison does not anticipate separate funding for BNDN at this time.</p> <p>BNDN will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> <p>The details of monitoring and follow-up plans are being developed to support the separate process of Project licensing and permitting. The specific means by which provincial and federal authorities, and Indigenous Nations and communities will be engaged in developing the follow-up and monitoring program, including the information-sharing program, are currently under consideration with the Denison project team. It is noted that Section 4.2.1 of the draft EIS provides the variety of ways in which Denison has engaged with Interested Parties to date and it is assumed it would continue to use these means and others that may be identified to fulfil its key corporate principals for developing positive relationships (see draft EIS Section 4.2).</p> |
| 80 | BNDN (February 28, 2023) | Section 2.2.2.2.2 Uranium Bearing Solution Holding Area | <p>Comment #80: The Proponent states that the UBS holding area will have leak detection (Figure 2.2-18). The system is shown as a pipe running under the pond.</p> <p>Request/recommendation:</p> <ol style="list-style-type: none"> BNDN requests more details on the leak detection system used for all ponds shown in Figure 2.2-18. BNDN requests that Denison respond to all the following questions in writing: <ul style="list-style-type: none"> Is the pipe connected to an automated sensing system? If not, how frequently is the system monitored? What chemical or physical indicator(s) are used to detect a leak? What are the detection limits/thresholds for each indicator? What is the precision of each indicator? Who is notified, and how quickly would a response be mobilized? <p>See Section 4.7 for additional information on this topic (p. 77).</p> | <p>It is important to note that Denison is completing a sequential EA and licensing process for the Project (see draft EIS Section 1). Denison considers the EA to be a planning and decision-making tool that assesses the potential effects of the Project in a careful and precautionary manner and integrates results of engagement with Indigenous nations and communities. The details requested by BNDN will be developed to support licensing and will be included in Management System programs / plans including for example the Groundwater Monitoring Plan and the Emergency Response and Preparedness Plan.</p> |
| 81 | BNDN (February 28, 2023) | Section 2.2.2.2.2 Uranium Bearing Solution Holding Area Section 2.2.4.5 Process Precipitate Pond | <p>Comment #81: The Proponent states that the UBS holding area will have leak detection (Figure 2.2-18). The system is shown as a pipe running under the pond.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests to know what specific containment/restoration methods will be used in the event that a leak is detected, and how quickly they would be implemented. This applies to both the UBS holding area and process precipitate pond. <p>See Section 4.7 for additional information on this topic (p. 77).</p> | <p>It is important to note that Denison is completing a sequential EA and licensing process for the Project (see draft EIS Section 1). Denison considers the EA to be a planning and decision-making tool that assesses the potential effects of the Project in a careful and precautionary manner and integrates results of engagement with Indigenous nations and communities. The details requested by BNDN will be developed to support licensing and will be included in Management System programs / plans including for example the Groundwater Monitoring Plan and the Emergency Response and Preparedness Plan.</p> |

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| 82 | BNDN (February 28, 2023) | Section 2.2.2.2 Uranium Bearing Solution Holding Area | <p>Comment #82: The Proponent states that the UBS holding area will be designed as a pond contained by a double composite liner system (Figure 2.2- 18), and that options to use tanks instead of holding area will be evaluated as engineering advances. Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests that Denison undertake a risk assessment for the design of the UBS holding area. BNDN recommends the safer, less environmentally risky option be selected and that BNDN can review and provide input into the decision that Denison makes. <p>See Section 4.7 for additional information on this topic (p. 77).</p> | <p>As outlined in draft EIS Section 2.2.2.2, Denison will evaluate options to use tanks instead of holding area as engineering advances. It is also important to note that Denison is completing a sequential EA and licensing process for the Project (see draft EIS Section 1). Denison considers the EA to be a planning and decision-making tool that assesses the potential effects of the Project in a careful and precautionary manner and integrates results of engagement with Indigenous nations and communities. The details requested by BNDN will be developed to support licensing and will be included in Management System programs / plans including for example the Groundwater Monitoring Plan and the Emergency Response and Preparedness Plan.</p> |
| 83 | BNDN (February 28, 2023) | Section 2.2.1.4.5 | <p>Comment #83: The Proponent states that the wellfield pipelines will be designed to have secondary containment or catchment and have leak detection systems in place at key locations. BNDN requests more details on the leak detection system used for wellfield lines. Specifically, BNDN requests that Denison respond to the following questions:</p> <ul style="list-style-type: none"> - Is an automated sensing system used? - Will automated controls shut off pressure in the event of a significant leak? - If no automation is used, how frequently is the system monitored? - What chemical or physical indicator(s) are used to detect a leak? - What are the detection limits/thresholds for each indicator? - What is the precision of each indicator? - Who is notified, and how quickly would a response be mobilized? <p>See Section 4.7 for additional information on this topic (p. 77).</p> | <p>Wellfield piping system will transport the mining solution to and from the processing plant. The flow rates and pressures of the individual well lines will be monitored in the pumphouses. This data will be transmitted to the processing plant for remote monitoring through a master control system. Through the master control system, operators will be capable of controlling pumphouse production lines remotely.</p> <p>The specific details requested by BNDN in this comment are not available at this time and will be developed as part of detailed design to support Project licensing and permitting. Denison considers the EA to be a planning and decision-making tool that assesses the potential effects of the Project in a careful and precautionary manner and integrates results of engagement with Indigenous nations and communities. Denison views the EIS as an important planning tool that will be used to support future activities and represents one stage in the rigorous overall approvals process for a uranium mining facility in Canada. Denison completed feasibility designs for the Project in 2023. The engineering design of the wellfield pipelines including control measures to monitor and respond to leaks will be included in the detailed design information provided to the CNSC during Project licensing.</p> |
| 84 | BNDN (February 28, 2023) | Section 2.2.1.4.5 Primary Containment of Mining Solution – Wells | <p>Comment #84: The Proponent states that the well designs and operational monitoring of the wellfield will mitigate accidental release of mining solution or UBS in the sandstone above the mining area. Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests to know how Denison will monitor the integrity of wells once in production. Will tests be conducted at regular intervals? <p>See Section 4.7 for additional information on this topic (p. 77).</p> | <p>The well designs and operational monitoring of the wellfield will mitigate accidental release of mining solution or UBS in the sandstone above the mining area. Each well will have double containment: mining solution will travel inside an inner casing with the outer casing acting as secondary containment for the mining fluids. Wells will be continually monitored for operational parameters such as injection pressures, injection flow rates, and recovery flow rates. This data will be transmitted to the processing plant for remote monitoring through a master control system. Through the master control system, operators will be capable of controlling pumphouse production lines remotely. Wellfield monitoring will facilitate detection of any issues with the injection and recovery wells.</p> <p>A network of monitoring wells installed within the freeze wall area will be equipped with pressure instrumentation for the determination of the vertical strain/stresses placed on the formation to do mining zone space creation. This monitoring network is designed to detect if these strains may be approaching their acceptable levels prior to failure. The injection and recovery wells will also be equipped with devices for pressure and temperature that can detect a breach in the well casing if one were to occur. As a preventative measure, annual mechanical integrity testing is conducted on the wells to ensure their containment and compliancy.</p> <p>Active monitoring will allow for operational shutdown if a scenario is approaching a failure mode.</p> |
| 85 | BNDN (February 28, 2023) | Section 2.2.1.4.5 Fuel Storage and Dispensing Facility | <p>Comment #85: The Proponent states that fuels will be stored in approved, above-ground, 25,000 L double-walled storage tank(s) equipped with secondary containment in accordance with provincial regulations and standards. Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests to confirm when the permanent fuel storage facility will be constructed. If temporary fuel storage for construction is required, indicate how much, how it will be stored and dispensed, and show on a sketch where it will be located. Construction fuel requirements for site development may be significant. <p>See Section 4.7 for additional information on this topic (p. 77).</p> | <p>Details on when Denison will construct the permanent fuel storage facility or precisely where temporary fuel storage tanks will be located are not available at this phase of the Project and these details are not required to support EIS review. However, at the EIS stage it is important to note that Denison is committed to construction and operating all fuel storage and distribution infrastructure in accordance with applicable legislative requirements. Fuels will be stored in approved, above-ground, double-walled storage tank(s) equipped with secondary containment in accordance with provincial regulations and standards. In Saskatchewan, the permitting process for hazardous substances including above ground storage tanks for diesel, propane, gas, and jet fuel are governed by The Hazardous Substances and Waste Dangerous Goods Regulations; Environmental Code Chapter E-10.2 Reg 3 (HSWDG). Denison will need to apply for an Approval to Construct, Install, Alter and Expand a Storage Facility and Store Hazardous Substances and/or Waste Dangerous Goods and secure an approval from the Ministry of Environment pursuant to The Environmental Management and Protection Act, 2010, and The</p> |

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| | | | | Hazardous Substances and Waste Dangerous Goods Regulations. Denison will have to adhere to the Terms and Conditions of the approval, complete regular inspections of the facilities, and maintain an Emergency Response Contingency Plan. The Ministry of Environment staff also conduct regular inspections to ensure the conditions of the approval are being followed. |
| 86 | BNDN (February 28, 2023) | Section 2.2.4.5 Process Precipitate Pond | <p>Comment #86: The Proponent states that process precipitates may be stored in totes inside the process precipitate pond.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests details on the procedures for placement and handling of precipitate totes within the pond. Care should be taken to ensure that equipment and totes do not compromise the pond lining. Totes should be sealed and transport of totes from the plant to the pond should be carefully planned to minimize the risk of a spill, and in the event of a spill ensure that runoff is captured on the site. <p>See Section 4.7 for additional information on this topic (p. 77).</p> | <p>The precipitate pond is proposed as a lined area with berms (as shown in Section 2, Figure 2.2-18) and may be more clearly described as being a lined pad. As such, process precipitates can be placed into totes, which can be placed on the lined area ('pond') for containment during storage. Details on the plans for precipitate management, placement and handling will be developed to support Project licensing and permitting. Denison agrees the integrity of the liner and totes are important considerations which will be factors in the plans. We also refer BNDN to the following draft EIS sections and comments responses:</p> <ul style="list-style-type: none"> - Waste Management: Waste management is described in Section 2.2.4 of the draft EIS and includes discussion of all waste types that will be generated by Project-related activities. The following is noted in Section 2.2.4 for reference, "Conventional waste, radiologically contaminated waste, and hazardous waste will be managed at the Project. Denison is committed to conducting stringent waste characterization throughout the life of the Project. This includes physical, radiological, and chemical characterization to maintain accurate waste inventories and determine how wastes will be dispositioned through either re-use, recycling, temporary storage, or permanent disposal (on or off site). This includes clearance of material that meets unconditional release requirements and can be safely removed from site. A waste management program will be developed for the Project to support licensing and permitting. The waste management program and associated plans developed to support licensing will be based on the 4 R's: Reduce, Reuse, Recycle, and Recover, and will detail how each type of waste generated on site will be managed. Resources used to develop the waste management program will include, but are not limited to, the CNSC's REGDOC-2.11 series, related Canadian Standards Association (CSA) standards, and the Hazardous Substances and Waste Dangerous Goods Regulations (Government of Saskatchewan 2000)." - Water Management: Water management is described in Section 2.2.3 of the draft EIS and includes Denison's commitment to capturing any contact water. Clean, non-contact runoff will be diverted around Project components where possible. Contact water, including, for example, runoff from the wellfield and around the processing plant, will be collected in various ponds and eventually routed through the IWWTP for treatment prior to release to Whitefish Lake. Refer to Figure 2.2-17 for runoff collection assumptions. - Emergency Preparedness and Response Program: Please also see Denison's response to BNDN comment 87 below for information on the Emergency Preparedness and Response Program. |
| 87 | BNDN (February 28, 2023) | Section 2.8 Project Design Features | <p>Comments #87 and 88: Denison states that they will maintain an up-to-date record of the various hazardous substances on site and will maintain Safety Data Sheets and appropriate procedures for spill management, handling, and clean up in an accessible location</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests a description of the safety and spill response training programs that employees will undergo. What is the duration of each training program and how often will retraining be conducted? - BNDN requests to know what resources will be kept on site for management and clean-up of spills, for example spill kits, absorbents, neutralization agents, vacuum trucks, PPE, hand tools, etc. <p>See Section 4.7 for additional information on this topic (p. 77).</p> | <p>The details requested related to the Emergency Preparedness and Response Program are being developed to support licensing efforts. The EIS is a planning tool to provide an assessment of the potential Project effects on the human and biophysical environment; at the EIS stage a detailed Management System is not required.</p> <p>A brief description of the Emergency Preparedness and Response Plan is provided in the draft EIS, Section 2.9.1.3.5: and included below for reference. Please also refer to draft EIS, Section 14 Accidents and Malfunctions for an assessment of the potential accidents and malfunctions that could occur in association with the Project and a description of the potential effects on human health or the biophysical environment, considering environmental design features and mitigation measures that would be implemented to reduce such effects.</p> <p>2.9.1.3.5 Emergency Preparedness and Response Program The Emergency Preparedness and Response Program would identify how the Project will</p> |

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| | | | | <p>prepare for and addresses emergencies that may affect the health and safety of persons, the environment, and the protection of property. The objectives of the program would include the following:</p> <ul style="list-style-type: none"> • identification of accidents and emergencies and the actions and responsibilities in the event of an emergency; • Project requirements for emergency response equipment and personnel; • internal incident command structure to effectively manage complex, lengthy, and large scale emergencies; • required communications with external emergency services, statutory bodies, and public, Indigenous groups, and regulatory agencies; • development of appropriate emergency procedures; and • assurance of availability of vital information during an emergency. <p>Emergency Preparedness and Response Program would be developed consistent with guidance provided by CNSC in REGDOC-2.10.1, Nuclear Emergency Preparedness and Response.</p> |
| 88 | BNDN (February 28, 2023) | Section 2.2.2.2.4 Yellowcake drying and packaging | <p>Comment #89: The Proponent describes various measures used to mitigate yellowcake dust emissions: the yellowcake drying and packaging area will be outfitted with hygiene systems to capture dust generated during the material handling of the yellowcake product and sent to either the dryer or calciner venturi scrubbers. All equipment located after the dewatering of the yellowcake will be selected to provide minimal dust generation and outfitted with dust collection systems where required. The ventilation system in this area of the processing plant will also be adequately designed to provide safety of workers and control fugitive dust emissions.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN recommends redundant hygiene systems be installed (n+1 units) to ensure continuity of air filtration in the event of equipment failure. <p>See Section 4.7 for additional information on this topic (p. 77).</p> | <p>Should dust collection systems in the yellowcake drying and packaging area fail and generate a hazard for the workers, the plant will be shut down until repairs are completed. A redundant hygiene system is not economical to implement. Hygiene scrubbers are typically very reliable and can be repaired in short time frames.</p> |
| 89 | BNDN (February 28, 2023) | Draft EIS 9.3.5.1 Project Design Measures | <p>Comment #90: The Proponent states that all contaminated areas will be fenced to avoid contact with workers and wildlife. Fences will be monitored and maintained.</p> <p>Request/recommendation:</p> <ul style="list-style-type: none"> - BNDN requests to know the size and type of fence considered for each project area. - Confirm if the wellfields will be fenced. Show all fences on a site layout drawing like Figure 2.2-1. <p>See Section 4.7 for additional information on this topic (p. 77).</p> | <p>Access to the property will be controlled by both a north and south security gate. In the draft EIS, Denison has committed to fencing the domestic landfill (Section 2.2.4.3.1) and having a fenced storage area near the operations centre. Details on the size and type of fencing are not defined at this stage of the Project, but will meet the criteria outlined in the EIS. The wellfield is not proposed to be fenced. For the wildlife-specific mitigation measures, refer to Section 9.3.5.2.5 Wildlife Deterrence and Prevention of Wildlife Entrapment and Section 9.3.5.2.8 Waste and Hazardous Materials Management.</p> |
| 90 | Peter Ballantyne Cree Nation (PBCN) (March 3, 2023) | General | <p>The Wheeler River project falls within PBCN traditional territory, where traditional land use activities have historically been and are currently practiced. PBCN has traditional territory spanning Treaty 10 with the nearest community of Southend located 185km away from the Project. PBCN has exercised aboriginal rights in and around the Project site and currently exercises Indigenous and Treaty Rights in proximity to the Project.</p> <p>PBCN is concerned that the Project has potential adverse environmental, cultural and socio-economic impacts to PBCN members, lands and uses, including hunting, fishing and gathering in all seasons.</p> <p>Both Denison and CNSC indicate that they have fulsome aboriginal engagement policies and guidelines and appear to be undertaking their delegated Crown duty to consult in good faith, as informed by those policies, principles, legal and regulatory requirements. However, there has been an initial error in the assessment, both by Denison and CNSC, as PBCN was erroneously excluded from indigenous engagement, ostensibly due to distance from Wheeler and a lack of understanding of PBCN lands and Indigenous activities potentially impacted by the project. PBCN wishes to participate fully in the regulatory review of the Wheeler River project. PBCN requests that the CNSC ensure that it's review timelines be adjusted, as required, to ensure fulsome participation by PBCN with the proponent and the regulator, going forward.</p> <p>PBCN's goals are to:</p> <ul style="list-style-type: none"> - Meet with CNSC to share PBCN knowledge of its land, and Indigenous uses, and how these may be impacted by the Project and methods to address any adverse impacts. - Establish a shared understanding of how PBCN would like to be engaged in the regulatory review, including, but not restricted to, timely project updates, information and an opportunity to discuss concerns throughout the EA process, including the review of the dEIS, CNSC's staff's | <p>Denison followed the criteria identified in CNSC's REGDOC 3.2.2 v 1.2 in determining the Project's Indigenous Communities of Interest. By way of background, Denison has been the operator of the Wheeler River property since 2004, and its predecessors have been in the area since the 1980s. Denison followed a systematic and comprehensive process to identify Indigenous communities who may be impacted by the Project, informed by a wide variety of information, such as the wildlife and fur block management administration areas, existing traditional land use information (particularly information made available through the Key Lake and McArthur River public review processes), access restrictions on Highway 914 north of Key Lake, anticipated impacts to water, anticipated transportation routes, and publicly available descriptions of Indigenous Nations' traditional territories, including that of PBCN. Our approach was further informed by our discussions with those Indigenous Nations with the potential to be adversely effected by Project activities, as well as Indigenous organizations in the region, and supported by information from and interactions with representatives of the Saskatchewan Ministry of Environment (MOE) and Canadian Nuclear Safety Commission (CNSC). Denison has been discussing the interests and concerns identified by PBCN on an on-going basis since March of 2023, and will continue to share information regarding the Project.</p> |

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| | | | EA Report, and other project-related documentation [Additional questions on this topic directed to regulators or government entities are included in the CNSC table] | |
| 91 | PBCN (March 3, 2023) | General | <p>The Wheeler River project falls within PBCN traditional territory, where traditional land use activities have historically been and are currently practiced. PBCN has traditional territory spanning Treaty 10 with the nearest community of Southend located 185km away from the Project. PBCN has exercised aboriginal rights in and around the Project site and currently exercises Indigenous and Treaty Rights in proximity to the Project.</p> <p>PBCN is concerned that the Project has potential adverse environmental, cultural and socio-economic impacts to PBCN members, lands and uses, including hunting, fishing and gathering in all seasons.</p> <p>Both Denison and CNSC indicate that they have fulsome aboriginal engagement policies and guidelines and appear to be undertaking their delegated Crown duty to consult in good faith, as informed by those policies, principles, legal and regulatory requirements. However, there has been an initial error in the assessment, both by Denison and CNSC, as PBCN was erroneously excluded from indigenous engagement, ostensibly due to distance from Wheeler and a lack of understanding of PBCN lands and Indigenous activities potentially impacted by the project.</p> <p>PBCN meets nearly all of Denison's stated criteria to evaluate Indigenous communities located within the Saskatchewan Northern Administration District that would be engaged by Denison. A full and accurate description of PBCN's rights and interests is an essential part of the Wheeler dEIS and is necessary to ensure a fulsome environmental assessment. PBCN is interested in the opportunity to collaborate with Denison mines to comprehensively identify PBCN's rights and interests that may be impacted by the project.</p> <p>PBCN's goals are to:</p> <ul style="list-style-type: none"> - Work together with Denison in a spirit of mutual respect to cooperate to collectively identify means to avoid, mitigate or otherwise address potential negative impacts of the project on PBCN's territory and the exercise of its Indigenous rights and interests. - Participate in a funding agreement with Denison to facilitate and support PBCN participation and meaningful engagement in the EA process. - Meet with Denison to share PBCN knowledge of its land, and Indigenous uses, and how these may be impacted by the Project and methods to address any adverse impacts. - Explore employment and job opportunities related to the Project. <p>[Additional questions on this topic directed to regulators or government entities are included in the CNSC table]</p> | Denison remains committed to conducting meaningful engagement with Indigenous communities potentially affected by the Project and to understanding how the proposed development of the Project may affect the ability of Indigenous peoples to exercise collective Indigenous and Treaty Rights. Denison has been corresponding with PBCN on these issues and concerns since March of 2023, including written correspondence and an in-person meeting with PBCN on September 20, 2023. We believe that consultation and engagement is an iterative, two-way process, such that as we learn about the Project, its potential impacts, and the interests of Indigenous peoples in the region, we will continue to tailor our approach to engagement. It is in this spirit that we have continued to engage with PBCN to better understand the Nation's interests and land uses in the vicinity of the Project. |
| 92 | PBCN (March 3, 2023) | General | <p>PBCN has concerns regarding potential impacts to Valued Components including but not limited to water quality, fish, wildlife, aquatic vegetation, Human health, country food consumption, resource use, and socio-economic factors.</p> <p>Areas of specific concern are:</p> <ul style="list-style-type: none"> • What are the potential impacts to the landscape, including aquatic and terrestrial environments? • What are the effects on the growing/carrying capacity of both aquatic and terrestrial environments for Country Foods due to potential changes to the landscape and risk of contaminants? • What are potential accident or spill impacts on the harvesting of plant specific country foods? • Will there be limitations to access lands for country food harvesting due to mining traffic or operation of the mines? • How will Denison use freshwater from Whitefish Lake? • What are the potential impacts to boreal shield woodland caribou? • How will Denison contain effluent from the mine and manage anticipated downstream impacts? In particularly interconnected waterbodies? • What are the socio-economic impacts of the Project, including vulnerable populations, from construction through operation? | The potential effects of the Wheeler River Project on the aquatic and terrestrial environments have been comprehensively assessed in the EIS and related supporting documentation. The spatial scale is very small (resulting from ISR mining method) of 160 hectares (for reference, the McIlvenna Bay Project is 1,029 hectares [8 times bigger than Denison's Project]). A conservative approach was taken in the assessment and the overall conclusion was made that there would be no significant adverse residual effects in consideration of proposed mitigations. |

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| | | | <ul style="list-style-type: none"> • What is the proposed means and haul route of yellowcake product to the market? • Are there employment or procurement opportunities for PBCN members or Group of Companies? • How will PBCN be included in the development and execution of long-term environmental effects monitoring and follow-up programs? | |
| 92 | PBCN (March 3, 2023) | General | <p>PBCN has concerns regarding potential impacts to Valued Components including but not limited to water quality, fish, wildlife, aquatic vegetation, Human health, country food consumption, resource use, and socio-economic factors.</p> <p>Areas of specific concern are:</p> <ul style="list-style-type: none"> • What are the potential impacts to the landscape, including aquatic and terrestrial environments? • What are the effects on the growing/carrying capacity of both aquatic and terrestrial environments for Country Foods due to potential changes to the landscape and risk of contaminants? • What are potential accident or spill impacts on the harvesting of plant specific country foods? • Will there be limitations to access lands for country food harvesting due to mining traffic or operation of the mines? • How will Denison use freshwater from Whitefish Lake? • What are the potential impacts to boreal shield woodland caribou? • How will Denison contain effluent from the mine and manage anticipated downstream impacts? In particularly interconnected waterbodies? • What are the socio-economic impacts of the Project, including vulnerable populations, from construction through operation? • What is the proposed means and haul route of yellowcake product to the market? • Are there employment or procurement opportunities for PBCN members or Group of Companies? • How will PBCN be included in the development and execution of long-term environmental effects monitoring and follow-up programs? | <p>See above answer regarding the scale of the Project in the landscape. While it is acknowledged that the footprint is not “zero” it is a small footprint on the landscape scale and the assessment of the potential effects of the Project has concluded that the Project will not cause a change in any component of the environment that would alter its status or integrity beyond an acceptable level. Specifically, as it concerns the risk of introduction of contaminants to the environment the following is noted. A Human Health risk Assessment (HHRA) was undertaken for the Project in Section 10. The HHRA evaluated direct exposure to constituents of potential concern (or contaminants) released to air and water, and through indirect exposure to the constituents associated with soil, sediment, and food, such as fish, wildlife, and plants. The assessment was inclusive of information based on use of traditional foods and a specific traditional food diet from ERFN. The overall conclusion of the HHRA was that there would be no significant adverse effects to human health from the Project.</p> |
| 92 | PBCN (March 3, 2023) | General | <p>PBCN has concerns regarding potential impacts to Valued Components including but not limited to water quality, fish, wildlife, aquatic vegetation, Human health, country food consumption, resource use, and socio-economic factors.</p> <p>Areas of specific concern are:</p> <ul style="list-style-type: none"> • What are the potential impacts to the landscape, including aquatic and terrestrial environments? • What are the effects on the growing/carrying capacity of both aquatic and terrestrial environments for Country Foods due to potential changes to the landscape and risk of contaminants? • What are potential accident or spill impacts on the harvesting of plant specific country foods? • Will there be limitations to access lands for country food harvesting due to mining traffic or operation of the mines? • How will Denison use freshwater from Whitefish Lake? • What are the potential impacts to boreal shield woodland caribou? • How will Denison contain effluent from the mine and manage anticipated downstream impacts? In particularly interconnected waterbodies? • What are the socio-economic impacts of the Project, including vulnerable populations, from construction through operation? • What is the proposed means and haul route of yellowcake product to the market? • Are there employment or procurement opportunities for PBCN members or Group of Companies? • How will PBCN be included in the development and execution of long-term environmental effects monitoring and follow-up programs? | <p>A standalone Accidents and Malfunctions (A&M) assessment was completed and is summarized in Section 14 of the EIS (full report is Appendix 14-A of the EIS). The A&M assessment considered almost 70 accident scenarios including many that would relate to the unplanned release of chemicals and radiation to the environment with potential to effect country foods. Specific scenarios including the release of chemicals and radiation to the aquatic environment and to the terrestrial environment adjacent to the ERFN and KML culture camps located along Hwy 914. The overall risks in consideration of likelihood and consequence were characterized as low. The assessment concluded that with planned engineering / environmental design features, mitigation measures, and emergency response, as well as implementing industry best practices that the risks to the environment from accidents and malfunctions can be reduced to levels that are as low as reasonably practical.</p> |

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| 92 | PBCN (March 3, 2023) | General | <p>PBCN has concerns regarding potential impacts to Valued Components including but not limited to water quality, fish, wildlife, aquatic vegetation, Human health, country food consumption, resource use, and socio-economic factors.</p> <p>Areas of specific concern are:</p> <ul style="list-style-type: none"> • What are the potential impacts to the landscape, including aquatic and terrestrial environments? • What are the effects on the growing/carrying capacity of both aquatic and terrestrial environments for Country Foods due to potential changes to the landscape and risk of contaminants? • What are potential accident or spill impacts on the harvesting of plant specific country foods? • Will there be limitations to access lands for country food harvesting due to mining traffic or operation of the mines? • How will Denison use freshwater from Whitefish Lake? • What are the potential impacts to boreal shield woodland caribou? • How will Denison contain effluent from the mine and manage anticipated downstream impacts? In particularly interconnected waterbodies? • What are the socio-economic impacts of the Project, including vulnerable populations, from construction through operation? • What is the proposed means and haul route of yellowcake product to the market? • Are there employment or procurement opportunities for PBCN members or Group of Companies? • How will PBCN be included in the development and execution of long-term environmental effects monitoring and follow-up programs? | <p>Access limitations will be limited to the 169 hectare footprint of the site (for reference, the McIlvenna Bay Project is 1,029 hectares [8 times bigger than Denison's Project]). Access north of the Key Lake Road is already limited to a select number of individuals/resource harvesters, and will remain in place until such a time that the access is changed by other parties. Limitation to Indigenous Land and Resource Use beyond the Project footprint and along Highway 914 are expected to result from Project related traffic. Denison is sensitive to areas of high value to ERFN and KML along Highway 914, and is working with these communities to ensure that appropriate mitigations and restrictions are in place during periods of intensive use, such as community-hosted cultural camps proximal to Highway 914. These, and any other mitigations could be applicable to all users of Highway 914, inclusive of PBCN. Although the known trapper in the Project area is recently deceased, it is understood that similar uses are expected from future ERFN members. When the trapline is transferred, a trapper's compensation agreement with inclusions for loss of commercial income and/or any in-kind support related to access and continued use will be contemplated with the future user (irrespective of their home community).</p> |
| 92 | PBCN (March 3, 2023) | General | <p>PBCN has concerns regarding potential impacts to Valued Components including but not limited to water quality, fish, wildlife, aquatic vegetation, Human health, country food consumption, resource use, and socio-economic factors.</p> <p>Areas of specific concern are:</p> <ul style="list-style-type: none"> • What are the potential impacts to the landscape, including aquatic and terrestrial environments? • What are the effects on the growing/carrying capacity of both aquatic and terrestrial environments for Country Foods due to potential changes to the landscape and risk of contaminants? • What are potential accident or spill impacts on the harvesting of plant specific country foods? • Will there be limitations to access lands for country food harvesting due to mining traffic or operation of the mines? • How will Denison use freshwater from Whitefish Lake? • What are the potential impacts to boreal shield woodland caribou? • How will Denison contain effluent from the mine and manage anticipated downstream impacts? In particularly interconnected waterbodies? • What are the socio-economic impacts of the Project, including vulnerable populations, from construction through operation? • What is the proposed means and haul route of yellowcake product to the market? • Are there employment or procurement opportunities for PBCN members or Group of Companies? • How will PBCN be included in the development and execution of long-term environmental effects monitoring and follow-up programs? | <p>The specific activity of water taking from White Lake to support the mining operation was assessed in Section 8.1.4.2.2 of the EIS. Based on a conservative (i.e., high) estimate of water taking it was estimated that the taking would result in a reduction of flow of about 3% at times of low flow and the lake level could change by about 1 cm. These small incremental changes would be beyond the ability of monitoring techniques to practically measure and are much less than the natural variability seen. For these reasons the EIS concluded that these minor incremental changes did not represent a significant adverse effect.</p> |
| 92 | PBCN (March 3, 2023) | General | <p>PBCN has concerns regarding potential impacts to Valued Components including but not limited to water quality, fish, wildlife, aquatic vegetation, Human health, country food consumption, resource use, and socio-economic factors.</p> <p>Areas of specific concern are:</p> <ul style="list-style-type: none"> • What are the potential impacts to the landscape, including aquatic and terrestrial environments? • What are the effects on the growing/carrying capacity of both aquatic and terrestrial environments for Country Foods due to potential changes to the landscape and risk of contaminants? • What are potential accident or spill impacts on the harvesting of plant specific country foods? • Will there be limitations to access lands for country food harvesting due to mining traffic or operation of the mines? • How will Denison use freshwater from Whitefish Lake? | <p>The Caribou in SK1 are stable. Potential effects on Woodland Caribou were considered in Section 9.3 of the EIS and it was concluded that there would be no significant adverse effects. The full reasoning for that conclusion can be found in the EIS but the conclusion was based on several factors including the small spatial scale of the Project relative to the SK1 range (0.001%), risk of Project-related mortality being below natural variation, and the various mitigations that will be implemented. An initial Draft Caribou Management Plan has been developed, provided to regulators, and this document will be used as a framework to further reduce or mitigate potential Project-related effects. The plan is a living document that will evolve over time in response to the eventual Provincial overall management plan for the SK1 range.</p> |

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| | | | <ul style="list-style-type: none"> • What are the potential impacts to boreal shield woodland caribou? • How will Denison contain effluent from the mine and manage anticipated downstream impacts? In particularly interconnected waterbodies? • What are the socio-economic impacts of the Project, including vulnerable populations, from construction through operation? • What is the proposed means and haul route of yellowcake product to the market? • Are there employment or procurement opportunities for PBCN members or Group of Companies? • How will PBCN be included in the development and execution of long-term environmental effects monitoring and follow-up programs? | |
| 92 | PBCN (March 3, 2023) | General | <p>PBCN has concerns regarding potential impacts to Valued Components including but not limited to water quality, fish, wildlife, aquatic vegetation, Human health, country food consumption, resource use, and socio-economic factors.</p> <p>Areas of specific concern are:</p> <ul style="list-style-type: none"> • What are the potential impacts to the landscape, including aquatic and terrestrial environments? • What are the effects on the growing/carrying capacity of both aquatic and terrestrial environments for Country Foods due to potential changes to the landscape and risk of contaminants? • What are potential accident or spill impacts on the harvesting of plant specific country foods? • Will there be limitations to access lands for country food harvesting due to mining traffic or operation of the mines? • How will Denison use freshwater from Whitefish Lake? • What are the potential impacts to boreal shield woodland caribou? • How will Denison contain effluent from the mine and manage anticipated downstream impacts? In particularly interconnected waterbodies? • What are the socio-economic impacts of the Project, including vulnerable populations, from construction through operation? • What is the proposed means and haul route of yellowcake product to the market? • Are there employment or procurement opportunities for PBCN members or Group of Companies? • How will PBCN be included in the development and execution of long-term environmental effects monitoring and follow-up programs? | <p>Potential effects from the Project on water quality were assessed in Section 8.2 of the EIS and the assessment directly evaluated discharge of effluent from the site using predictive modeling. Water treatment will occur; testing will occur prior to release; and no release will occur if water quality does not meet objectives. The predictive modeling showed that constituent concentrations including radionuclides would be below water quality objectives for the protection of aquatic life (i.e., no effects would be expected) at the outlet of White Lake well upstream of the outflow of the Iceland River to Russel Lake. Since no impact are expected to occur in these areas close to the Project, it can also be concluded that no effects would accrue in areas further downstream in the watershed where contributing sub watersheds are many, many-times the size of the sub watersheds near the Project site. In addition, the HHRA concluded that there would be no human health risks related to the Project for traditional food users in consideration of traditional food uses in relatively close proximity to the Project site. As above, if Project effects are not found in relatively close proximity to the site, there is no risk of Project effects in more downstream areas. Finally, the A&M assessment (see response to Question #8; Section 14 of the EIS) did evaluate unplanned releases of chemicals and radioactivity to the environment. As noted, the assessment concluded that with planned engineering / environmental design features, mitigation measures, and emergency response, as well as implementing industry best practices that the risks to the environment from accidents and malfunctions can be reduced to levels that are as low as reasonably practical.</p> |
| 92 | PBCN (March 3, 2023) | General | <p>PBCN has concerns regarding potential impacts to Valued Components including but not limited to water quality, fish, wildlife, aquatic vegetation, Human health, country food consumption, resource use, and socio-economic factors.</p> <p>Areas of specific concern are:</p> <ul style="list-style-type: none"> • What are the potential impacts to the landscape, including aquatic and terrestrial environments? • What are the effects on the growing/carrying capacity of both aquatic and terrestrial environments for Country Foods due to potential changes to the landscape and risk of contaminants? • What are potential accident or spill impacts on the harvesting of plant specific country foods? • Will there be limitations to access lands for country food harvesting due to mining traffic or operation of the mines? • How will Denison use freshwater from Whitefish Lake? • What are the potential impacts to boreal shield woodland caribou? • How will Denison contain effluent from the mine and manage anticipated downstream impacts? In particularly interconnected waterbodies? • What are the socio-economic impacts of the Project, including vulnerable populations, from construction through operation? • What is the proposed means and haul route of yellowcake product to the market? • Are there employment or procurement opportunities for PBCN members or Group of Companies? • How will PBCN be included in the development and execution of long-term environmental effects monitoring and follow-up programs? | <p>Both the construction and operation camps will operate on a fly-in/out basis, limiting the opportunities for interactions between the workforce and Indigenous communities, as workers will be transported by air directly to the site. Other measures to protect community well-being of people employed on the site include health and wellness programming, life skills programming, employee and family assistance programming, implementing a no drug and alcohol policy on site, and offering culturally sensitive employment policies available to all employees, inclusive of any PBCN members.</p> <p>The assessment of socio-economic impacts of the Project can be found in EIS Part III: Human Environment Assessments which includes Section 10: Human Health, Section 11: Land and Resource Use, Section 12: Quality of Life, and Section 13: Economics.</p> |

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| 92 | PBCN (March 3, 2023) | General | <p>PBCN has concerns regarding potential impacts to Valued Components including but not limited to water quality, fish, wildlife, aquatic vegetation, Human health, country food consumption, resource use, and socio-economic factors.</p> <p>Areas of specific concern are:</p> <ul style="list-style-type: none"> • What are the potential impacts to the landscape, including aquatic and terrestrial environments? • What are the effects on the growing/carrying capacity of both aquatic and terrestrial environments for Country Foods due to potential changes to the landscape and risk of contaminants? • What are potential accident or spill impacts on the harvesting of plant specific country foods? • Will there be limitations to access lands for country food harvesting due to mining traffic or operation of the mines? • How will Denison use freshwater from Whitefish Lake? • What are the potential impacts to boreal shield woodland caribou? • How will Denison contain effluent from the mine and manage anticipated downstream impacts? In particularly interconnected waterbodies? • What are the socio-economic impacts of the Project, including vulnerable populations, from construction through operation? • What is the proposed means and haul route of yellowcake product to the market? • Are there employment or procurement opportunities for PBCN members or Group of Companies? • How will PBCN be included in the development and execution of long-term environmental effects monitoring and follow-up programs? | <p>The yellowcake will be transported in industrial containers, in accordance with the Transportation of Dangerous Goods Act.</p> <p>Project-related truck traffic during Construction and Operation (such as surface construction equipment, materials, and drill rigs) is expected to originate from Saskatoon or other southern locations. Project-related traffic originating from the west may travel through Beauval via Highway 165, whereas traffic from the south and east may access Highway 165 via Highway 2. Traffic from Saskatoon would likely use Highway 11 to Prince Albert and Highway 55 to Beauval, then travel via Highway 165. Highways are under the authority of the Saskatchewan Ministry of Highways.</p> |
| 92 | PBCN (March 3, 2023) | General | <p>PBCN has concerns regarding potential impacts to Valued Components including but not limited to water quality, fish, wildlife, aquatic vegetation, Human health, country food consumption, resource use, and socio-economic factors.</p> <p>Areas of specific concern are:</p> <ul style="list-style-type: none"> • What are the potential impacts to the landscape, including aquatic and terrestrial environments? • What are the effects on the growing/carrying capacity of both aquatic and terrestrial environments for Country Foods due to potential changes to the landscape and risk of contaminants? • What are potential accident or spill impacts on the harvesting of plant specific country foods? • Will there be limitations to access lands for country food harvesting due to mining traffic or operation of the mines? • How will Denison use freshwater from Whitefish Lake? • What are the potential impacts to boreal shield woodland caribou? • How will Denison contain effluent from the mine and manage anticipated downstream impacts? In particularly interconnected waterbodies? • What are the socio-economic impacts of the Project, including vulnerable populations, from construction through operation? • What is the proposed means and haul route of yellowcake product to the market? • Are there employment or procurement opportunities for PBCN members or Group of Companies? • How will PBCN be included in the development and execution of long-term environmental effects monitoring and follow-up programs? | <p>Denison's Indigenous Peoples Policy sets out priority for Indigenous employment and procurement (among other items). With respect to employment, as noted in Section 13.3.2.1 of the EIS, Residents of Saskatchewan's North (i.e., those resident in the northern administration district of Saskatchewan, inclusive of PBCN communities) are prioritized for employment as an expected condition of the Surface Lease Agreement, similarly for goods and services to service the Project. With respect to procurement, Denison has established an internal procurement policy approach. The approach requires that Denison consider businesses within the local study area first and the Northern Administrative District second, prior to looking elsewhere (southern Saskatchewan and/or outside of Saskatchewan) throughout all phases of the Project. PBCN businesses would fall in the category of northern Saskatchewan businesses, which would place them in line for second preference if project needs cannot be met within the local study area.</p> |
| 92 | PBCN (March 3, 2023) | General | <p>PBCN has concerns regarding potential impacts to Valued Components including but not limited to water quality, fish, wildlife, aquatic vegetation, Human health, country food consumption, resource use, and socio-economic factors.</p> <p>Areas of specific concern are:</p> <ul style="list-style-type: none"> • What are the potential impacts to the landscape, including aquatic and terrestrial environments? • What are the effects on the growing/carrying capacity of both aquatic and terrestrial environments for Country Foods due to potential changes to the landscape and risk of contaminants? • What are potential accident or spill impacts on the harvesting of plant specific country foods? • Will there be limitations to access lands for country food harvesting due to mining traffic or operation of the mines? • How will Denison use freshwater from Whitefish Lake? | <p>Denison acknowledges PBCN interests in respect of the Project. Detailed monitoring programs to be developed through licensing and this will include how data is going to be reported and shared. The regulators have developed third party monitoring programs and undertake data review on an ongoing basis.</p> |

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| | | | <ul style="list-style-type: none"> • What are the potential impacts to boreal shield woodland caribou? • How will Denison contain effluent from the mine and manage anticipated downstream impacts? In particularly interconnected waterbodies? • What are the socio-economic impacts of the Project, including vulnerable populations, from construction through operation? • What is the proposed means and haul route of yellowcake product to the market? • Are there employment or procurement opportunities for PBCN members or Group of Companies? • How will PBCN be included in the development and execution of long-term environmental effects monitoring and follow-up programs? | |
| 93 | Kineepik Métis Local #9 (KML) and the Northern Village of Pinehouse (NVP) (February 17, 2023) | Water Security Education of In-Situ Recovery and Freeze Wall Technology | <p>Section 1.5 and 3.4 of KML and NVP submission: KML as a community wishes to understand the technical background of water protection processes, the Lixiviant solutions, interactions of chemical compounds with water and toxicity. The KML Community will require this knowledge to have confidence in the continued success of the new mining application on our traditional territories. What are the potential effects to the aquifers and waters around Denison and Wheeler River?</p> <p>KML describes that they need to understand:</p> <ul style="list-style-type: none"> - how water protection processes such as reverse osmosis and water treatment are used in the mining operations. - the exact molecular compounds that are part of the “Lixiviant” solution - how this chemical compound interacts with water and at what concentrations that is becomes toxic. <p>KML further states: “If these processes are not well understood by our communities, how can we state that we are prior informed and offer consensus to the process?”</p> <p>Ultimately, as noted in their summary of Primary Concerns:</p> <ol style="list-style-type: none"> 1) There is a need for funding for education and training to reach a standard of knowledge in mining, science and math required to understand the impacts of uranium mining industry that is expected for an Indigenous community to be able to make free and prior informed decision on impact and expectation of that industry. 2) Development of a centre of Excellence in Pinehouse to organically develop the knowledge transference required for Indigenous community to understand the uranium mining industry including regulations, materials used, transportation, end use of products, education required mitigation efforts etc. 3) Support for training and education to support KML and Pinehouse on uses of artificial intelligence in the mining projects and to what level this activity can be managed by and in the community. A strategy to build capacity for matriculation graduates with the following classes English 30A 30B Chemistry 30, Physics 30, Math 30. <p>KML wants to increase the community western education levels so that they are knowledgeable and have the capacity to protect themselves and the environment.</p> <p>[Additional questions on this topic directed to regulators or government entities are included in the CNSC table]</p> | <p>Denison has estimated a workforce of 300 during the two-year Construction phase and 180 during the Operation phase. Mineral sector positions are typically considered to be higher paying than many other industrial positions. Residents and communities in the LSA (ERFN (including Indian Reserve Wapachewunak 192D and Indian Reserve La Plonge 192) and Patuanak, Northern Hamlet (Patuanak); Pinehouse Lake, Northern Village; and Beauval, Northern Village) will be given first priority for employment, training, and business opportunities, followed by residents and communities in the RSA (Northern Saskatchewan Administrative District). Mitigation and enhancement measures will be implemented by Denison to enhance the positive effects of the Project on employment and training, income, traditional economy, and business opportunities and minimize adverse effects including:</p> <ul style="list-style-type: none"> • A Human Resource Development Plan to initially prioritize Indigenous and non-Indigenous communities in the LSA in terms of employment and training opportunities; • Establishment of a procurement approach through all phases of the Project, focusing on businesses based within the LSA communities, followed by Indigenous and / or businesses in the RSA; • Negotiation with the Province of Saskatchewan to develop the Project’s Surface Lease Agreement and Human Resource Development Agreement. <p>See Section 13 for a summary on local, provincial, and federal Project benefits and Denison’s approach to employment, training, and business participation opportunities for communities.</p> <p>See Section 13 for information regarding employment, employment opportunities, and career growth for community members.</p> <p>As outlined in Denison’s Indigenous Peoples Policy, Denison recognizes the critical necessity of advancing reconciliation with Indigenous peoples in Canada and the important role of Canadian business in the reconciliation process. Denison is committed to providing Indigenous people and businesses with sustainable economic opportunities and benefits and sharing the economic benefits of Denison’s business activities.</p> <p>In terms of building capacity locally for emergency response and waste management, Denison supports KML’s vision on these items where it makes sense and is possible and will continue with ongoing discussions in this regard.</p> |
| 94 | KML and NVP (February 17, 2023) | Language and Culture Restitution | <p>Section 2.2 of KML and NVP submission: KML note that loss of language can be correlated to the introduction of the Saskatchewan Uranium Industry.</p> <p>Prior to the industry development, Pinehouse was among the most fluent speaking communities in northern Saskatchewan. All children in Pinehouse spoke Cree with limited English and French capacity. Since the collateral effect of industry became the prominent community discourse the support for Cree language was diminished and marginalized by industry as English is the primary language used by industry.</p> <p>KML and NVP are actively working to determine how to stop the current language extinction process with strategies around creating more resources for culture and language. KML is leading the process for recovering from this loss. KML are using our own source revenue and resources to bring pride in the language and culture for community members of KML. KML will continue to bring this attention to all proponent activities that occur on the KML territory for KML are all are responsible to remove the effects of colonisation and institutional racism.</p> | <p>Denison respects the concern raised by KML regarding language and culture related to working at an industrial operation. Denison and KML will be working on specific items of interest to mitigate these types of concerns through private contractual arrangements, which may include specific mitigation and accommodation measures in this respect.</p> <p>Mitigation measures associated with potential effects to cultural continuity (including knowledge transfer and language) are described in Section 12.1.5 and include:</p> <ul style="list-style-type: none"> • working with Indigenous COIs to understand culturally important periods relative to harvest times and cultural camps to facilitate Indigenous employees taking time off to participate in such activities; • implementation of Denison’s Indigenous Peoples Policy and advancement of reconciliation • Using a commuter rotation system has also shown to be effective in allowing Indigenous employees continued opportunities to spend time on the land, and important factor in the transmission of knowledge and language (see Section 11 for a description of potential effects to land use). |

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| | | | | <p>In discussions with Indigenous Communities of Interest since the filing of the draft EIS, it has become apparent that Denison should add additional commitment / mitigation measure in relation to this area of interest, as follows:</p> <ul style="list-style-type: none"> • Encouragement to speak languages of choice while at site, except during safety sensitive situations. <p>Section 12.1.5 of the final EIS will be updated to include the additional commitment / mitigation measure in relation to culture and language, as follows:</p> <ul style="list-style-type: none"> • Encouragement to speak languages of choice while at site, except during safety sensitive situations. |
| 95 | KML and NVP (February 17, 2023) | Mining methods and education Education of In-Situ Recovery and Freeze Wall Technology | <p>Section 3.1 and 3.4 of KML and NVP submission: KML and NVP must be educated on all aspects of the Denison project to remove limited understanding of the processes that occurred within our traditional territories. They note that they cannot learn how to protect the land if they cannot understand the math and science involved in mining and environmental protection. KML people require higher education levels because of the collateral effect, on their population, caused by industry [which the proposed Wheeler River project adds to]. They further assert that they must understand the technological advantages being employed in the Denison Wheeler River Project. This transference of knowledge can occur through a sustained and supported education program.</p> <p>The community will also require confidence that any environmental incidents are managed in a way that is fully understood by the community. A long term plan would be to develop and build that capacity in the community to manage the incidents and monitor any environmental cleanup processes. They want assurance that the standards being followed and that as a community, KML are able to action a response to mitigate potential environmental impact. This knowledge must become an integral part of the community knowledge and capacity for this project and for uranium exploration and mining in general.</p> <p>As noted in their summary of Primary Concerns, this includes:</p> <ul style="list-style-type: none"> - Begin training and education support for community to prepare for employment at the mining operations with a focus on females, youth, and previously marginalized land users. Effort to increase employment in trades and drilling related work. <p>See also other related Primary Concerns from Document, #1-3.</p> | See responses to KML and NVP Public Comment #93 |
| 96 | KML and NVP (February 17, 2023) | Road safety concerns Maintenance of 914 road with 914 Extension | <p>Section 5 and 5.2 of KML and NVP submission: When determining community safety with respect to need for increased transportation for a new operation, the Indigenous people of KML have the following concerns:</p> <ul style="list-style-type: none"> - The state of the existing road from 165 to 914: The road has received upgrades up to the kilometer 75 on highway 165. From Kilometer 75 to Kilometer 112 where Highway 165 ends and Highway 914 begins, Highway 914 needs an upgrade in width all the way to Pinehouse to create a more industrialized road. KML are not looking forward to the spring road conditions with just the current industry activity. - Every community member has reported near miss incidents with the increased traffic caused by the general resurgence of the Uranium Industry using semi truck and heavy hauls to transport material to the operations and project sites. With the increase in incidents and near misses the opportunity for a major incident is inevitable, with the current road conditions. Adding the development of a new Denison mining operation will only increase this potential for incidents for people using this road. - When you add the rough road conditions, visibility reduction in the winter and summer with dust and snow flurry from large vehicles. This causes unsafe conditions and increases the potential for incidents. - The current capacity for road maintenance from the community members of Pinehouse are not prepared for the additional maintenance requirements for the road becoming a connected road. <p>The road must be developed to an industrial rating to allow for the increase in industrial use so that members of KML do not experience safety issues. KML is requesting that the Transport Canada, Ministry of Highways respond to the concerns of Pinehouse and inform the community of the plans for road infrastructure development. KML would request the road be developed to the standard that the Key Lake and McArthur River road is managed all the way to Junction of Highway 165 and Highway 2.</p> <p>KML and NVP request further capacity to develop road management capacity so KML can provide the support necessary to manage the integrity of the road.</p> | <p>The EIS for the Wheeler River Project was completed with consideration of Project components that include: ISR, Drilling, Freeze Wall, Wellfield, Processing, Water Management, Waste Management, Access and Transportation, Power, Support Facilities, Project Area, Project Activities, Ancillary Projects, GHG Emissions, Project Schedule, Project Benefits, Project Design Features, Management System, and Project Alternatives.</p> <p>Through an alternative means assessment, Denison considered options in relation to access and transportation. The access road alignment will follow part of the existing exploration access road, stream crossing structures will use clear span bridges, and worker transportation will be air transport to a) nearby Cameco operations or, b) a new airstrip constructed and operated by Denison.</p> <p>Denison incorporated the feedback provided on road options select the current road alignment for the Project.</p> <p>See Section 2 of the EIS for information and technical detail pertaining to Project Components and Project alternatives; see also EIS Appendix 2-C for Alternative Means Assessment.</p> <p>Highway improvements are not within Denison's jurisdiction and are not considered in the EIS for the Wheeler River Project. However, Denison notes KML's perspective of increased traffic volumes and subsequent desire for highway improvements.</p> <p>On Highway 914 between Key Lake and Pinehouse, Denison anticipated that road users would see an increase between 16% and 40% over the life of the mine. Trucks travelling on this section of highway will increase from 35 to 53 at peak operational times.</p> <p>Denison's vision in respect of this concern is that Denison and KML work together as partners in discussions about highways with the Provincial Government.</p> |

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| | | | <p>As also noted in their summary of Primary Concerns, this includes a requirement for:</p> <ul style="list-style-type: none"> - Immediate efforts to build and increase emergency response capacity with community people from KML and NVP to support capacity for road incidents. - Significant improvements to the road to an industrial grade from Highway 2 to the Key Lake gatehouse to support the massive increase in heavy traffic from Industry <p>[Additional questions on this topic directed to regulators or government entities are included in the CNSC table]</p> | <p>However, in respect of actions Denison can undertake regarding traffic along the road at times important for the undertaking of cultural activities, Denison commits to:</p> <ol style="list-style-type: none"> 1) Assisting KML with the clear identification of the forthcoming culture camp along highway 914 (providing clear signage) 2) Having Project vehicle slow down to 40km/hr from mid-August to mid-October, during the times when KML members may be using the portion of the road near the culture camp. To be specific, this includes 2.5km before the entry into the culture camp, and 2.5km after the entry into the culture camp. <p>See Denison's response to comment #97 for information pertinent to emergency response capabilities.</p> <p>See EIS Section 2, Appendix 2-B for more detail pertaining to traffic volumes.</p> |
| 97 | KML and NVP (February 17, 2023) | Emergency Response Services | <p>Section 5.1 of KML and NVP submission: Pinehouse will inherit significant impacts from the transportation of goods and services to the mining operations. Safety of our community member is a paramount concern for the community. KML will be impacted from increased heavy haul traffic and this will impede our ability to hunt for food. KML will also bear the effects of needed emergency services from our community first from the increased need for emergency response, which could dilute the limited emergency response services KML currently are provided. KML will also inherit any future security emergency requirement and expanded exploration and developmental impacts.</p> <p>The expectation is that within the life of the mine the community and industry will co- develop capacity to engage in emergency response including environmental spills, traffic incidents, air traffic incidents, emergency road security, search and rescue, fire fighting, and water rescue. See also other related Primary Concerns from Document, #5.</p> | <p>Denison will establish a Transportation of Dangerous Goods Program, intended to provide for the safe transport of goods by conforming to all applicable laws, regulations, company policies, and procedures. The Transportation of Dangerous Goods Program applies to all modes of transport and all locations where Denison assumes care and control of the materials.</p> <p>Denison will establish an Emergency Preparedness and Response Program to identify how the Project will prepare for and addresses emergencies that may affect the health and safety of persons, the environment, and the protection of property. Emergency Preparedness and Response Program would be developed consistent with guidance provided by CNSC in REGDOC-2.10.1, Nuclear Emergency Preparedness and Response (CNSC 2016).</p> <p>Increased pressure on emergency services is most likely to stem from an accident or malfunction on Highways 914 or 165. The extent to which these changes could affect any given community would depend on the nature of the accident or malfunction. Accidents and malfunctions for the Project were determined to (generally) have a highly unlikely to unlikely probability of occurrence, with an overall risk rating of low to moderate; however, the severity of accidents and malfunctions was determined to be minor to major. If such an event were to occur, local resources may be called upon to provide support, which may result in a call to fire, RCMP, or ambulance services depending on the nature of the event. Denison will provide any necessary training and/or equipment to local first responders to make sure they are sufficiently prepared to deal with an unlikely accident or malfunction.</p> <p>Denison's objective is to utilize existing emergency response teams from other operations prior to drawing on community-based resources. In the unlikely event that this were to occur, and KML resources were drawn upon, the Agreement negotiated between provides the foundation for discussions in respect of such incidents.</p> <p>See Section 2 for information pertaining to the above programs.</p> |
| 98 | KML and NVP (February 17, 2023) | Waste management of new development and historical issues | <p>Section 6.1 of KML and NVP submission: KML is concerned with cumulative impacts from historical legacy exploration and mining practices. Not specific to Denison, Cameco or Orano, KML notes that land users have often found remnants of past poor exploration practices which are now affecting our continued land use. The abandoned camps and industrial and domestic waste left with no known program for clean up are the most significant of these remnants. They would like the EIS to host in partnership with provincial government regulators to host a conversation on progressive reclamation of these legacy sites.</p> <p>This conversation should prioritise the community capacity and an environmental agent for process that occur on our traditional territories. This conversation could include changing the policies of waste (future waste) being brought into the NAD. KML's contention is that waste that is brought into the region should be removed entirely from the region. The need for a regional waste management facility or a transfer station must be developed in partnership with KML.</p> <p>As noted in their summary of Primary Concerns, this includes a requirement for:</p> <ul style="list-style-type: none"> - Immediate efforts to build capacity in a regional waste management operation within or near the community. To build current and future expertise in domestic waste, special waste, recycling, and the development of a transfer station in Pinehouse to support all mining activity including current operation and exploration. | <p>Denison conducted a cumulative effects assessment, which included the Highway 914 extension project, on categories the Atmospheric and Acoustic Environment; Geology and Groundwater; the Aquatic Environment; the Terrestrial Environment; Human Health; Land and Resource Use; Quality of Life; and Economics.</p> <p>Denison respects and understands KML's concern about the cumulative effects in the region, particularly in relation to access to traditional lands and resources in correlation with industrial and mining developments. The residual effects of the Project are expected to interact with the residual effects of other projects and activities in the ILRU RSA, resulting in potential cumulative effects to Indigenous land use activity in the area. This is largely due to the proposed Highway 914 extension project.</p> <p>See Section 16 for a summary of the cumulative effects assessments for each category above.</p> <p>As outlined in Denison's Indigenous Peoples Policy, Denison recognizes the critical necessity of advancing reconciliation with Indigenous peoples in Canada and the important role of Canadian business in the reconciliation process. Denison is committed to providing Indigenous people</p> |

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| | | | [Additional questions on this topic directed to regulators or government entities are included in the CNSC table] | <p>and businesses with sustainable economic opportunities and benefits and sharing the economic benefits of Denison's business activities.</p> <p>In terms of building capacity locally for emergency response and waste management, Denison supports KML's vision on these items where it makes sense and is possible.</p> <p>General discussions to continue as part of ongoing dialogue.</p> |
| 99 | KML and NVP (February 17, 2023) | Loss of Use and Access to Traditional Lands and Resources | <p>Section 6.2 of KML and NVP submission: While one project or mining operation does not materially affect KML's land use practices, the substantial and growing projects and mineral exploration activity severely limits their ability to practice land use for the region north of Haultain River. KML land users are now experiencing loss of use with some areas leading to complete exclusion for food sovereignty and traditional activities. As an example of this, hunting practices currently use high powered rifles to engage with big game including moose, bear, deer, and caribou in the area.</p> <p>How will Denison ensure the community can continue to practice this method of food gathering in a safe method?</p> | <p>In 2018, KML approached Denison to support a land use mapping initiative in the Project area. The 2018 study builds on existing land use maps, completed in 2011. A verification meeting was held in late 2018 to make sure no geographic data gaps existed and that the results speak for the whole community. In 2022, KML prepared a document to voice their perspectives on Project VCs and to provide a record for EIS development. Based on 12 community engagement sessions and review of the land use maps, KML explained their unique social, cultural, and historical context, expressed a general consensus of support for the Project, and described issues and concerns.</p> <p>See Section 3 for information on IK and LK and how this information was integrated throughout the EIS. See Section 11 for information on how the Project will interact with land and resources including how potential effects will be mitigated.</p> |
| 100 | KML and NVP (February 17, 2023) | UNDRIP and TRC Protocols | <p>Section 6.3 of KML and NVP submission: KML sees limited mention that this project has respected the intent of the United Nations Declaration on the Rights of Indigenous People or the Recommendations of the Truth and Reconciliation Commission. There is limited opportunity for this project to review the implications of UNDRIP and TRC and how this project will cause to effect for the Indigenous rights bearing members of Pinehouse. This is not case for other agencies providing information for this project.</p> <p>KML request advocacy to increase education for external agencies on the need to develop greater understanding of UNDRIP and TRC calls to actions. These agencies can be contractors, regulators, and managers within the companies. This process could be developed if the agencies co develop a centre of excellence in Pinehouse.</p> <p>[Additional questions on this topic directed to regulators or government entities are included in the CNSC table]</p> | <p>Denison respects KMLs perspectives on the matter and understands this is not an industry only prerogative. As outlined in Denison's Indigenous Peoples Policy, Denison recognizes the critical necessity of advancing reconciliation with Indigenous peoples in Canada and the important role of Canadian business in the reconciliation process. Denison is committed to providing Indigenous people and businesses with sustainable economic opportunities and benefits and sharing the economic benefits of Denison's business activities.</p> |
| 101 | KML and NVP (February 17, 2023) | Co-Management, Food Sovereignty and Métis Land Access | <p>Section 6.4 of KML and NVP submission: Potential impacts to KML are from increased development and access to their territory. Current provincial regulation of hunting, fishing, tourism, resources development and increase human traffic will affect and limit our ability to practice our protected rights. Western business with greater acumen may displace economic activity as they note that they are still evolving their understanding of the industry business practices.</p> <p>KML request further study on how current provincial regulations including opportunity for co-management so lessen the impacts from this project and from increased encroachment.</p> <p>[Additional questions on this topic directed to regulators or government entities are included in the CNSC table]</p> | <p>See response to KML and NVP Public Comment #99. The Agreement negotiated between Denison and KML outlines specific commitments for KML participation in environmental monitoring associated with the Project.</p> |
| 102 | KML and NVP (February 17, 2023) | Waste Management Plan | <p>Section 6.5 of KML and NVP submission: Waste generated from the operation, construction and maintenance of mines and exploration projects need to be better understood by the community. KML is of the view that waste management may represent the greatest source of environmental liability arising from this project and the mining industry in northern Saskatchewan in general. KML request that planning for waste management including capacity for Pinehouse to host a waste management company and a transfer station in Pinehouse to be considered. As a community that uses this land for food, shelter and culture KML want the capacity and responsibility to manage waste for this project and the industry in general and prepare for future development.</p> <p>See also other related Primary Concerns from Document, #6.</p> | <p>As outlined in Denison's Indigenous Peoples Policy, Denison recognizes the critical necessity of advancing reconciliation with Indigenous peoples in Canada and the important role of Canadian business in the reconciliation process. Denison is committed to providing Indigenous people and businesses with sustainable economic opportunities and benefits and sharing the economic benefits of Denison's business activities.</p> <p>In terms of building capacity locally for emergency response and waste management, Denison supports KML's vision on these items where it makes sense and is possible.</p> <p>General discussions to continue as part of ongoing dialogue.</p> |

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| 103 | KML and NVP (February 17, 2023) | Waste Management Plan | <p>Section 6.5 of KML and NVP submission: KML describes Indigenous Economic Leakage and Triggered Response Capacity as concerns:</p> <ul style="list-style-type: none"> - Indigenous Economic Leakage: the lack of capacity within Indigenous communities like Pinehouse prior to massive development projects like uranium mining operations. No ability in existing community development to capitalize on industrial activity in their areas because of historic colonization and racism. There are limited businesses, stores, materials and infrastructure within community to support and build upon. - Triggered Response Capacity: the respond required by the Indigenous people of KML to meet the need of industry. The community is required to change focus away from Indigenous community needs to focus on the needs of Industry. This includes time to respond to the industrial education, safety protocols, regulatory responses. The need as a community to participate in the Duty to Consult on exploration requests, feasibility studies, Environmental impact studies, negotiate agreements, industry training requirements. All of this removes the community ability for practicing Indigenous cultural activities, less time of Cree language retention. This response increases as the Collateral Effect increase. <p>It is acknowledged by KML that these are factors are exacerbated by an additional mine. As noted in their summary of Primary Concerns, this necessitates:</p> <ul style="list-style-type: none"> - Systemic increases in the use of services in Pinehouse including COOP store and PBNLP, Pinehouse Housing Corporation, Pinehouse Fishing COOP and Wild Rice, and KML Métis Local to prevent the continuation of Indigenous economic leakage. - Consideration to build industry supporting infrastructure such as warehousing, hotels, bulk fuels parts and mining necessities in Pinehouse to support community development and to stop the Indigenous economic leakage which has occurred over the last 50 years of development. <p>[Additional questions on this topic directed to regulators or government entities are included in the CNSC table]</p> | See response to KML and NVP Public Comment #102. |
| Main Area of Concern for ERFN #1 | | | <p>Concern was raised for the use of the more sophisticated CALPUFF modelling package rather than Meteorological Society / Environmental Protection Agency Regulatory Model. Has the province accepted this method as appropriate? Concern is in reference to Section 6.1.4.2.</p> | <p>As described in Section B.1 of Appendix 6-A, staff at the Saskatchewan Ministry of Environment (Air Quality Branch) were consulted on the selection of CALPUFF and development of the CALMET meteorological data set, beginning in 2019. The CALMET consultation included an initial discussion about the general approach, and once the CALMET runs were completed, two technical memos were produced and reviewed by Ministry staff including: 1) a memo completed in March 2020 summarizing the general CALMET approach and results (e.g., wind roses, temperature data, precipitation data); and 2) a follow-up memo completed in May 2021, which answered specific questions posed by Ministry staff. Ministry staff also completed a review and provided feedback on the CALPUFF model setup in August 2021. The specific rationale for the use of CALPUFF in lieu of AEROMOD as documented in the March 2020 memo was as follows:</p> <ul style="list-style-type: none"> • The domain size needed to generate inputs for the human health and ecological risk assessment (HHERA) is estimated to be 60 km by 60 km. The Saskatchewan Air Modelling Guide recommends CALPUFF for long-range transport (i.e., > 50 km); • CALPUFF includes wet and dry removal processes and chemical transformation algorithms that are needed to generate inputs for the HHERA and the terrestrial and aquatic assessments; and, <p>The approach is consistent with other uranium mines in the area.</p> |
| Main Area of Concern for ERFN #2 | | | <p>ERFN would like to further understand the progressive remediation of the mining area proposed, including thawing of the freeze wall in phases; it is believed reasonable for ERFN to request the following:</p> <ol style="list-style-type: none"> Engagement between ERFN and Denison Mines throughout the life of the project, specifically pertaining to the remediated / restored solution targets and associated environmental effects monitoring. The EIS appears to only provide the remediated / restored solution targets and the concentration of COCPs following mixing in Whitefish Lake Middle (the basin where impacted groundwater expected to interact with the receiving environment). ERFN requests clarification on the targets and concentrations in the EIS. Alignment of environmental risk assessment updates and review of updates by ERFN prior to execution of progressive mine area remediation phases. Prior to freeze wall thaw, there should be approved progressive decommissioning objectives that are considered conservatively protective of the receiving environment and contingency planning that would allow for continued remediation following freeze wall thaw, if this is deemed necessary by monitoring results. Further, the progressive decommissioning objectives should be considered living and reviewed regularly, as a finalized decommissioning and closure | <p>With respect to:</p> <ol style="list-style-type: none"> Denison has committed to meeting the mining area decommissioning objectives presented in the draft EIS (Table 2.3-3). These were modelled in draft EIS Section 7 with recharge to Whitefish Lake. Refinement of mining area decommissioning objectives is expected as part of updates to the decommissioning plan, which forms the basis of the decommissioning cost estimate and associated financial assurance. The conceptual decommissioning plan (CDP) included in the draft EIS (Section 2.3.3) contains the appropriate level of detail for this stage of the Project and recognizes that the details of the decommissioning plan and the elements thereof (including remediation and restoration targets and monitoring) will evolve and become more detailed and specific as the Project advances. The subsequent iteration of the plan is the preliminary decommissioning plan (PDP) which will be submitted to regulators as part of Project licensing and permitting. The PDP would reflect input that will be solicited from ERFN and others prior to its submission. Finally, prior to executing decommissioning activities, Denison shall prepare and submit a detailed decommissioning plan (DDP) to regulators for acceptance, which builds on the PDP. In this case the DDP would reflect input that will be solicited from ERFN and others prior to its submission and would also be informed by conditions on the ground at the Project site at that time, operational experience that has been gained and the regulatory landscape at |

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| | | | <p>plan has not been approved. Concern is in reference to Section 2.3.3.1.1.</p> | <p>that time. To reiterate, as highlighted above, the decommissioning plan, including the mining area decommissioning objectives, will evolve over time becoming more detailed and specific as the Project advances. Denison is committed to working with ERFN to solicit input through this process.</p> <p>ii. From Denison's response and EIS contents, Denison is committing to no residual effects to groundwater beyond the mining area during operations and during decommissioning activities; nor effects from changes in groundwater to surface water in the vicinity of the project during the same time period. As such, no potential groundwater effects pathway occurs until restored solution targets are achieved and controls isolating the mining area are removed. As interpreted, this would imply that during operations and early decommissioning activities, there will be no measurable change to groundwater outside of the mining area.</p> <p>iii. As recommended, Denison will work with ERFN to align the ERA updates and reviews of those updates as recommended.</p> <p>iv. The narrative posed by the review comments is consistent with Denison's perspective on how the decommissioning process (and therefore development of the decommissioning plan including decommissioning objectives) will be implemented. The reader is further referred to the response to part i provided above that describes the overall progression of the CDP to the DDP. As noted, Denison will engage with ERFN to solicit input during all phases of the process and Project.</p> |
| Main Area of Concern for ERFN #3 | | | <p>ERFN would like clarification on whether or not start up of backup generators for the injection and recovery wells and IWWTP will be immediate? Is there a concern of loss of mining solution containment because of a power outage? ERFN understands there will be planned period when the IWWTP will be offline, does this planning also encompass unplanned events? ERFN requests commitment from Denison Mines of ongoing engagement pertaining to the development of the wellfield environmental effects monitoring and Emergency Preparedness and Response Plan. Concern is in reference to Section 2.2.6.2.</p> | <p>Electrical service to the Project will be provided via an approximate 5-km extension tap from the existing 138 kV overhead transmission line that runs along Highway 914. Denison expects an average of six outages per year based on information provided by SaskPower. An outage would be anticipated to last a few hours for a given event. As noted in the draft EIS, Denison will have back-up power supply available with diesel generators to supply power to essential services and functions.</p> <p>In the event of a power interruption, essential services would include the processing plant HVAC system and ensuring the power to the processing plant was maintained to provide Denison the overall ability to shutdown the processing plant in a safe manner. While this is happening (i.e., processing plant shut down), the majority of the electrical loads from the generators will be directed to these activities. Once the processing plant is shutdown safely, loads can then be redirected on a priority basis.</p> <p>In terms of the wellfield operation, the inwards hydraulic gradient only needs to be maintained when mining solutions are being injected. In the event of a power interruption, no mining solution injection would be occurring, therefore no UBS recovery would be required for vertical containment as the system would become static. Denison may use the "sit and soak" method in the wellfield as part of routine ISR mining (i.e., no injection or recovery) which essentially provides Denison the ability to store or hold solutions underground.</p> <p>In terms of the freeze wall, the design and nature of the freeze wall means that the integrity of the freeze wall will not change during short-term power outages. Even if a longer outage is envisioned, freeze wall integrity is would not be compromised. Once developed, the freeze wall would take months to thaw. It is also noted that the freeze wall provides tertiary containment of the mining solution / UBS.</p> <p>With regard to unplanned events and/or care and maintenance situations, Denison would manage the wellfield as follows:</p> <ol style="list-style-type: none"> 1. Provided power is still available to site the UBS can be used as make-up in the mining solution and recirculated into the wellfield in a closed loop system. 2. If power is lost to the site, the well pumps can be shut off with existing mining solution and UBS remaining stagnant within the mining zone. As the mining zone is contained within the freeze wall with the combined absence of pumping/injecting, no hydraulic gradient existing (translating to no flow). <p>As per correspondence dated July 26, 2023, Denison is committed to engagement with ERFN where input will be solicited and opportunity for document review will be provided, as necessary, for the Environmental Management Program, including development of the Heritage Resource Management Plan, Emergency Preparedness and Response Plan, and Environmental Effects Monitoring Programs. Denison and ERFN have an agreed upon process for such activities in the future.</p> |

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| Main Area of Concern for ERFN #4 | | | <p>It appears that a specific source term for the clean waste rock has not been provided, and that if deemed to need management a liner will be integrated into the pond design and contact water would be sent to the IWWTP. ERFN expects that the material would be non-potential-acid generating and non-potential metal leaching. ERFN is asking for clarification as to what will inform this decision, for example is it that the clean waste rock would not need management if the leachate would meet surface water quality guidelines?</p> <p>Concern in reference to Section 2.2.4.8.</p> | <p>Conceptually, clean waste rock is defined as non-mineralized and non-potentially acid generating (non-PAG) rock. More precise criteria (numeric and/or narrative), and testing program documentation, will be developed as part of the Waste Management Program that will describe the basis for waste rock segregation based on mineralized content and acid generating potential.</p> <p>For further reference the following is noted. "Clean" waste rock (as described above) is expected to comprise clean sandstone cuttings and core. Waste rock from the sandstone will be characterized during construction and operation per the Waste Management Program prior to placement on the clean waste rock pad. Waste rock characterization will be done primarily based on geological and geochemical characteristics though static and kinetic testing, as appropriate, following standard testing guidance to ensure the rock is both non-mineralized and non-PAG. Any waste rock identified as being mineralized or PAG will be stored on the special waste pad. While the draft EIS did not definitely state that a clean waste rock pond would be constructed, Denison has since committed to constructing a single geomembrane lined pond adjacent to the clean waste rock pad to collect contact water. The contact water in the clean waste rock pond will be routed to the process water pond for eventual treatment in the IWWTP and ultimately released to Whitefish Lake.</p> |
| Main Area of Concern for ERFN #5 | | | <p>In the EIS, there are no details provided in relation to the off-site processing and permanent disposal of the process precipitates. Please clarify whether or not this activity will be encompassed in decommissioning and closure or would this activity potentially occur during operations. As there are processing and disposal options within ERFN Nutsiye-kwi Benéne, ERFN requests commitment from Denison Mines to ongoing engagement pertaining to this component of the operations.</p> <p>Concern in reference to Section 2.2.4.5.</p> | <p>Denison is committed to continued dialogue with ERFN on the details related to the sale, transport, off-site processing, and final disposal of the process precipitates. At this time it is envisioned that these details will be developed as part of the decommissioning plan updates and will outline the timing for when these assets are removed from the Wheeler River Project site, as well as the regulatory approvals process to which such activities may be subject, including but not necessarily limited to provincial approvals or federal licensing requirements and statutory obligations such as those described in the Transportation of Dangerous Goods Regulations.</p> |
| Main Area of Concern for ERFN #6 | | | <p>It appears to be stated that during construction contact water discharge to the receiving environment from the Clean Water Rock Pond might be required in the case of upset conditions (e.g., extreme precipitation event). As such, ERFN requests commitment from Denison Mines to ongoing engagement pertaining to development of a Construction Environmental Management Plan, including discharge monitoring and trigger action response planning, as well as having a qualified environmental professional design this plan and/or be present during high-risk construction activities.</p> <p>Concern in reference to Section 8.3.4.2.1 and Section 8.3.4.2.3.</p> | <p>During construction, no effluent is expected to be released to the aquatic environment.</p> <p>As part of both diamond and rotary drilling activities during construction, a centrifuge will be used for separating out solids in order to recycle fluids. Only solid drill cuttings, not wastewater, will be produced and all muds and waters will be recycled as part of the drilling process. Upon completion of a drilling campaign, all remaining mud and water will be stripped of solids, treated with mud zymes to break down polymers, and injected back down into the mineralized horizon. During active drill campaigns clean water will be held in approved tanks.</p> <p>Any contact water stored in the clean waste rock pond during construction will be held onsite until the Industrial Wastewater Treatment Plant (IWWTP) is commissioned. At that time the water from the pond would be conveyed to the IWWTP, treated, and released to Whitefish Lake per permit / licence requirements.</p> <p>It is also important to note that the sequencing of construction activities will occur in a manner that prioritizes water management based on Project execution plans. For instance, construction of the wellfield runoff pond will be prioritized during the early part of construction and it will be able to hold 38,200 m3 of water. This will provide contingency and additional water storage capacity if contact water produced exceeds estimates or the volume available in the clean waste rock pond during construction. Should the volume of water requiring management exceed site infrastructure storage volumes during construction, contingency measures would be available and could include for example use a hydrovac for offsite disposal.</p> <p>More broadly in terms of Project water management pond designs, ponds will be constructed to maintain a minimum freeboard of at least 1.0 m to allow for continued functioning during a probable maximum precipitation (PMP) event. The PMP event used for feasibility engineering designs is 493 mm. The PMP is very conservative as it effectively assumes a full year of precipitation in one event, under both existing and future climate conditions. For comparison, the PMP is well above both the 24-hour maximum precipitation (e.g., 72 mm recorded at Key Lake in 1998) and 1:100, 24 hour return precipitation events (e.g., 88.6 mm for climate change influenced IDF curves). However, in the event that a pond's design basis is exceeded, emergency spillways will direct excess water away safely as not to compromise the integrity of</p> |

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| | | | | <p>the water management infrastructure. An unplanned event such as a pond exceeding its design capacity will be reported to ERFN in a timely manner per the commitments in the Public Information Program.</p> <p>ERFN's engagement and review of the Environmental Management Program, including the Emergency Preparedness and Response Plan, will be completed in the agreed upon process for such future activities. The program and plans will outline commitments for the construction phase. While details on the plans are not available at this time, Denison welcomes ERFN's input and recognizes the importance of having qualified environmental professionals onsite during construction activities.</p> |
| Main Area of Concern for ERFN #7 | | | <p>In relation to IWWTP effluent it is stated that discharge will be to a surface waterbody or injected into groundwater via deep well inject. However, the EIS only assesses direct release of 10.1 L/s of effluent to Whitefish Lake during operations and decommissioning. As such, any deviation from this discharge plan would need to be assessed and approved prior to implementation. Concern in reference to Section 8.2.4.1.</p> | <p>Reference to effluent discharge via deep well injection was a typo in the draft EIS and will be removed from Section 8 of the final EIS. Effluent release is to Whitefish Lake only and no deep well injection of effluent is planned.</p> |
| Main Area of Concern for ERFN #8 | | | <p>Can you provide clarification re: Sulphate and sulphate (Hardness) concentrations provided? It would be anticipated that the screening concentration would change because of hardness, but it is unclear as to why the predicted concentration would increase?</p> <p>Concern in reference to Table 8.2-10.</p> | <p>There was a typographical error in Table 8.2-10 in the draft EIS; the sulphate (hardness) value in column LA-5 Well Mixed (7Q10) should read 63.83 mg/L. Table 8.2-10 is updated in the EIS and also includes the addition of MDMER constituents (these were added to address a comment from the federal review process, IR-114).</p> |
| Main Area of Concern for ERFN #9 | | | <p>Specifically, the EIS appears to only provide the IWWTP effluent quality and the concentration of COCPs following mixing in Whitefish Lake Middle (the basin where impacted discharge is expected to interact with the receiving environment). As dilution in Whitefish Lake Middle is required to meet guidelines for some COCPs, are chronic toxicity effects possible within the initial dilution zone within the basin including salinity? If yes, what portion of the available habitat would be impacted by elevated levels of COCPs? In relation to the potential for chronic exposure within a dilution zone, ERFN requests engagement as this should be captured within the aquatic effects monitoring. Concern in relation to Section 8.2.4.2.3.</p> | <p>An analysis of near-field effluent mixing was undertaken as part of the EIS, based on discharge to Whitefish Lake through an off-shore multiport diffuser. Simulations were carried under different flow scenarios using CORMIX to assess the size of the mixing zone. In this case, the meaning of "mixing zone" can be used synonymously with "regulatory mixing zone" that is defined as an area (or water volume) where numeric water quality thresholds (i.e., chronic effects thresholds) may be exceeded as long as conditions inducing acute toxicity are prevented. Such a situation (i.e., existence of a regulatory mixing zone) is envisioned by the MDMER (and in fact permitted by statute), as well as the provincial water quality policy framework.</p> <p>The results of effluent mixing analysis predicted that the regulatory mixing zone would be very small under each of the modelled scenarios. It was predicted that constituent concentrations would be equal to or less than their respective water quality objectives (i.e., chronic effects thresholds) within a few meters (up to 5 m) of discharge and by definition those constituent concentrations would be protective of the most sensitive life stage of the most sensitive resident aquatic taxa.</p> <p>Both effluent-based and receiver-based monitoring plans will be developed as the Project moves forward and Denison is committed to working with ERFN in that process. For reference, at minimum the programs would be designed consistent with and to meet the requirements of the MDMER, as well as provincial operating permits that will be negotiated subsequent to the EA process. Under MDMER, effluent (end of pipe) monitoring would include laboratory-based chemical and biological (acute and sublethal toxicity) measurement and testing (see MDMER Part 2, Division 2 – Effluent Monitoring Conditions). Under MDMER, receiver-based monitoring, including effluent and water quality monitoring studies and biological studies are completed within the framework of the Environmental Effects Monitoring program (MDMER, Schedule 5).</p> |

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| Main Area of Concern for ERFN #10 | | | <p>It would appear that a temperature assessment was not completed for the proposed heated treated effluent discharge line. It is assumed if there is the potential for adverse effect to the receiving environment, discharge limits would be stipulated as a licensing condition. ERFN requests engagement regarding the establishment of effluent discharge limits, as well as finalized remediated/restored solution targets.</p> <p>Section 8.2.4.2.5.</p> | <p>The EIS does consider the potential thermal effects of effluent in Whitefish Lake; please refer to Appendix 8-E Constituent Concentrations and Mixing Zone Assessment Report. Because the effluent holding ponds are outside, Denison anticipates very minimal differences in the temperature of effluent entering the lake versus the lake water itself. Effluent will be discharged to Whitefish Lake via a pipeline and multiport diffuser that will be situated at depth of 3-4 meters depth. The effluent itself will be held in effluent monitoring ponds prior to discharge and maximum effluent temperature is assumed to be 5 degrees Celsius during the winter. Water temperature in Whitefish Lake during ice-cover is expected to be between 3 and 4 degrees Celsius. As such, the effluent may have a temperature difference of between 1 and 2 degrees Celsius in the immediate zone of the diffuser ports. Mixing of the effluent with the receiving water will be nearly instantaneous and over an area of less than 5 m and generally near its depth of discharge (3 to 4 m). As a result, the thermal change within the highly localized mixing zone will be less than a degree Celsius.</p> <p>We note that Denison will be collecting field temperature in effluent samples as part of the requirements under Schedule 3 of the MDMER. Water quality monitoring will also be conducted to meet the requirements of the MDMER and includes recording temperature of water in both exposure (e.g., Whitefish Lake) and reference areas, per MDMER Section 7(1)(b). It is also assumed that similar monitoring requirements would be included within provincial approvals.</p> <p>The above monitoring will allow Denison to test the assumptions made in the EIS and to understand any potential thermal effects of effluent in Whitefish Lake. This level of monitoring is appropriate as a starting point. If based on monitoring data it was evident that the EIS assumptions were not being met the monitoring program would be adapted accordingly. This approach is consistent with Denison's overall approach to its proposed environmental monitoring programs that will incorporate adaptive management.</p> |
| Main Area of Concern for ERFN #11 | | | <p>Can it be clarified as to whether or not the clear span bridges proposed for stream crossings will be temporary or intended for use throughout the life of the project? There is uncertainty as the DFO Interim Code of Practice for Temporary Stream Crossings, but the use of these crossing doesn't seem to be limited to a limited stage of the life of mine?</p> <p>Concern in reference to Section 8.3.5.</p> | <p>The two clear span bridges proposed at stream crossing locations would be in place for the life of the Project to allow for transportation of staff and contractors between the airstrip and the main Wheeler River Project site.</p> <p>Section 8.3.5 of the draft EIS does list adherence to the Interim Code of Practice for Temporary Stream Crossings as a mitigation measure, as applicable. Denison does not expect this code of practice would apply to the final, constructed clear span bridges, since these are not temporary structures. However, depending on how construction sequencing and logistics proceeds, Denison may use temporary watercourse crossings to access the eastern shores of the streams, as needed. Temporary stream crossings are employed for short term access across a watercourse by construction vehicles when an existing crossing is not available or practical to use. Denison acknowledges that any temporary watercourse crossings, if used, are not intended for prolonged use, per the code of practice.</p> |
| Main Area of Concern for ERFN #12 | | | <p>What is the rationale for the timeframe (post-closure) criteria in terms of concluding full reversibility of an effect? Table 3-4 of Appendix 10-A indicates that mass flux (mg/s) rates of molybdenum and selenium persist for 1000 years or more following the end of decommissioning. Further, it is our experience that effects to sediment quality would not decrease for some time following cessation of the water quality effects.</p> <p>Concern in reference to Table 8.3-9.</p> | <p>The Section 8.3 assessment related to the Fish and Fish Habitat Valued Component's Key Indicator of surface water quality is focused on the release of treated effluent. As such, the timeframe for the fully reversible rating in Table 8.3-9 is the post-decommissioning period and considers whether or not the residual effect on surface water quality can be reversed once the activity causing the residual effect (i.e., treated effluent release) ceases. Refer to draft EIS, Appendix 10-A, Figure 3-2 for modelled concentrations of COPCs in water, which show COPC concentrations returning to baseline concentrations in the post-decommissioning period. The figure shows the first five years of post-decommissioning and the actual post-decommissioning period extends to a total of 15 years.</p> <p>The "future centuries" scenario evaluates the potential effects post-restoration (i.e., beyond the Project timeline of 0-38 years) and reflects the time period over which the highest constituent concentrations in groundwater are predicted to migrate towards and interact with surface water. The period of time between the cessation of discharge of treated effluent to Whitefish Lake and when remediated solution in the decommissioned mining area migrates to Whitefish Lake is hundreds to thousands of years. To be conservative the future centuries modelling in Appendix 10-A assumed the mass flux from groundwater to Whitefish Lake starts 200 years after the post-decommissioning phase. Between the end of post-decommissioning period and the start of the future centuries, any changes to surface water quality from treated effluent release would be fully reversed (refer to Appendix 10-A, Figure 3-4). The EIS considered the post-</p> |

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| | | | | <p>decommissioning changes through the future centuries assessment which was completed in Appendix 10-A. The predicted maximum concentrations of COPCs in water and sediment during future centuries are shown in Appendix 10-A, Table 3-5. There are no predicted exceedances of water and sediment quality guidelines for any of the COPCs and as such, the future centuries evaluations were not carried through the residual effect characterizations in Section 8.</p> <p>As a result of the continued technical review until October 2024, Denison was requested to further assess copper compared to Federal Environmental Quality Guidelines and the following clarification was made within the EIS:</p> <p>Denison notes one exception for copper where baseline concentrations exceed the FEQG (due to the copper analytical detection limit being equal to the FEQG) and an incremental increase in concentration is predicted such that the predicted copper concentration (0.0006 mg/L) would be greater than the FEQG of 0.0002 mg/L under baseline conditions, indicating a slight increased level of risk to the most sensitive aquatic biota. We expect this exceedance will not persist through future iterations of the future centuries modelling once additional baseline surface water quality data is collected at detectable concentrations.</p> |
| Main Area of Concern for ERFN #13 | | | <p>There appears to be some uncertainty regarding the benthic invertebrate community and tissue chemistry data provided. Regarding the tissue chemistry, it is understood that baseline data would have been used to evaluate the baseline predicted by the environmental effects assessment, and as such questions regarding the ERA sampling program may not affect the outcome of the assessment. However, having a robust baseline in terms of benthic invertebrate community composition and abundance would be required to complete a before-and-control-impact assessment (pre and post operations). It is our experience that benthic invertebrate community composition and relative abundance are sensitive end point to changes in aqueous and sediment metal concentrations. If changes are observed above those predicted in the EIS, the first area of investigation would be metal speciation and contaminant bioaccumulation in the organisms.</p> <p>Concern in reference to Section 8.4.3.2.5 and Table 8.4-4.</p> | <p>For clarity, in the ERA model (Appendix 10-A) the benthic invertebrate tissue chemistry predictions shown are modelled values based on exposure to surface water and sediment in consideration of Project-related releases to the aquatic environment and appropriate bioaccumulation factors. The measured baseline benthic invertebrate chemistry was not used specifically within the ERA, but the ERA was informed by the measured data in that the baseline data were used to validate the model predictions. Generally, there was reasonable agreement for many parameters though some constituent concentrations were either over- or underestimated by the model. The model predictions will be updated as part of routine ERA updates throughout the life of the Project. Additionally, the model predictions will be compared to measured benthic invertebrate tissue chemistry collected as part of monitoring programs. The overall objective of this process is to continue to gain a better understanding of potential risks associated with the Project as more operational data are generated and reduce the uncertainty related to estimating such risks.</p> <p>A very brief overview of the benthic invertebrate data collected as part of the environment baseline characterization is shared below for reference. Benthic invertebrate samples were collected in 2016 at ten lake locations and a total of 78 benthic invertebrate taxa from 38 major taxonomic groups (Families) were identified within the study area (Appendix 8-D). Chironomids were prevalent across the study area and were the most numerically dominant taxon at most locations. Other taxonomic groups that represented more than 10% of the total benthic invertebrate density at a sampling location were detritus worms (Naididae), pill clams (Pisidiidae), water fleas from the families Holopedidae and Macrothricidae, and phantom midges (Chaoboridae). From a feeding group perspective, predatory taxa and those that feed on fine particulate organic matter (collector-gatherers) were generally the most abundant groups in lakes within the study area.</p> <p>As alluded to in the review comment, benthic invertebrates will be utilized to assess potential effects related to the Project, and in particular those that may be associated with the discharge of effluent. As such, and also as noted in the review comment a “robust” baseline data set is needed to evaluate such effects. The baseline benthic invertebrate collections made in areas relevant to assessing the potential effects of effluent discharge were sampled with rigour (i.e., sample replication and processing methodology) consistent with the federal EEM program requirements, and therefore in that regard meet the robustness test and can be used to help define the before condition in the Before After Control Impact (“BACI” – described #39) framework. Moving forward (that is in the operations phase of the Project), benthic invertebrate community sampling will be implemented through the site’s EEM program and, at minimum, would be completed in a manner consistent with MDMER requirements. Sampling would focus on upstream reference areas and downstream effluent exposed areas and would be statistically based to ensure an appropriate level of statistical power is provided to determine whether there are mine-related effects, or not. Endpoints that would be measured include density, richness, evenness and community composition (via the B-C Index).</p> |

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| | | | | <p>The above does not preclude the execution of a further before operations benthic invertebrate community sampling program that would further define the before condition in the BACI framework. Such considerations are in the early planning stages and will be considered in the next stage of EMS documentation whereby plans and procedures are developed. As previously indicated Denison is committed to involving ERFN in development of those plans.</p> |
| Main Area of Concern for ERFN #14 | | | <p>It is stated that pre-constructed listed plant surveys / breeding bird surveys would be required on the final project footprint with ecosites that were not sampled in 2017; however, it is ERFN's understanding from the June 22nd site tour that almost all of the footprint has already been disturbed. Were preconstruction surveys completed prior to clearing activities? Concern in relation to Section 9.1.1.1 and Section 9.4.3.</p> | <p>The commitments made in the EIS, including those related to pre-construction surveys, are applicable to the Project as it advances to the Project development phase. Any forest clearing completed by Denison to date was done in accordance with the Saskatchewan mineral exploration guidelines and permitted through Saskatchewan Ministry of Environment, Lands Branch as part of exploration activities.</p> <p>While some limited areas above the Phoenix uranium deposit and trails have been cleared in previous years to access the site as part of exploration activities, the majority of the proposed Project Area has not been cleared. For example, the footprints of the proposed airstrip, camp, processing plant, borrow area, landfills, and portions of the access roads within the Project Area are undisturbed areas consisting primarily of upland jack pine ecosites. Please refer to draft EIS Figure 9.2-6: Vegetation Communities and Ecosystems within the Project Study Areas for a visual representation of the current anthropogenic disturbance within the Project Area. The current anthropogenic disturbance in the Project Area is approximately 24.8 hectares which represents less than 15% of the total Project Area (169.6 ha) (refer to draft EIS table 9.4-20 Summary of Available Common Nighthawk Habitat, Direct Habitat Loss, and Habitat Alteration in the Study Areas).</p> |
| Main Area of Concern for ERFN #15 | | | <p>ERFN is looking for commitment later in the permitting phase to discuss the development and monitoring of key indicators (KIs) for community health and wellness that reflect the perspectives of community members within the region. Firstly, it is recommended that human health evaluation efforts and KIs / measurement endpoints be reviewed and consider expanding to encompass directly the health of Patuanak/Wapachewunak community members and perceived risks. This may not be required to finalize the EIS as we understand the Human Health Conceptual Site Model based on fisher/trapper on Whitefish Lake and post-closure permanent resident on Whitefish Lake, however, it would be valuable to addressing concerns throughout the life of the project. For example, continued engagement with ERFN communities has identified that regardless of historical radiation protection performance, country food monitoring results and mine/mill personnel health monitoring, community member still believe that uranium mining contributes to cancer rates in community members. Perhaps a community specific KI could be developed and monitored (e.g., a limited uranium testing program looking at levels in ERFN residents on reserve versus off reserve). Further, local scale economy and wellness KIs could be proposed that reflect community members perspectives (e.g., local traffic rates / accidents and community quality of life and income disparity). Concern in relation to Section 10.1.1.2, Section 10.1.1.3, Section 10.1.3.2, Section 12.1.1.2, and Section 12.1.6</p> | <p>As noted in the draft EIS, Section 10.1.8 monitoring will focus on collecting data to verify ERA model predictions as well as provide data to improve model predictions as the Project begins, with the goal of reducing uncertainty over time. It is expected this will be an iterative process, and will be approached in consultation with Indigenous groups, other stakeholders, and relevant federal and provincial agencies with interest. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions. The environmental monitoring program is anticipated to include air emissions, surface water, sediment, soil samples, fish tissue sampling, benthic invertebrate tissue sampling, and country food sampling. Monitoring is currently anticipated on Whitefish Lake, McGowan Lake and Russell Lake, and could be expanded based on the interests of ERFN.</p> <p>Although no specific monitoring is currently anticipated with regards to the Cultural Expression VC (Section 12.1.8) follow-up programs for the EIS are proposed to address any uncertainties identified during the EA process. Denison is committed to working with ERFN to understand how this might be executed at the community level to address community perspectives.</p> |
| 104 | English River First Nation (ERFN) (February 22, 2023) | Section 6.1.1.2.3 Other Guidelines and Standards | <p>Comment #ERFN-001: Background radon concentrations were used for predicted concentrations for the Project without an appropriate rationale for why CNSC criteria are not used. Question/Recommendation: Provide rationale why background radon concentrations were used in favour of air quality emissions standards/criteria from CNSC for predicted radon concentrations from the Project.</p> | <p>As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement.</p> |

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| 105 | ERFN (February 22, 2023) | Section 6.1.1.3 Spatial and Temporal Boundaries | <p>Comment #ERFN-002: For simplicity, a single criterion and time-averaging period were selected for each COPC based on the most stringent criteria or standard presented (federal/provincial). Time period effects are expected to occur in relation to project phases and activities (scenarios), and that the prediction of effects are applicable to/driven by MPs and air quality criteria (1-hour, and 24-hour – short term emissions; and, 30-day, and annual averaging periods). Average compositions from dust fall data during baseline studies was limited to two sampling events (September and October 2021) and presented as a percentage of fixed dust fall – the lowest average of measurable concentrations was used to represent background levels.</p> <p>Question/Recommendation: The AQ modelling assumptions used for the Project are heavily reliant on conversion calculations and average baseline measurable concentrations from passive monitoring methods, instead of a more conservative approach using maximum measurable concentrations. Denison iterates that maximum concentrations for each scenario were extracted from modelling results and compared to criteria to determine effects; however, for dust fall, the lowest average measurable baseline concentrations were used to represent background levels in the modelling.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 106 | ERFN (February 22, 2023) | Section 6.1.1.2.4 Summary of Assessment Criteria (KIs and MPs) Section 6.1.3.2 Existing Environment Air Quality | <p>Comment #ERFN-003: As KIs associated with the Air Quality VC pertain to levels of dust, combustion products, uranium, metals, and/or radionuclides; passive monitoring methods (commenced in 2016) were used to characterize the baseline air quality for the Project (included particulate matter [dust fall], NO₂, SO₂, radon, and external gamma). Provincial regional background concentrations were used for TSP, PM₁₀, PM_{2.5}, NO₂, SO₂, CO; while Key Lake ECCC background data were used to represent concentrations of uranium, arsenic, and nickel; and Cigar Lake data were used for copper, lead, selenium, and zinc background concentrations.</p> <p>Question/Recommendation: Passive methods represent averaged concentrations for deployment periods, and in some cases are not directly comparable to the regulatory criteria identified in Table 6.1-5. Conversion calculations were used on the passive monitoring data to compare the minimum requirements of averaged baseline results gathered, against identified provincial/federal criteria for use in modelling effects for the Project. Only predicted short-term (less than 3 years) and medium-term exceedances of modelled COPC concentrations of TSP, PM₁₀, uranium (24-hour), and NO₂ (1-hour) to exceed air quality criteria at receptors located outside of the Property Boundary (6.1.4.2); however, as per the Saskatchewan Air Quality Modelling Guideline (SK MOE 2012), the eight highest 1-hour predictions and the single highest 24-hour prediction at each receptor can be discarded.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 107 | ERFN (February 22, 2023) | Section 6.1.1.2.4 Summary of Assessment Criteria (KIs and MPs) Section 6.1.3.2 Existing Environment Air Quality | <p>Comment #ERFN-004: Table 6.1-15 shows 24-hour Arsenic concentrations met criteria established in Table 6.1-5 for background level comparisons (0.003 µg/m³ – used conversion calculation due to passive sampling techniques used for baseline).</p> <p>Question/Recommendation: The EIS lacks clarity with respect to COPCs, as there was no discussion on the effects of 24-hour Arsenic concentrations meeting established criteria, nor was rationale included for the addition of Zinc as a COPC.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 108 | ERFN (February 22, 2023) | Section 6.1.3.2.7 Adopted Background Considerations | <p>Comment #ERFN-005: Ontario criteria for uranium in PM₁₀ were conservatively selected as the Project criteria although particle size information for ISR stacks (main source of Project uranium emissions) remains unknown. Input data to run the dispersion modelling included meteorological data from one year (2016 – minimum under guidelines).</p> <p>Question/Recommendation: Information is lacking on how uranium emissions can be mitigated if ISR plant stacks demonstrate particle sizes other than inhalable particulate matter (i.e., respirable particulate matter [PM_{2.5}] levels). Adjustments and refinements to the modelling and thus conclusions were made, heavily based on assumptions.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 109 | ERFN (February 22, 2023) | Section 6.1.3.1 Climate (Existing Environment) Section 6.1.7.1 Climate Change Considerations (Cumulative Effects) | Comment #ERFN-006: Climate considerations within the EIS do not address the potential for permafrost in the project area or potential disruption of permafrost by the Project (i.e., contributing GHG emissions directly and indirectly related to the project or as it relates to climate change). Question/Recommendation: Update Section 6 to include permafrost implications from interactions with the Project. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 110 | ERFN (February 22, 2023) | Section 6.1.3.1 Climate (Existing Environment) | Comment #ERFN-007: Baseline wind direction blowing predominantly from the west (~10%), followed by south and east directions (Appendix 6-C) with an average wind speed of 3.5 m/s. Proponent doesn't demonstrate relative maximums and minimums of wind speed over the averaging periods and wind data are not available for the climate normal period or from baseline studies for comparison and integration into project design/seasonal mitigations. Question/Recommendation: Update baseline information to reflect seasonal wind speed maximums and minimums and integrate it into mitigations. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 111 | ERFN (February 22, 2023) | Section 6.1.4.2 Potential Project-Related Effects | Comment #ERFN-008: "The propagation of air emissions from Project activities associated with Construction, Operation, and Decommissioning was predicted using version 7 of the CALMET/CALPUFF modelling package (Exponent 2015). ... While the Saskatchewan Air Quality Modelling Guideline identifies that the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) should be used for most assessments in Saskatchewan, Section 3.3 of the guideline does allow for the use of more sophisticated models, including CALPUFF, where justified (SK MOE 2012a)." (pp. 6-30) Question/Recommendation: From the Saskatchewan Air Quality Monitoring Guideline (Section 3.3) "The use of specialized models [CALPUFF] requires consultation... [and] maybe approved by the ministry on a case-by-case basis. This justification should clearly state the reasons why the approved models are not appropriate..." (SKMOE 2012). Provide a rationale for why the approved models were not appropriate based on the limited meteorological dataset available. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 112 | ERFN (February 22, 2023) | Section 6.1.5 Mitigation Measures | Comment #ERFN-009: Additional mitigation measures include the use of chemical dust suppressants to address Air Quality. Denison does not provide evidence discussing the potential impacts on Air Quality from the use of chemical dust suppressants. Question/Recommendation: ERFN requests that Denison provide discussion regarding the potential impacts of using chemical suppressants to mitigate dust including whether there are any risks to air quality associated with the chemical suppressants themselves. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 113 | ERFN (February 22, 2023) | Section 6.1.6.2 Significance and Confidence (Residual Effects Evaluation) | Comment #ERFN-010: Denison states that a gap analysis memo and model input summary was prepared as part of the draft EIS. The memo appears to be missing from the EIS appendices. Question/Recommendation: Please either provide ERFN with the memo or clearly indicate where in the appendices this information is available. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 114 | ERFN (February 22, 2023) | Section 6.2.3.1 Baseline Noise Measurement Program (Existing Environment) | <p>Comment #ERFN-011: Baseline data are not sufficient to support the assessment of noise impacts.</p> <p>Data were only collected for 2 locations during 1 week in May 2021 and did not include a portion of Highway 914 (like atmospheric component and identified traffic impacts from Project Activities).</p> <p>Unrepresentative data (meteorological events – temperature, relative humidity, precipitation, wind speed) were removed prior to summarization (14 hours, or 7.5% of measurement data). One of the two monitoring locations was disturbed during the monitoring period and these data were also discarded in the analysis.</p> <p>Question/Recommendation:</p> <p>Denison must provide further baseline information to support sound level criteria conclusions, project level-, residual-, and cumulative effects evaluations for modelling that links noise receptors with other VCs; as compliance determination is based on baseline measurements. Noise significance determination for receptor VCs may not be representative of actual conditions.</p> <p>Per the EIS, “based on professional experience, the SK MOE has considered the Alberta Directive 038 (AER 2013) as a suitable stand in for provincial guidance...”</p> <p>Please clarify how the current baseline data collection for noise aligns with this recommended guidance.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 115 | ERFN (February 22, 2023) | Section 2.3.3.1.1 Mining Area Remediation | <p>Comment #ERFN-012: Section 2.3.3.1.1 states that “the mining area decommissioning objectives have been developed through groundwater modelling work and are achievable based on metallurgical testing.” Section 7.6.2.1 refers to decommissioning objectives. The objectives are not appropriate for environmental protection. Table 2.3-3 decommissioning objectives portrays water quality that represents a substantial environmental risk and would need generations of monitoring to assess migration of this highly impacted plume. pH 4 is highly acidic and metal/radium levels are concerning (200 Bq/L radium is 200 to 1,000 times over safe limits). For species where baseline levels are higher than safe levels, baseline levels should be used as a target.</p> <p>Question/Recommendation:</p> <p>(i) Further effort should be taken to define the remediation goals that are achievable with best available technology and a commitment should be made to remediate to the maximum extent possible (until baseline levels are reached or the water is deemed suitable with no risk or need to monitor further). Funds spent to remediate will reduce the need for multi- generational monitoring and an unreasonable burden and risk on future generations (to monitor for a very long period of time).</p> <p>(ii) An options assessment for decommissioning objectives should be conducted based on Best Available Technologies (BAT) for treatment of contaminated groundwater and non-degradation approaches for the decommissioning objectives. Consultation on decommissioning objectives is required. Please revise the project closure plan to reflect updated decommissioning objectives.</p> <p>Also noted in Appendix B, Comment #1 (Source Environmental Associates).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 116 | ERFN (February 22, 2023) | Section 2.3.3.1.1 Mining Area Remediation | <p>Comment #ERFN-013: To determine groundwater targets for decommissioning, the levels for groundwater protection from contaminated sites should be used for this project. This would involve use of typical numerical standards rather than the risk-based approach used in the EIS. A minimum level of protection is to define baseline groundwater levels where baseline is greater than water quality guidelines for groundwater. It is acceptable to use the higher value as the target, with baseline being defined as 95% background.</p> <p>Question/Recommendation:</p> <p>As a point of reference, any groundwater decommissioning objective should be compared to the 95% background levels and/or numerical groundwater standards for contaminated sites at the depth of impact compared.</p> <p>Also noted in Appendix B, Comment #2 (Source Environmental Associates).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 117 | ERFN (February 22, 2023) | Section 2.3.3.1.1 Mining Area Remediation | <p>Comment #ERFN-014: Over the course of the project, a certain mass of acid will be added into solutions for injection into the formation. Use of peroxide/ferric may indirectly add acid load via oxidation of sulphide minerals or other oxidation-reduction reactions. Some of the acid used in the project will be neutralized on surface as part of water treatment and discharge. The difference between total acid added to the formation and acid neutralized on surface through treatment represents the net acid load added to the formation and left underground. The EIS describes one mitigation for the leach area as being pumping alkali solution (i.e. caustic) into the leach formation to neutralize residual acid.</p> <p>Question/Recommendation: The mass load of alkali used during decommissioning should be commensurate with the net acid load added to the formation throughout the Project. Mitigation planning along these lines is recommended for consideration to support development of more environmentally responsible decommissioning targets. Also noted in Appendix B, Comment #3 (Source Environmental Associates).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 118 | ERFN (February 22, 2023) | Section 2.3.3.1.1 Mining Area Remediation | <p>Comment #ERFN-015: Section 2.3.3.1.1 on decommissioning and remediation of the mine area is vague and should be expanded. For example, certain reagents "may" be used, freshwater will be mixed with contaminated water as a remediation method, and remediation plans will be further refined.</p> <p>Question/Recommendation: Without prejudice to previous comments on the suitability of proposed decommissioning objectives (i.e. Table 2.3-3), the EIS requires a more specific plan on how decommissioning objectives will be achieved and how remediation targets will be assessed to be met. Also noted in Appendix B, Comment #4 (Source Environmental Associates).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 119 | ERFN (February 22, 2023) | Section 2.3.3.1.1 Mining Area Remediation | <p>Comment #ERFN-016: To be able to plan for decommissioning, it is essential that targets developed now, at the EIS stage. Otherwise, the project could be unacceptable to communities in the long term and there is no recourse.</p> <p>Question/Recommendation: Mitigation planning to meet the closure targets must be outlined conceptually so that bonding can be put in place to ensure the targets are met and the project is acceptable. With that in mind, development of targets and an approach to achieve these targets is required at the EIS level and should not be deferred. Also noted in Appendix B, Comment #5 (Source Environmental Associates).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 120 | ERFN (February 22, 2023) | Section 2.3.3.1.1 Mining Area Remediation | <p>Comment #ERFN-017: The EIS states that the freeze wall will be allowed to thaw once recovered water meets the proposed mining decommissioning groundwater quality objectives and has been demonstrated to be "stable over sufficient time." The freeze wall should be maintained until there is no longer a groundwater plume. It is not environmentally responsible to leave the risk in the ground to monitor for many generations with the optimistic assumption that such a plume will not reach receiving environments. There is no precedent in Canada for the approach of purposefully leaving heavily impacted mine water injected underground with the expectation that it will not reach surface water. Modelling of such a plume is inherently uncertain and the highly impacted water represents a significant environmental hazard/liability.</p> <p>Question/Recommendation: (i) The approach should be to fully mitigate the groundwater zone impacted until the targets are reached. The stress on communities is too high if a groundwater plume of acidity is left in the ground. Adequate neutralization is critical for the groundwater impact zone so that a plume does not develop. Similar to regulation of contaminated sites source areas and plumes, the site is not remediated until it meets this standard of care. (ii) It is unclear from the EIS how it will be determined that the freeze wall is no longer required at the site. ERFN must be engaged indecision-making for thawing of the freeze wall after Decommissioning objectives have been met. Also noted in Appendix B, Comment #6 (Source Environmental Associates).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 121 | ERFN (February 22, 2023) | Section 7.8.2.2.4 Post-Decommissioning | <p>Comment #ERFN-018: Section 7.8.2.2.4 groundwater monitoring, post-decommissioning outlines that monitoring will continue indefinitely, until “transfer of the site into the provincial institutional control program.” This ongoing monitoring requirement and stress on communities and ongoing governance should be avoided or minimized to the extent possible by increasing the amount of remediation of the fluids to background levels.</p> <p>Purposely avoiding remediation efforts by passing the responsibility to ongoing monitoring adds significant uncertainty about whether objectives will be achieved, and should further mitigation be required, funds for execution would not be available from the closed project.</p> <p>Question/Recommendation: Monitoring should be done as a last approach after all efforts have been made to maximize remediation and minimize/remove the groundwater plume. For this project, the timelines and risks are too great to avoid mitigation measure for source control. The freeze wall, remediation pumping and treatment should continue until no further improvements are possible or targets are reached that reduce the need for long-term plume monitoring.</p> <p>Also noted in Appendix B, Comment #7 (Source Environmental Associates).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 122 | ERFN (February 22, 2023) | Section 7.8.2.2.3 - Decommissioning Operation; Figure 7.8-2 | <p>Comment #ERFN-019: Please clarify what changes to the groundwater monitoring network established during Operations will be anticipated during Decommissioning, including potential pathways of water from the mine site to the receiving environment. Figure 7.8-2 on PDF p. 618 of the EIS is meant to illustrate the conceptual groundwater monitoring network during Decommissioning; however the figure does not show the proposed monitoring locations.</p> <p>Question/Recommendation: A conceptual map similar to Figure 7.8-1 would be valuable and aid ERFN in determining the adequacy of the monitoring network and assessing potential impacts to important water courses.</p> <p>Also noted in Appendix B, Comment #8 (Source Environmental Associates).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 123 | ERFN (February 22, 2023) | Section 7.8.2.2.3 Decommissioning | <p>Comment #ERFN-020: The EIS mentions progressive reclamation in general terms.</p> <p>Question/Recommendation: The concept of progressive reclamation is recommended to be applied to remediation of groundwater in the different zones of the leach field after leaching of the zone is complete. For example, progressive reclamation/remediation of the Phase 1 and 3 could be started while leaching of Phase 4 and 5 is underway.</p> <p>Also noted in Appendix B, Comment #9 (Source Environmental Associates).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 124 | ERFN (February 22, 2023) | EIS Section 2.2.1.4.6 Mining Solution | <p>Comment #ERFN-021: The way water recycle is discussed and assessed in the EIS is inconsistent. Section 2.2.1.4.6 states “once [Uranium Bearing Solution] UBS is recovered to surface, it will be pumped from the wellfield into the processing plant where uranium will be removed from the UBS (Section 2.2.2). The treated solution created can be refortified with reagents as required and pumped back into the mining area to maximize water recycling during the life of the mine. No water recycling has been included in the water balances, although it is expected to occur.”</p> <p>Similarly, Section 2.2.3 states, “Denison intends to recycle process water to the greatest extent possible, thereby reducing the demand for freshwater supply and volume of treated effluent. To develop a conservative assessment basis for the EA, the water recycled flows from the industrial wastewater treatment plant back into the processing plant and wellfield have not been incorporated into the estimates for freshwater withdrawal and treated effluent discharge.”</p> <p>All models must be updated to include the operational strategy employed by Denison and actual conditions to occur during operations as best as possible.</p> <p>From the perspective of fresh water withdrawal from the environment, evaluating the project water balance with the assumption that no water is recycled is conservative. However, from a water management and water treatment perspective the opposite is true as use of water recycle reduces risks by reducing the total amount of solution requiring management, reducing the rate of discharge of treated effluent and associated contaminant load going to Whitefish Lake.</p> <p>Question/Recommendation: (i) The EIS should incorporate assessment of water recycling into a separate case for the water balance/water quality model (similar to the way base/upper case modeling is used for other phenomenon). The EIS should discuss limits of water recycling, such as the minimum amount of water required to operate the project or the potential for contaminant accumulation in leachate</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| | | | <p>that prevents effective recycle.</p> <p>(ii) Further, recycling all or portion of the process water may increase the concentration of contaminants reporting to the IWWTP and may impact the effluent quality achievable. Accumulation of contaminants in the recycled solution and its impact on the performance of the IWWTP and effluent quality must be assessed and discussed. Incorporating water recycle may reduce the amount of process water requiring treatment and discharge and so may help ameliorate the concern with the high salinity of treated water.</p> <p>Also noted in Appendix B, Comment #10 (Source Environmental Associates).</p> | |
| 125 | ERFN (February 22, 2023) | Section 2 General | <p>Comment #ERFN-022: The EIS describes several water storage ponds on surface including precipitate ponds and process water ponds. The design basis for these ponds in terms of how much solution storage is required is not clear in the EIS.</p> <p>Question/Recommendation:</p> <p>The EIS should discuss the sizing basis for these ponds in more detail, including storage capacity for probable-maximum-flood, pond capacity used by precipitate, freeboard volume, and normal operations volume. This should also be discussed in the context of the total amount of solution requiring management at a given time (underground and on surface) and the extent of water recycle achievable. The ability to safely manage process water on surface is a critical mitigation measure for the project and so understanding the design basis for these features is required to assess risk to the environment.</p> <p>Also noted in Appendix B, Comment #11 (Source Environmental Associates).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 126 | ERFN (February 22, 2023) | Section 2.2.2.2.1 Radon Purge Tank | <p>Comment #ERFN-023: Figure 2.2-13, the Processing Plant Overview shows the 5,000 m3 uranium solution holding area would include tanks. This is incongruent with Section 2.2.2.2.1, which states that the UBS holding area will be contained by a double composite liner system with leak detection adjacent to the processing plant and under a fabric tension building system.</p> <p>Question/Recommendation:</p> <p>It is unclear if Figure 2.2-13 shows what is currently being considered for the design.</p> <p>Also noted in Appendix B, Comment #12 (Source Environmental Associates).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 127 | ERFN (February 22, 2023) | Section 7.4.2 Potential Project- related Effects; EIS Section 7.6.1 Life of Mine (0 to 38 years) | <p>Comment #ERFN-024: Section 7.4.2 and section 7.6.2.1 describe scenarios for upward migration of acidic, impacted mining waters and include discussion of upward migration distances of 11 to 50 m. The basis for these scenarios is not made clear in the work and the rationale for why these scenarios are conservative is not sufficient. Upward migration could be a real risk for the project. For example, current and decommissioned boreholes for monitoring could be a pathway for migration of acidic, contaminated fluids to the surface.</p> <p>Question/Recommendation:</p> <p>The EIS should provide a compelling case for the conservatism of the current approach and/or more rigorously assess the impact of substantive upward migration of leach solution.</p> <p>Also noted in Appendix B, Comment #13 (Source Environmental Associates).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 128 | ERFN (February 22, 2023) | Section 2.2.1.3 Freeze Wall | <p>Comment #ERFN-025: Section 2.2.1.3 states "current plans are for the freeze wall to be a minimum of 10 m thick, be installed 25 m away from the uranium deposit, and extend 30 m into the basement rock (Figure 2.2-6)." This is 20 m smaller than the maximum extent of the area approximated to be influenced by mining around the deposit (50 m). This increases the risk of contaminants leakage from the mining affected area with potentially negative impacts on the receiving environment especially considering that the primary means of containing containment within the leaching zone relies on maintaining an inward hydraulic gradient by recovering more solution than what is being injected (1%). This is subject to planned and unplanned operational downtime due to maintenance or other reasons.</p> <p>Question/Recommendation:</p> <p>Please explain the rationale for the selection of a 30-m thick freeze wall and how it ensures the containment of contaminants as predicted under a variety of different site and mining conditions.</p> <p>Also noted in Appendix B, Comment #14 (Source Environmental Associates).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 129 | ERFN (February 22, 2023) | Section 2.2.1.3.1 Freeze Plant | <p>Comment #ERFN-026: The ammoniacal solution will be used in the freeze plant to maintain the freeze wall in place for the execution of mining activities. Section 2.2.1.3.1 states that “the freeze plant will be designed with ammonia safety in mind to monitor for and minimize risks to workers and the environment from potential leakages.” However, no information is provided on potential underground leakages and assessment of potential negative impacts on water quality/balance as well as any appropriate mitigation measures. This is important because as stated in the Application, “the sandstone hosting the uranium deposit is permeable and groundwater can flow horizontally through the deposit.”</p> <p>Question/Recommendation:</p> <p>(i) Has the freeze-wall brine been evaluated as a potential source of groundwater contamination?</p> <p>(ii) How would leakage of freeze-wall liquid be detected or assessed?</p> <p>Also noted in Appendix B, Comment #15 (Source Environmental Associates).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 130 | ERFN (February 22, 2023) | Section 2.2.6.2 Back-up Power Supply | <p>Comment #ERFN-027: Section 2.2.6.2 of the EIS states that “to provide electrical service during times of utility outages, diesel generators will be installed to service the site and maintain essential functions. The generators will be used to maintain power to the processing plant and the camp, as well as to maintain other essential services as required.” Given that maintaining the freeze wall as well as a negative water balance in the ISR area are key to the mitigation of environmental impacts, a plan must be developed for maintaining the operation of the ISR pumping and freeze systems during power outages.</p> <p>Question/Recommendation:</p> <p>The EIS should discuss the impact of short term power outages on freeze-wall operation and efficacy and on the water balance associated with solution injection/recovery.</p> <p>Also noted in Appendix B, Comment #16 (Source Environmental Associates).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 131 | ERFN (February 22, 2023) | Section 2.2.3.8 Industrial Wastewater Treatment Plant | <p>Comment #ERFN-028: An important aspect of preventing environmental impacts is the industrial wastewater treatment plant (IWWTP) that is to treat excess process water and surface runoff. The EIS provides limited information about this system, its design basis, the Project-specific testing conducted, or how the predicted effluent quality provided in Table 2.2-1 of the EIS was developed. Section 2.2.3.8 states, “a metallurgical test program was completed at SRC to help define the IWWTP design and performance criteria.” However, no reference is provided to this program, nor have its results or conclusions have been discussed in the Application. This is a key part of the mine design and it is important, for review, that the EIS provide the information needed to understand and evaluate the efficacy of the proposed mitigation measures.</p> <p>Question/Recommendation:</p> <p>Table 2.2-1 in Section 2.2.3.9 outlines the upper bound effluent quality proposed for the Project and states, “the effluent quality was determined to be achievable through laboratory test results conducted by Denison at SRC.” However, this section does not provide a comparison of the concentrations achieved at the bench scale with the upper bound limits.</p> <p>Also noted in Appendix B, Comment #17 (Source Environmental Associates).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 132 | ERFN (February 22, 2023) | Section 2.2.3.9 Treated Effluent Monitoring and Release Ponds | <p>Comment #ERFN-029: The IWWTP process appears to use processes similar to those of other waste water treatment sites in the Canadian uranium mining sector. It would be useful if the EIS discussed the IWWTP relative to analogue sites in terms of the treatment technologies used and the quality of effluent achieved at other sites.</p> <p>Question/Recommendation:</p> <p>How does the predicted effluent quality shown inspection 2.2.3.9 compare to effluent from analogue sites in the Canadian uranium sector, for example water treatment systems at Cameco and Orano’s projects in the region?</p> <p>Also noted in Appendix B, Comment #18 (Source Environmental Associates).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 133 | ERFN (February 22, 2023) | Section 2.2.3.9 Treated Effluent Monitoring and Release Ponds | <p>Comment #ERFN-030: Table 2.2-1 of the EIS shows predicted effluent quality for the IWWTP. This table includes a prediction that the total dissolved solids in effluent is predicted to be 6,420 mg/L, with 600 mg/L chloride and 3,915 mg/L sulphate. The table also includes predicted effluent for copper of 0.042 mg/L. These levels approach the British Columbia’s water quality guidelines associated with acute toxicity and so may be acutely toxic at the end-of-pipe (i.e. prior to discharge via diffuser in Whitefish Lake and subsequent dilution). Section 36.3 of the Fisheries Act specifies that, no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish.”[1] The Canadian Metal and Diamond Mining Effluent Regulations (MDMER) includes a definition of deleterious substance as effluent that is</p> | <p>As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement.</p> <p>As a result of the continued technical review until October 2024, Denison updated Table 2.2-1 to be reflective of the Federal Environmental Quality Guidelines for Copper.</p> |

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| | | | <p>acutely lethal to several commonly tested species of fish and aquatic life.</p> <p>Question/Recommendation:</p> <p>Guidelines are not prescriptive and so the predicted effluent may or may not be acutely toxic, but since the levels of contaminants in predicted effluent are relatively high, it is recommended that the risk of acutely toxic effluent at end-of-pipe be assessed to support the EIS. Specifically, it is recommended that acute toxicity tests as described by MDMER be conducted on water quality matching the predicted effluent presented in the EIS.</p> <p>[1] https://laws-lois.justice.gc.ca/eng/acts/F-14/page-5.html#docCont</p> <p>Also noted in Appendix B, Comment #19 (Source Environmental Associates).</p> | |
| 134 | ERFN (February 22, 2023) | Section 2.2.3.8 and 2.2.3.9 | <p>Comment #ERFN-031:</p> <p>(i) Sections 2.2.3.8 and 2.2.3.9 of the EIS describe the IWWTP and note that the design of the system is being informed by an ongoing Best Available Technology (BAT) study. The EIS is not clear if the system as described in the EIS is a reflection of application of BAT or if this is an interim design pending completion of the BAT study.</p> <p>(ii) Similarly, the EIS notes the use of zero valent iron (ZVI) as a treatment reagent but it is not apparent how this is to be used in the process. ZVI can be a very effective method for removing metals and metalloids from mine water, particularly for relatively small treatment systems</p> <p>(iii) Finally, the impact of different treatment technologies on TDS of effluent should be considered given the previous comment about potential for acute toxicity with the predicted effluent quality. Salt removal systems should be evaluated</p> <p>Question/Recommendation:</p> <p>(i) Given the predicted effluent quality in 2.2.3.9 and the relatively high predicted levels of copper, it is recommended that this BAT study include assessment of use of organosulphide reagents (i.e. trimercapto-triazine). This type of chemical is a common and inexpensive method of removing heavy metals such as copper and cadmium from water. Use of organosulphide is commonly incorporated into mine water treatment systems and is generally recognized as part of BAT treatment of mine water [1]. Copper levels in the range of single digit parts per billion (ppb) are achievable, below the 22 ppb predicted effluent quality.</p> <p>(ii) ERFN support the inclusion of this reagent in the process but requests additional information on how it is to be used. The predicted level of selenium in effluent (42 ppb) can likely be improved on through better application of ZVI</p> <p>(iii) Overall, ERFN support the use of a BAT study to inform design of the IWWTP and recommend that further bench testing be conducted in the future following the BAT study to improve on the predicted effluent quality presented in the EIS</p> <p>[1] https://mend-nedem.org/wp-content/uploads/MEND3.50.1BATEAppAD.pdf Also noted in Appendix B, Comment #20 (Source Environmental Associates).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 135 | ERFN (February 22, 2023) | Section 2.2.3.8 Industrial Wastewater Treatment Plant | <p>Comment #ERFN-032: According to the IWWTP flowsheet shown in section 2.2.3.8 of the EIS, treated effluent will be recycled</p> <p>Question/Recommendation:</p> <p>Considering that the leach is acidic and the IWWTP involves acid neutralization, it is recommended that drawing water for recycle from earlier in the treatment process be considered. This would reduce reagent demands from unnecessary acidification/neutralization as well as the amount of radionuclide and metals-laden treatment by-products that will have to be used and managed.</p> <p>Also noted in Appendix B, Comment #21 (Source Environmental Associates).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 136 | ERFN (February 22, 2023) | Section 2.2.3.9 Treated Effluent Monitoring and Release Ponds | <p>Comment #ERFN-033: Section 2.2.3.9 of the EIS states, "the effluent quality was determined to be achievable through laboratory test results conducted by Denison at SRC." However, Section 6.2 of Appendix 10- A (Sensitivity Analysis) states, "If treated effluent is released at the maximum upper bound discharge rate, cadmium concentration in Whitefish Middle/South and McGowan Lake (LA-1) would exceed its surface water quality guideline of 0.00004 mg/L, and chromium concentration in Whitefish Middle/South would exceed its surface water quality guideline of 0.001 mg/L. The modelled concentrations of other COPCs are expected to be below their corresponding surface water quality guidelines."</p> <p>Question/Recommendation:</p> <p>Methods of preventing these exceedances should be explored and incorporated into the project. For example, alternative treatment technology may reduce metal loading with treated effluent, and greater water recycle would reduce the volume of treated water discharged, reducing the load of metal introduced to Whitefish Lake via treated effluent.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| | | | <p>More generally, these exceedances caused by a higher rate of discharge is an example of how the assumption to exclude water recycling from water balance predictions is not entirely conservative.</p> <p>Also noted in Appendix B, Comment #22 (Source Environmental Associates).</p> | |
| 137 | ERFN (February 22, 2023) | Section 7.0 Geology and Groundwater | <p>Comment #ERFN-034: The Application lacks a clear discussion of the various source terms that were considered for water quality modelling. Most reagents utilized for the ISR process include highly soluble contents and must be considered for modelling purposes. The Application is lacking a clear discussion of the various source terms and information geochemical stability of various sources that were considered for water quality modelling.</p> <p>Question/Recommendation: Please clearly describe the sources of various contaminants in process water and how they inform water management/water treatment design. Distinguish between contaminants found in natural groundwater, contaminants released through leaching, and contaminants introduced as mill reagents (i.e. sulphate, TDS).</p> <p>Also noted in Appendix B, Comment #23 (Source Environmental Associates).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 138 | ERFN (February 22, 2023) | Section 2.2.1.4.3 Permeability Enhancement | <p>Comment #ERFN-035: Section 2.2.1.4.3 lists options considered for enhancing leach solution permeability in the leaching zone and includes potential for use of propellant permeability enhancement.</p> <p>Question/Recommendation: (i) How does this material compare to common blasting explosives (i.e. ANFO) in terms of potential for water soluble explosive residue to be left behind after use? (ii) ANFO is commonly an environmentally relevant source of ammonia, nitrite, and nitrate at mine sites. (iii) Please discuss the potential impact of propellant permeability enhancement products as a source of contaminants.</p> <p>Also noted in Appendix B, Comment #24 (Source Environmental Associates).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 139 | ERFN (February 22, 2023) | Section 2.2.2 Processing Plant Components | <p>Comment #ERFN-036: Section 2.2.2 states “Denison’s processing plans are based on numerous metallurgical tests completed as part of engineering activities. A detailed metallurgical testing program was developed and implemented in collaboration with the Saskatchewan Research Council (SRC) under the supervision of several third- party consultants and Denison.</p> <p>Around 1,000 L of UBS was produced by leaching over 64 kg of core samples recovered from the Phoenix deposit and the UBS produced was tested using variations of several parameters to define the processing plant design and its components.” This work is critical for informing levels of contaminants expected to be leached in the in-situ process which in turn require treatment and management. This work is not discussed substantially in the EIS.</p> <p>Question/Recommendation: The EIS should discuss how this work was carried out, a summary of key conclusions including estimates of freshwater and recycled water use, recoveries expected, reagents consumed, waste produced and steady-state contaminant concentrations.</p> <p>Also noted in Appendix B, Comment #25 (Source Environmental Associates).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 140 | ERFN (February 22, 2023) | Section 2.2.4.8 Clean Waste Rock and Clean Waste Rock Pad | <p>Comment #ERFN-037: Section 2.2.4.8 states that approximately 7,800 m3 of clean waste rock will be generated because of mining activities, and Section 2.2.3.6 states that “a pond may be constructed beside the clean waste rock pad (Section 2.2.4.8) to collect runoff if required. The pond would be a single geomembrane-lined pond (Figure 2.2-26). Water collected in the clean waste rock pond would be routed to the process water pond.”</p> <p>Question/Recommendation: The Application however does not provide information on the geochemical stability of the waste rock and how waste rock is expected to impact water quality of runoff/pond inflow.</p> <p>Also noted in Appendix B, Comment #26 (Source Environmental Associates).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 141 | ERFN (February 22, 2023) | Section 2.2.3.8 Industrial Wastewater Treatment Plant | <p>Comment #ERFN-038: Section 2.2.3.8 states that “the majority of the IWWTP precipitates formed during the second stage of treatment are gypsum and these precipitates are not expected to be radioactive.”</p> <p>Question/Recommendation:</p> <p>(i) How much radioactivity is expected in these solids?</p> <p>(ii) Did the metallurgical test program include testing these solids for radioactivity and, if available, have these results been considered in the long-term management strategy for these solids?</p> <p>Also noted in Appendix B, Comment #27 (Source Environmental Associates).</p> | <p>As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement.</p> <p>As a result of the continued technical review until October 2024, the additional specific commitment has been made: Denison has committed to pre-construction and pre-clearing surveys for multiple species. Surveys will be completed by a qualified professional biologist that will refer to available guidance and protocols.</p> |
| 142 | ERFN (February 22, 2023) | Section 2.2.3 Water Management | <p>Comment #ERFN-039: Figures 2.2-15 and 2.2-16 show that water from the IWWTP process precipitate pond will be recycled to the process pond at a rate of 5.35 m3/h that then primarily reports back to the IWWTP for treatment with some used for drilling. The water from the IWWTP precipitate pond forms ~65% and 41% of the flow rate reporting to the IWWTP for treatment during the operations and Decommissioning phases, respectively, so this is a significant source of feed water to the IWWTP.</p> <p>Question/Recommendation:</p> <p>The geochemical stability of the precipitates in the two ponds should be evaluated and incorporated as source terms in water quality modeling. This should be discussed in the EIS.</p> <p>Also noted in Appendix B, Comment #28 (Source Environmental Associates).</p> | <p>As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement.</p> |
| 143 | ERFN (February 22, 2023) | Section 7.0 Geology and Groundwater | <p>Comment #ERFN-040: The EIS does not provide information on the mine’s plans for events of care and maintenance (C&M) or temporary closure. C&M is an important potential phase of mine life that warrant assessment of potential impacts. During C&M, changes to the site- wide water balance would be expected, potentially requiring modifications to the water management strategies at the site. In particular, it is important that a conceptual plan for how solution would be recovered/injected/managed on surface during a period of care and maintenance.</p> <p>Question/Recommendation:</p> <p>The EIS should include a conceptual description of how each major piece of mine infrastructure would be operated during C&M maintenance and how risk of environmental impact would be mitigated under these conditions. The following topics are recommended for discussion in C&M planning at the EIS level:</p> <p>(i) Any significant changes to the water management strategies at the site, including whether the Industrial Wastewater Treatment Plant would be expected to continue operating during C&M.</p> <p>(ii) Any significant changes in how the freeze wall would be operated.</p> <p>(iii) Discussion of how leachate and process solution would be managed, i.e. would injection/recovery continue or cease, would any recovered solution be subjected to uranium recovery, how solution would be managed on surface if re-injection ceased.</p> <p>(iv) If monitoring activities would change during care and maintenance.</p> <p>(v) If any new mitigation measures are required to address C&M specific risks.</p> <p>The development of the Care and Maintenance Plan must include input from ERFN. Also noted in Appendix B, Comment #29 (Source Environmental Associates).</p> | <p>As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement.</p> |
| 144 | ERFN (February 22, 2023) | Section 2.9.1 Environmental Management System Framework | <p>Comment #ERFN-041: Section 2.9.1 includes discussion of several environmental management plans.</p> <p>Question/Recommendation:</p> <p>As a general comment, ERFN recommend that requirements for any project plan include the following, at a minimum, in addition to plan- specific topics:</p> <p>(i) Purpose and objectives of the plan;</p> <p>(ii) Roles and responsibilities of staff including identification of Qualified Professionals(s);</p> <p>(iii) Schedule for implementing the plan through relevant project phases;</p> <p>(iv) Means by which the effectiveness of the mitigation measures will be evaluated including the schedule for evaluating effectiveness;</p> <p>(v) Schedules and methods for the submission of reporting to specific regulatory agencies, ERFN, and the public and the required form and content of those reports;</p> <p>(vi) Process and timing for updating and revising the plan including consultation with regulatory agencies and ERFN that would occur in connection with such updates and revisions.</p> <p>Further, following the development of a plan, the plan should be provided to regulatory agencies and ERFN for review and consultation. Consultation should include invitation for agencies and</p> | <p>As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement.</p> |

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| | | | ERFN to provide their views on the content of the plan in a reasonable timeframe. Subsequently, Denison should provide a written explanation to each party that provided comments describing how the views and information provided by the party has been considered in the revised plan or why such views and information were not addressed in a revised plan Also noted in Appendix B, Comment #30 (Source Environmental Associates). | |
| 145 | ERFN (February 22, 2023) | Section 2.9.1 Environmental Management System Framework | Comment #ERFN-042: Section 2.9.1 of the EIS discusses environmental management activities including emergency response. As written, this section of the EIS focuses on the roles and responsibilities of Project staff. Communication to ERFN in the event of a mine emergency is critical for ERFN to evaluate potential impacts to rights and interests. Some mines in Canada overlook the importance of this communication and erode important partnerships with their Indigenous hosts by communicating information late or without transparency. Question/Recommendation: Recommendations for inclusion in the Plan include a communication protocol based on emergency risk ratings and communications with Nation representatives for high consequence near-miss incidents (i.e. near-miss incidents that could have resulted in major environmental impacts or medical emergencies), as these can be valuable opportunities to improve training and operating practices. It is recommended that management plans and emergency response planning include communication protocols with ERFN so that ERFN is alerted to any incident in a timely fashion. Collaboration with ERFN in plan development, communication protocol, involvement of ERFN members in monitoring/response planning is recommended. Also noted in Appendix B, Comment #31 (Source Environmental Associates). | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 146 | ERFN (February 22, 2023) | Section 2.2.4.5 Process Precipitate Pond | Comment #ERFN-043: Section 2.2.4.5 states “the precipitates generated in the processing plant will be transferred to the process precipitate pond.....this pond design will allow the precipitate totes to be stacked below ground level.....any runoff collected in the pond will be directed to the process water pond and recycled through the plant.” The Application also states that the waste stored in this pond contains 2-3% uranium rendering it potentially economic for resale and recovery. Question/Recommendation: A plan for managing this material should reprocessing not be economically viable should be prepared and discussed in the EIS. Also noted in Appendix B, Comment #32 (Source Environmental Associates). | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 147 | ERFN (February 22, 2023) | Section 2.2.4.3.2 Industrial Landfill | Comment #ERFN-044: Section 2.2.4.3.2 discusses the industrial landfill that accepts industrial waste including radiologically contaminated waste. Leachate from this landfill will be collected and sent to the leachate collection pond immediately north of the landfill and eventually to the process water pond. Although the Application states that “upon closure of the site, the industrial landfill will be covered with an engineered impermeable liner system to minimize infiltration of precipitation into the containment system,” the leachate is not expected to stop. The Application however does not provide information on the management of the leachate from the industrial landfill post- closure. Question/Recommendation: Considering the limited life of the double liner system used for the landfill area, management of radiologically contaminated waste and its impact on the receiving environment for all phases of the project must be discussed in the EIS. Also noted in Appendix B, Comment #33 (Source Environmental Associates). | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 148 | ERFN (February 22, 2023) | Section 2.2.2.2.1 Radon Purge Tank | Comment #ERFN-045: Section 2.2.2.2.1 states “the radon purge tank will contain a mechanical ventilation system to facilitate the aeration of the solution and the removal of radon gas from the UBS to the air outside of the plant.” Question/Recommendation: (i) Is radon stripping on the exhaust proposed or is it to be directed into the atmosphere? (ii) Has exposure outside the building been evaluated? Also noted in Appendix B, Comment #34 (Source Environmental Associates). | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 149 | ERFN (February 22, 2023) | Section 8.1.3 Existing Environment | Comment #ERFN-046: Detailed baseline hydrology collected in 2011-2014, prior to the operation of Cameco Cigar Lake. Very little data have been collected since (~1 measurement per year 2016-2019) Question/Recommendation: Update continuous flow data to include more recent years, with emphasis on low-flow period and winter flows. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 150 | ERFN (February 22, 2023) | Section 8 General (Aquatic Environment) | Comment #ERFN-047: Surface water withdrawal Question/Recommendation: Please provide description(of waterbody characteristics as well as the precise latitude and longitude proposed) of all water withdrawal points to be used at any point during this project. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 151 | ERFN (February 22, 2023) | Section 8 General (Aquatic Environment) | Comment #ERFN-048: Recycling of process water. Question/Recommendation: Please provide examples from existing ISR projects that support the efficacy of process water treatment and re-use. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 152 | ERFN (February 22, 2023) | Section 8.1 General (Aquatic Environment) | Comment #ERFN-049: Recycling of process water appears to not be meaningfully incorporated into water balance modelling. Question/Recommendation: Please clarify and justify how recycled process water was incorporated into surface water quantity / water balance modelling. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 153 | ERFN (February 22, 2023) | Section 8.1.5 Mitigation Measures | Comment #ERFN-050: Denison makes “loose” promises with regard to maintenance and monitoring of water control structures, and avoiding sedimentation in local waterbodies/watercourses Question/Recommendation: Provide a water management plan (WMP) that addresses each phase of the project. Denison notes high confidence in assessments, implying few/no unknowns that would inhibit the creation of a sufficient WMP | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 154 | ERFN (February 22, 2023) | Section 8.1.9 Surface Water Quality | Comment #ERFN-051: Notable lack of winter data for stream and lake sites. Question/Recommendation: Conduct at least 1 winter field visit to verify/refine field data. The focus should be on watercourses adjacent to and directly interacting with the project, and the proposed discharge zone in South Whitefish Lake. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 155 | ERFN (February 22, 2023) | Section 8.2.3.3; Tables 8.2-2 to 8.2-4 Existing Surface Water Quality | Comment #ERFN-052: Note these tables use different benchmark/guideline compared to the Water Quality baseline study for Molybdenum and Zinc. Question/Recommendation: Proponent to provide justification for use of different Water Quality guidelines, or else adjust tables to reflect guidelines used in baseline study. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 156 | ERFN (February 22, 2023) | Table 8.2-5 Existing Surface Water Quality | Comment #ERFN-053: Potential project interactions during construction. Question/Recommendation: (i) What about the potential for a grout/cement spill to the environment? (ii) Proponent should include recognition of potential deleterious interaction of construction materials (notably grout/cement) with the aquatic environment, and appropriate mitigation. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 157 | ERFN (February 22, 2023) | Section 8.2.4.1.1 Site Water Management | Comment #ERFN-054: It is noted that the treated effluent holding ponds are designed to hold water for 72 hr. prior to discharge. Question/Recommendation: What laboratory will be used to test treated effluent samples to provide results within 72 hr? What if the water is deemed unfit to discharge? Please provide a surface water quality monitoring plan that includes clear information regarding sampling and analysis timelines to ensure discharge water is sufficiently tested prior to release. “Emergency release” due to pond capacity overage is unacceptable. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 158 | ERFN (February 22, 2023) | Section 8.2.4.1.1 Site Water Management | Comment #ERFN-055: “Loose” commitment to Water Quality monitoring – “Treated water...will be monitored prior to release.” Question/Recommendation: At what locations? How often? Which parameters? Recommend the creation of a draft surface water monitoring plan to ensure appropriate actions are in place. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 159 | ERFN (February 22, 2023) | Section 8.2.4.1.1 Site Water Management | Comment #ERFN-056: “Prior to release to a surface waterbody or injected into groundwater via deep well injection.” Treated water discharge to South Whitefish Lake, where sufficient dilution of effluent would be anticipated, was the prior commitment. This is the first instance mentioned of deep well injection of effluent. Question/Recommendation: Clarify the proposed effluent discharge method, and if Denison intends to use deep well injection, then the EIS should be updated to reflect the potential interactions associated with this method. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 160 | ERFN (February 22, 2023) | Section 8.2.4.2 Potential Project-related Effects | (applies elsewhere as well) Comment #ERFN-057: Section notes that “Whitefish Lake” will receive discharge during operation and decommissioning, however, EIS separates into North and South Whitefish Lake. Question/Recommendation: Clarify throughout which Whitefish Lake (north or south) will be the receiving environment for effluent discharge. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 161 | ERFN (February 22, 2023) | Section 8.2.4.2.1 Mobilization of Suspended Materials | Comment #ERFN-058: "acceptable levels" of TSS is noted as the deciding factor for safe discharge of treated water. Question/Recommendation: (i) What about other chemical constituents? All COPCs in the effluent are predicted to exceed long-term Water Quality Guidelines(CCME). (ii) What about MDMER requirements for the effluent to pass toxicity testing at end- of- pipe? (iii) Clarify whether Denison intends TSS to be the only factor contributing to the safety of effluent for discharge, and how the MDMER requirements for toxicity testing will be met. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 162 | ERFN (February 22, 2023) | Section 8.2.4.2.1 Mobilization of Suspended Materials | Comment #ERFN-059: Salinity does not appear to be included as a factor for considering effluent safe for discharge. Question/Recommendation: Predicted salinity of effluent is sufficiently high as to possibly result in failure of the acute toxicity testing required under MDMER. (i) Please justify the exclusion of salinity as a factor for considering effluent safe for discharge. (ii) Please ensure the potential impacts of salinity on aquatic VCs are recognized and discussed. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 163 | ERFN (February 22, 2023) | Table 8.2-10 | Comment #ERFN-060: Sulphate is given 2 different values in the table in the LA-5 well-mixed column (633 and 63.83), but not in other columns. Question/Recommendation: (i) Clarify whether this is a typo, or whether these rows are referring to different constituents. (ii) Clarify why predicted sulphate is anticipated to be lower for the lower screening concentration. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 164 | ERFN (February 22, 2023) | Section 8.2.4.2.3; Table 8.2-11 Near- Field Water Quality Model | Comment #ERFN-061: Mixing zone modelling. Question/Recommendation: (i) Why is plume formation in South Whitefish Lake modelled based on mixing zones in rivers? (ii) Justify the use of a lentic mixing model to represent effluent plume formation in a lotic environment. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 165 | ERFN (February 22, 2023) | Section 8.2.4.2.3 Near- Field Water Quality Model | Comment #ERFN-062: Mixing zone modelling in winter; there are very minimal data for the receiving waterbody in the winter, other than 1 shallow sampling event in April. Assumption is under-ice temperatures at the diffuser will be 3-4oC, with effluent emerging at 5oC. April sampling event suggests that under- ice temperatures may be closer to 0.5°C. Question/Recommendation: (i) How much effect will temperature differences between effluent and surrounding water have on mixing? (ii) Please clarify how mixing changes if input current from Icclander R. drops to near zero. (iii) Please clarify the effect of effluent salinity on mixing during winter. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 166 | ERFN (February 22, 2023) | Table 8.2-11 | Comment #ERFN-063: Average current velocity predicted in South Whitefish Lake at the discharge location is 0.23 m/s. However, in S. 4.3 of the Ecometrix aquatic baseline, average current velocity at S-6 (the channel feeding South Whitefish Lake) is 0.2 m/s. Question/Recommendation: (i) Why are the current velocities used to model the discharge mixing greater than the measured inflow velocities? (ii) Justify the disconnect between the current velocities measured upstream of the discharge location, and the velocities used to model the mixing zone. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 167 | ERFN (February 22, 2023) | Section 8.2.7 Cumulative Effects | Comment #ERFN-064: Meeting Water Quality benchmarks Question/Recommendation: ERFN recognizes and appreciates Denison's commitment to meeting Water Quality benchmarks within and down stream of South Whitefish Lake. How will "appropriate benchmarks" be determined? | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 168 | ERFN (February 22, 2023) | Section 8.2.8 Monitoring and Follow-up | Comment #ERFN-065: Monitoring program expectations, guidance, and commitment. Question/Recommendation: The proposed monitoring seems, on its surface, reasonable. However, as noted above it is important to see a water quality monitoring plan integrated with a water management plan grounded in guidance and regulatory requirements (e.g., MDMER) that includes appropriate triggers, actions, and safeguards. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 169 | ERFN (February 22, 2023) | Section 8.2.9 Surface Water Quality Summary | Comment #ERFN-066: Site-specific effluent treatment: the EIS overall is vague about the treatment planned for effluent prior to discharge. Question/Recommendation: Please provide examples of successful existing effluent treatment, preferably from ISR projects, which will form the basis for the site- specific treatment. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 170 | ERFN (February 22, 2023) | Section 8.3.1.1 Valued Component Selection | Comment #ERFN-067: MDMER requirements and deleterious substances. Question/Recommendation: Per MDMER guidance, please include a recognition that testing for Ammonia (un- ionized) is required under MDMER, and the requirement that effluent (at end-of-pipe, prior to dilution) must pass lethality testing. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 171 | ERFN (February 22, 2023) | Section 8.3.3.1 Fish Habitat | Comment #ERFN-068: Fish habitat characterization. Question/Recommendation: (i) What fish habitat characterization standards were used during field surveys? (ii) Were members of the field teams environmental professionals experienced in the assessment of fish habitat? | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 172 | ERFN (February 22, 2023) | Table 8.3-5 | Comment #ERFN-069: Burbot spawning habitat Question/Recommendation: What criteria were used to identify Burbot spawning habitat? Based on Burbot habitat preferences, SA-6 (at minimum) should be suitable for spawning. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 173 | ERFN (February 22, 2023) | Table 8.3-5 | <p>Comment #ERFN-070: Fish species distribution and spawning habitat. Table 8.3-4 suggests the presence of Lake Whitefish in South Whitefish Lake(LA-5).</p> <p>Question/Recommendation:</p> <ul style="list-style-type: none"> - Clarify fish presence in South Whitefish Lake, specifically Lake Whitefish and Lake Trout. ERFN would like to emphasize the importance of Northern Pike, Lake Whitefish, Lake Trout, Walleye, and White/Longnose Sucker to community members. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 174 | ERFN (February 22, 2023) | Figure 8.3-8 | <p>Comment #ERFN-071: The proposed effluent discharge point appears to be extremely close to Northern Pike spawning habitat at the north/upstream end of South Whitefish Lake.</p> <p>Question/Recommendation:</p> <p>Please clarify the measures proposed to ensure effluent discharge does not affect Northern Pike spawning habitat, recognizing that Northern Pike spawning occurs shortly after ice-off, before high water.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 175 | ERFN (February 22, 2023) | Section 8.3.4.2.1 Construction | <p>Comment #ERFN-072: First mention of potentially “necessary” releases to the environment during the construction phase.</p> <p>Question/Recommendation:</p> <ul style="list-style-type: none"> (i) What defines a situation where the release of collected/stored water is “necessary” during construction? (ii) Are there any other parameters other than TSS that will be measured to determine that water collected during construction is “safe”? (iii) Where will the collected water be discharged in the event of a “necessary” release during construction? <p>ERFN would like to emphasize that a water management plan would address many of these questions.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 176 | ERFN (February 22, 2023) | Section 8.3.4.2.1 (and elsewhere) Mobilization of Suspended Materials | <p>Comment #ERFN-073: TSS as the parameter measured to determine the “safety” of effluent prior to discharge. Note that MDMER also requires that effluent at end-of-pipe must pass lethality testing.</p> <p>Question/Recommendation:</p> <ul style="list-style-type: none"> (i) Please provide justification for only considering TSS with respect to the safety of effluent for discharge. (ii) If multiple parameters will be considered, please update the text to reflect this; at minimum, “e.g.,” should be used rather than “i.e.,”. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 177 | ERFN (February 22, 2023) | Section 8.3.4.2 Potential Project- related Effects | <p>Comment #ERFN-074: Consideration of overprinting as the only potential effect to fish habitat. Defining harm to fish habitat based solely on area</p> <p>Question/Recommendation:</p> <p>Effects to the quality/usability of fish habitat should be considered as part of the EIS, rather than simply the surface area covered by project structures.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 178 | ERFN (February 22, 2023) | Section 8.3.4.2.3 Controlled Discharge to Receiving Environments | <p>Comment #ERFN-075: “Discharge to the environment is not expected during construction.” This directly contradicts the statements in other sections regarding the potential for necessary water releases during construction.</p> <p>Question/Recommendation:</p> <p>Provide clarification regarding potentially necessary releases during construction.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 179 | ERFN (February 22, 2023) | Section 8.3.4.2.3 (and elsewhere) Controlled Discharge to Receiving Environments | Comment #ERFN-076: "Effluent rates during Decommissioning are expected to be less than during Operation." Denison commonly uses "expected" but does not provide elaboration. Question/Recommendation: Please provide clarity and justification (e.g., examples) for expectations regarding effluent rates. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 180 | ERFN (February 22, 2023) | Section 8.3.5 Mitigation Measures | Comment #ERFN-077: Adherence to DFO Interim Code of Practice for Temporary Stream Crossings. The proposed crossings are clear span bridges, which do not classify as temporary crossings. Question/Recommendation: Based on DFO code of practice guidance, the proposed crossings do not meet the requirements for being "temporary." Please update this section to include adherence to: Code of Practice for Clear Span Bridges and Code of Practice for Culvert Maintenance. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 181 | ERFN (February 22, 2023) | Section 8.3.5 Mitigation Measures | Comment #ERFN-078: Monitoring and management of effluent. Question/Recommendation: Given that discharge is anticipated to trigger MDMER, adherence to the requirements for effluent quality within MDMER should be explicitly recognized as part of mitigation measures. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 182 | ERFN (February 22, 2023) | Section 8.3.5 Mitigation Measures | Comment #ERFN-079: Preparation of an environmental code of practice. Question/Recommendation: (i) Please provide clarification regarding a timeline for the preparation of an environmental code of practice. It is ERFN's preference that this document be in place prior to construction. (ii) Will the environmental code of practice include consideration and planning in the event of malfunctions, as required under S19 of CEAA 2012? (iii) Will the environmental code of practice include and adaptive management plan for effluent discharge and treatment? | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 183 | ERFN (February 22, 2023) | Section 8.3.6.1 Construction | Comment #ERFN-080: Determination of effluent safety for release to environment. Question/Recommendation: Note again that earlier sections had asserted that contact water during construction would not be released to environment. Please revise the final sentence of paragraph 2 to be relevant to the fish & fish habitat section, as it currently refers to sediment chemistry and benthic invertebrate communities. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 184 | ERFN (February 22, 2023) | Section 8.3.6.1 Construction | Comment #ERFN-081: Upgrading two stream crossings to clear-span bridges. Question/Recommendation: ERFN would like to re-emphasize the above comment [reference to ERFN comment 77] related to adherence to DFO's Code of Practice for Clear Span Bridges. The proposed crossings are clear span bridges, which do not classify as temporary crossings. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 185 | ERFN (February 22, 2023) | Section 8.3.6.1 Operation | Comment #ERFN-082: Continued reference to deep-well injection of effluent. Question/Recommendation: Provide clarity throughout document on whether effluent will be discharged to South Whitefish Lake, or, to ground via deep well injection. If deep well injection is proposed, please revise EIS to reflect the potential interactions of this method. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 186 | ERFN (February 22, 2023) | Section 8.3.6.1 Operation (and elsewhere) | Comment #ERFN-083: The effluent discharge will be heated to avoid freezing during winter. Question/Recommendation: (i) What are the implications for mixing during winter, given effluent will likely be considerably warmer than the surrounding water? (ii) How has Denison accounted for the potential for the warmer effluent creating an attractant effect, a reduction in DO, or other interaction that increases the risk of impacts to aquatic biota? (iii) Has Denison collected under-ice thermocline/isocline and in-situ WQ data during winter to support any assertions? | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 187 | ERFN (February 22, 2023) | Section 8.3.6.1 Operation (and elsewhere) | Comment #ERFN-084: Effluent discharge point. Question/Recommendation: Bottom-feeding fish such as White Sucker are in extended contact with and will often ingest sediments. Effects on White Sucker were modelled based on sufficient dilution of effluent. What protections will be built into the effluent discharge outlets to ensure bottom-feeding fish such as White Sucker are sufficiently excluded from the mixing zone? | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 188 | ERFN (February 22, 2023) | Table 8.3-9 | Comment #ERFN-085: The magnitude of residual effect. ERFN disagrees that the parameters and decisions that form the basis for the mixing model and the IMPACT model are sufficient to reliably predict that constituents introduced by project activities will remain below applicable guidelines. Question/Recommendation: Mixing zone calculations should be revisited to account for actual hydrological conditions at the discharge point in South Whitefish Lake. IMPACT model calculations should be revisited to examine worst-case scenarios (e.g., maximum potential discharge of 81 m3/hr. during low-flow and winter) and use more accurate starting points for water quality (existing baseline conditions in South Whitefish Lake rather than a region-wide geometric mean). | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 189 | ERFN (February 22, 2023) | Table 8.3-9 | Comment #ERFN-086: Reversibility. The assertion of fully reversible Water Quality effects relies on the assumption that all COPCs in the effluent are well-mixed and eventually exit South Whitefish Lake. Question/Recommendation: Please provide clarification and justification for the assumption that COPCs in effluent remains in solution and exit South Whitefish Lake, rather than concentrating over time and/or sequestering in sediments with the potential for future release. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 190 | ERFN (February 22, 2023) | Table 8.3-10 | Comment #ERFN-087: Magnitude. This row mentions changes to benthic invertebrate habitat. Question/Recommendation: This table is supposed to be discussing residual effects to fish habitat. Please ensure the residual effect tables include the correct information. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 191 | ERFN (February 22, 2023) | Table 8.3-10 | Comment #ERFN-088: Magnitude. The assertion of low magnitude relies on defining a change to fish habitat based solely on % of surface area affected. Question/Recommendation: Recommend revising this table and the associated written section to include discussion relating to potential changes to the quality of fish habitat in addition to the amount. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 192 | ERFN (February 22, 2023) | Section 8.3.6.2 Significance and Confidence | Comment #ERFN-089: The judgement of not significant is reliant on successful mitigation measures, and that ecological integrity won't be altered beyond "an acceptable level." Question/Recommendation: (i) Recommend updating this section upon revision of the mitigation section, per above comments. (ii) What does "ecological integrity" mean? How is it measured? How will it be monitored? (iii) How will "an acceptable level" be determined? Acceptable to whom? ERFN requests that any determination of acceptability include consideration of the rights and values of Indigenous Peoples | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 193 | ERFN (February 22, 2023) | Section 8.3.6.2 Significance and Confidence | Comment #ERFN-090: "The predicted confidence with respect to the Fish and Fish Habitat VC is high as the mobilization of suspended materials can be readily mitigated." Question/Recommendation: Please clarify the justification for not considering other Water Quality-related factors (e.g., chemistry) and focusing on TSS mitigation. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 194 | ERFN (February 22, 2023) | Section 8.3.6.2 Significance and Confidence | Comment #ERFN-091: Conservative nature and accuracy of Water Quality modelling. Despite assumptions being conservative, the discharge model cannot produce conservative predictions if the inputs are inaccurate. Question/Recommendation: Please see ERFN comments 47-52, 55, 56, 58-64, 66-67, 73, 78, 80, 82-83, 85 and 86 for concerns regarding inaccurate model inputs. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 195 | ERFN (February 22, 2023) | Section 8.3.6.2 (and elsewhere) Significance and Confidence | Comment #ERFN-092: Focus on suspended materials. Sulphate in the effluent is predicted to be exceptionally high (almost 4,000 mg/L), with baseline values in South Whitefish Lake <1 mg/L. Question/Recommendation: Why were potential cascading effects of Water Quality not considered in the residual effects assessment? Very high sulphate in effluent has the potential to instigate eutrophication and/or cyanobacterial blooms through sulphate reduction pathways. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 196 | ERFN (February 22, 2023) | Section 8.3.6.2 Significance and Confidence | Comment #ERFN-093: Assertion of conservative assumptions for Water Quality modelling. Year-round discharge at the average rate (36.5 m3/hr.) is not conservative. Question/Recommendation: Please revisit the modelling with sufficiently conservative assumptions, such maximum potential discharge(81 m3/hr.) during low-flow and/or winter. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 197 | ERFN (February 22, 2023) | Section 8.3.6.2 Significance and Confidence | Comment #ERFN-094: Use of conservative 95th percentile for baseline Water Quality. According to the model documentation provided in the EIS appendices, the geometric mean condition across all regional waterbodies was used to define baseline WQ. Question/Recommendation: Recommend revisiting the Water Quality modelling using the 95th percentile specifically for South Whitefish Lake(LA-5) as the baseline. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 198 | ERFN (February 22, 2023) | Table 8.4-2 | Comment #ERFN-095: Based on baseline data, 3 of 5 samples from LA-5 are >75% clay, and 2 of 5 are >70% sand. With only one year of data and without knowing where samples were collected in the lakes, it is unlikely that the classifications are truly representative of the average condition and variation of bottom sediments in study lakes. Question/Recommendation: (i) ERFN recommends Denison collect additional sediment samples to create a sufficient baseline (ii) ERFN recommends that Denison ensure future sediment sampling stations are located such that, at a minimum, sediments at the inlet, outlet, and potential discharge location of South Whitefish Lake are characterized. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 199 | ERFN (February 22, 2023) | Table 8.4-3 | Comment #ERFN-096: Sediment chemistry tables. Question/Recommendation: Why is there no standard deviation or standard error associated with the mean values in this table? Note that for LA-5, 3 of 5 samples have chemistry much more similar to the “maximum” values in Table 8.4-3 than the “mean” values. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 200 | ERFN (February 22, 2023) | Table 8.4-4 | Comment #ERFN-097: Benthic invertebrate endpoints. Note that diversity, evenness, and Bray-Curtis for the 2 of 5 sand- dominated samples from LA-5 are considerably higher than for the 3 of 5 clay-dominated samples. This seems to suggest that some areas in LA-5 are especially sensitive to stressors, as suggested in the above paragraph. Question/Recommendation: (i) Why is there no standard deviation or standard error associated with the mean values in this table? (ii) ERFN recommends Denison consider the potentially sensitive areas within the proposed receiving environment (LA-5) in addition to the average condition. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 201 | ERFN (February 22, 2023) | Table 8.4-4 | Comment #ERFN-098: Benthic invertebrate endpoints for LA-5 appear to be miscalculated. Based on raw benthos baseline data, total family richness at LA-5 across all reps is 22 (however, mean is 13). %Cladocera, the dominant taxon (water fleas) is 65% across all reps (58% avg). Question/Recommendation: (i) Please revisit and confirm the summary calculations for Table 8.4-4. (ii) Why were more typically pelagic taxa, such as Cladocera, not excluded from benthic invertebrate community characterizations as is often recommended in analytical guidance? | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 202 | ERFN (February 22, 2023) | Section 8.4.3.2.5 Benthic Invertebrate Chemistry | Comment #ERFN-099: Use of caddisfly larvae to characterize benthos tissue. Caddisflies are rare across the LSA, and extremely rare in South Whitefish Lake(LA-5) based on baseline data (only 4 individuals across all 5 replicates). Question/Recommendation: (i) Why were caddisfly larvae selected for benthic invertebrate tissue characterizations when they do not appear to be representative of the community? (ii) ERFN recommends Denison revisit the characterization of baseline benthic invertebrate tissue using taxa that are more relevant to the project or whole- community samples. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 203 | ERFN (February 22, 2023) | Table 8.4-5 | Comment #ERFN-100: Benthic invertebrate tissue chemistry summary. Question/Recommendation: Please include any available tissue chemistry guidelines in this table. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 204 | ERFN (February 22, 2023) | Table 8.4-5 | Comment #ERFN-101: Benthic invertebrate tissue chemistry summary. One sample per lake, representing only one year of baseline data, is insufficient to characterize baseline conditions. Question/Recommendation: ERFN recommends Denison conduct at least one additional year of baseline data collection, including the collection of multiple benthic invertebrate tissue samples from South WhitefishLake. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 205 | ERFN (February 22, 2023) | Section 8.5.3 Existing Environment | Comment #ERFN-102 to 104: Fish tissue collection. Question/Recommendation: (i) Why were Lake Whitefish and Walleye not collected for tissue analyses? These species were also identified by ERFN citizens as important resources. (ii) Please provide additional justification for only using 5 fish in a single sample year for the characterization of baseline fish tissue chemistry. (iii) Why were organs, such as livers, discarded? Liver chemistry analyses are commonly recommended in fish tissue characterization guidance. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 206 | ERFN (February 22, 2023) | Section 8.5.4.2.2 Construction | Comment #ERFN-105: "Discharge to the environment is not expected during Construction." There appear to be contradictions across sections regarding whether discharge during construction will not occur, or whether it would occur "if necessary." Any discharge, even emergency discharge, would have implications for the fish health VC and should be considered in this section. Question/Recommendation: Please provide clarity throughout the document with regards to the anticipated effects from discharge (including "if necessary" emergency discharge) during construction. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 207 | ERFN (February 22, 2023) | Section 8.5.4.2.2 Operation and elsewhere Section 8.5.6.2 Significance and Confidence in the Assessment | Comment #ERFN-106 and ERFN-111: "The Project was assessed as having...a continuous effluent discharge rate of 81.0 m3/hr." This statement appears to contradict earlier assertions (see comment # ERFN -093 regarding S 8.3.6.2, above) that the conservative WQ model was based on average discharge of 36.5 m3/hr. Question/Recommendation: Please provide clarification throughout document on whether the assessments were based on the greatest potential effects at a discharge rate of 81 m3/hr., or a reduced potential effect at a discharge rate of 36.5 m3/hr. If assessments were not conducted based on discharge at 81 m3/hr., please provide additional justification for using less- conservative estimates. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 208 | ERFN (February 22, 2023) | Section 8.5.4.2.2 Operation | Comment #ERFN-107: "Sediment baseline concentrations were predicted from surface water concentrations." Question/Recommendation: Why were sediment baseline concentrations not based on actual sediment baseline data? | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 209 | ERFN (February 22, 2023) | Section 8.5.4.2.2 Operation | Comment #ERFN-108: "The dw to ww ratio of 0.25 to 1 from CSA N288.1-20 was used." Note that the recommended ww criterion after conversion, if site- specific data were used, would be closer to 2.28 mg/kg (ww) and White Sucker tissue predictions would exceed this criterion. Question/Recommendation: Why were site-specific %moisture data not used for this conversion? It would likely be closer to 0.2 to 1 based on actual fish tissue baseline data. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 210 | ERFN (February 22, 2023) | Figure 8.5-5 | Comment #ERFN-109: Predicted tissue concentrations of selenium in Northern Pike and White Sucker. Based on the IMPACT model report, Northern Pike were exposed to COPCs through water only (despite being used to represent piscivorous predator), and White Sucker were exposed through water and sediments (as it is a bottom-feeder). Question/Recommendation: (i) Please justify the use of the IMPACT model data for Northern Pike tissue, given that it excludes any pathway related to piscivory. (ii) Please justify the use of the IMPACT model data for White Sucker tissue, given that it excludes any pathway related to the consumption of benthic invertebrates in addition to exposure to sediment. (iii) Note that studies on the toxicity of effluent to fish at the nearby Cameco Key Lake mine directly implicated dietary selenium. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 211 | ERFN (February 22, 2023) | Section 8.5.5 Mitigation Measures | Comment #ERFN-110: "Implement Project-specific monitoring programs...that include...and applying adaptive management, if necessary." Question/Recommendation: Please remove the "if necessary" qualifier; ERFN considers the monitoring mentioned in 8.5.5 and the application of adaptive management to be necessary for the successful mitigation of residual effects. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 212 | ERFN (February 22, 2023) | Section 8.5.6.2 Significance and Confidence in the Assessment | Comment #ERFN-112 "A high degree of confidence was assumed." Question/Recommendation: ERFN does not echo the high degree of confidence in this assessment, for multiple reasons including (but not limited to): apparent contradictions in the assessment methods and parameters, distinctly lacking baseline data, unsupported selection of modelling parameters, numerous assumptions without evidence for their validity, no references to contingency planning. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 213 | ERFN (February 22, 2023) | Section 8.5.8 Monitoring and Follow-Up | Comment #ERFN-113: Regulatory criteria for monitoring data comparison. Question/Recommendation: ERFN requests including comparisons to any applicable human health guidelines and/or screening criteria in all monitoring programs | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 214 | ERFN (February 22, 2023) | Section 8.5.8 Monitoring and Follow-Up | Comment #ERFN-114: Monitoring locations. Question/Recommendation: ERFN requests the addition of a monitoring site for (at minimum) aquatic sediments, located within the Northern Pike spawning habitat north of the proposed discharge location | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 215 | ERFN (February 22, 2023) | Section 8.5.8 Monitoring and Follow-Up | Comment #ERFN-115: "It is recognized that additional collection of pre-mining fish tissue concentrations in Whitefish Lake and a reference area is needed." ERFN acknowledges and appreciates this recognition, but notes that the majority of baseline data for aquatic biota and sediments is extremely lacking. This also appears to be the only recognition of insufficient baseline data throughout the entire EIS. Question/Recommendation: Please update the other EIS sections to reflect the data gaps in the baseline sections, and an outline of the plan to address these gaps. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 216 | ERFN (February 22, 2023) | Appendix 8-D Baseline Aquatic Environment Study Table 1-2 | Comment #ERFN-116: High-level sample locations are provided, but an appropriate evaluation and characterization of baseline conditions require targeted sampling in specific areas. Question/Recommendation: Please update Table 1-2 to include sampling site coordinates (and replicate coordinates, if they are different), or, please provide a separate list of precise sample coordinates. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 217 | ERFN (February 22, 2023) | Appendix 8-D Baseline Aquatic Environment Study Figure 1-7 | Comment #ERFN-117: Based on this figure, neither bathymetry nor habitat surveys were completed on South Whitefish Lake (LA-5). Bathymetry and fish habitat are crucial to evaluating potential project impacts in the receiving environment. Question/Recommendation: (i) If these surveys have been completed, please update Figure1- 7 and provide the location of these data. (ii) If these surveys represent a data gap, ERFN recommends that Denison complete bathymetry and habitat surveys on South Whitefish Lake to sufficiently characterize the effluent discharge receiving environment. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 218 | ERFN (February 22, 2023) | Appendix 8-D Baseline Aquatic Environment Study Figure 1-8 | Comment #ERFN-118: Although benthic invertebrate sampling was completed in South Whitefish Lake, based on this figure, the potential inputs from upstream have not been characterized. Question/Recommendation: ERFN recommends collecting benthic invertebrate samples at SA-6 to characterize the potential upstream inputs to the benthic invertebrate community of the receiving environment. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 219 | ERFN (February 22, 2023) | Appendix 8-D Baseline Aquatic Environment Study Section 2.0 | Comment #ERFN-119: ERFN recognizes that Denison followed standardized or recommended field methodology during the collection of baseline information. Question/Recommendation: (i) What guidance did Denison follow to determine the frequency of baseline sampling? (ii) What guidance did Denison follow to determine the number of years that would provide sufficient characterization of the aquatic baseline? (iii) What guidance did Denison follow to determine the sampling locations and the number of samples? | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 220 | ERFN (February 22, 2023) | Appendix 8-D Baseline Aquatic Environment Study Section 3.5.1 | Comment #ERFN-120: The hydrological baseline data are now 8-10yearsold. These data are too old to sufficiently characterize the current baseline conditions, especially given that development has occurred in the Project area within that time. Question/Recommendation: Denison should collect updated hydrological baseline data for South Whitefish Lake, including (but not limited to) water level, ice thickness, and bathymetry. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 221 | ERFN (February 22, 2023) | Appendix 8-D Baseline Aquatic Environment Study Section 3.5.1.3 | Comment #ERFN-121: The South Whitefish Lake bathymetric baseline data collected by Golder in 2012 suggests that the average depth was 1.1 m. This appears to contradict the depth used in the mixing model (~3 m). Question/Recommendation: Please clarify the data and decisions that contributed to the depth parameter used for the mixing model. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 222 | ERFN (February 22, 2023) | Appendix 8-D Baseline Aquatic Environment Study Section 3.5.4 | Comment #ERFN-122: Section suggests a collection of habitat data in South Whitefish Lake was completed in 2012 by Golder, and observations were made during the 2016 field program. Question/Recommendation: (i) Where are these data? Does Denison have a detailed characterization of the aquatic habitat in South Whitefish Lake available? (ii) ERFN does not agree that high-level observations made during 2016 are sufficient to confirm that aquatic habitat has remained unchanged for the last 10 years. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 223 | ERFN (February 22, 2023) | Appendix 8-D Baseline Aquatic Environment Study Section 3.5.5 | Comment #ERFN-123: As referenced in comment #ERFN-092, the baseline phytoplankton community for South Whitefish Lake is nearly 30% Cyanophyceae, the highest proportion of cyanobacteria in any Project waterbody except Russel Lake. This is likely to influence the risk of eutrophication in the receiving environment. Question/Recommendation: Please confirm whether the risk of eutrophication in South Whitefish Lake has been considered and justify its exclusion from the EIS. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 224 | ERFN (February 22, 2023) | Appendix 8-D Baseline Aquatic Environment Study Section 3.5.7 | Comment #ERFN-124: Fish spawning habitat. Question/Recommendation: ERFN recognizes the inclusion of Indigenous Knowledge in confirming local fish spawning habitat. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 225 | ERFN (February 22, 2023) | Appendix 8-D Baseline Aquatic Environment Study Table 3-7C | Comment #ERFN-125: Caddisflies comprise <1% of the benthic invertebrate community in the receiving environment. Question/Recommendation: Please justify the specific selection of caddisflies for characterizing the baseline benthic invertebrate tissue chemistry. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 226 | ERFN (February 22, 2023) | Appendix 8-D Baseline Aquatic Environment Study Table 3-8 | Comment #ERFN-126: No tissue chemistry guidelines are provided for benthic invertebrates. Question/Recommendation: ERFN recommends the inclusion of any available tissue chemistry guidelines for benthic invertebrates, including those from other Canadian jurisdictions, to provide sufficient context for evaluating the baseline data. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 227 | ERFN (February 22, 2023) | Appendix 8-D Baseline Aquatic Environment Study Table 3-10 | Comment #ERFN-127: There appears to be a disagreement between the n's provided in this table, and the description of fish tissue collection methods in the baseline and EIS. The methods section implies that 5 total samples were collected per waterbody, with some samples representing more than 1 fish. Question/Recommendation: Please clarify the fish tissue collection and analysis methods. Were all fish analyzed separately? Were tissues for each "sample" aggregated if multiple fish were required? | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 228 | ERFN (February 22, 2023) | Appendix 8-D Baseline Aquatic Environment Study Table 3-10 | Comment #ERFN-128: The table presents the average concentration of parameters, but no indication of variation/accuracy. Question/Recommendation: Please provide standard deviation and/or standard error for fish tissue chemistry average values. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 229 | ERFN (February 22, 2023) | Appendix 8-D Baseline Aquatic Environment Study Figures 3-10 and 3-11 | Comment #ERFN-129: The inclusion of bathymetric and habitat survey data for North Whitefish Lake (LA-6) from 2018 highlights the lack of similar surveys on South Whitefish Lake (LA-5), which is the actual receiving environment. Question/Recommendation: (i) Please justify the lack of current bathymetric and habitat survey data for South Whitefish Lake. (ii) Denison should conduct multibeam sonar surveys on South Whitefish Lake, the receiving environment, to sufficiently characterize bathymetry and aquatic habitat. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 230 | ERFN (February 22, 2023) | Appendix 8-D Baseline Aquatic Environment Study Section 4.6.1 | Comment #ERFN-130: Paragraph two notes that stage- discharge curves were updated in 2019 to account for greater discharge measured during manual surveys in 2019. Question/Recommendation: (i) Were stage-discharge curves adjusted for flows measured in recent years, other than 2019? Were manual measurements collected in any other recent years? (ii) If not, please justify the adjustment of stage-discharge curves based on a single year that had a higher- than-average discharge. How does Denison know that flows in 2019 were not abnormally high? | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 231 | ERFN (February 22, 2023) | Appendix 8-D Baseline Aquatic Environment Study Section 4.6.1.2 and Table 4-1 | Comment #ERFN-131: "In May-early June 2018, the flow at SA-6 was fluctuating around 0.7 m3/s until end of May before decreasing." This appears to imply that freshet flows in 2018 (assumedly high flows for that year) were near the minimum discharge measured from Sept 2016 to Aug 2019 (0.717 m3/s). Question/Recommendation: (i) Were stage-discharge curves updated to reflect the flows in 2018? (ii) Please clarify the decisions and data used for updating stage-discharge curves. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 232 | ERFN (February 22, 2023) | Appendix 8-D Baseline Aquatic Environment Study Section 4.6.3 | Comment #ERFN-132: "Mean channel wetted width, water depth and water velocity were 14 m, 0.7 m and 0.2 m/s, respectively." Question/Recommendation: How does a wide, slow, low-gradient inflow translate to the current velocities used for mixing modelling? Please refer to the earlier comment and justify the assumptions made for the mixing model. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 233 | ERFN (February 22, 2023) | Appendix 8-D Baseline Aquatic Environment Study Section 4.6.3 | Comment #ERFN-133: "Snails (Gastropoda), mayfly nymphs (Hexagenia sp.) and dragonfly nymphs were observed." Field observations do not substitute for sample collection and taxonomy. Question/Recommendation: As noted in an comment #ERFN-118, ERFN recommends benthic invertebrate sampling at SA-6 to sufficiently characterize the benthic invertebrate community upstream of South Whitefish Lake. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 234 | ERFN (February 22, 2023) | Appendix 8-D Baseline Aquatic Environment Study Section 4.6.4 | Comment #ERFN-134: Burbot were recovered at SA-6 but were considered not present in South Whitefish Lake. Question/Recommendation: Please justify the assertion that burbot are not present in South Whitefish Lake, despite recovering them shortly upstream at SA-6. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 235 | ERFN (February 22, 2023) | Appendix 10-A, Appendix A: Wheeler River Project IMPACT Model Figure 2-1 | Comment #ERFN-135: This figure illustrates that absorption from surface water was only source of COPCs investigated for Northern Pike as part of the IMPACT model. Northern Pike was intended to represent piscivorous predators for the purpose of this modelling. Question/Recommendation: Please justify the results of the IMPACT model for Northern Pike despite not accounting for piscivory or any other feeding. Note that studies on the toxicity of effluent to fish at the nearby Cameco Key Lake mine directly implicated dietary selenium. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 236 | ERFN (February 22, 2023) | EIS Appendix 10-A, Appendix A: Wheeler River Project IMPACT Model Table 3-4 | Comment #ERFN-136: The "Water Baseline" used for the IMPACT model integrates surface water quality from multiple regional waterbodies. This results in baseline chemistry that is lower (sometimes 10x lower) than the chemistry of South Whitefish Lake, the receiving environment. Question/Recommendation: Please revisit the IMPACT model using surface water quality data accurate to the South Whitefish Lake receiving environment. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 237 | ERFN (February 22, 2023) | Section 9.2.1, 9.3.1, and 9.4.1: Influence of IK, LK and Engagement on VC selection. | Comment #ERFN-137: Concerns raised by the ERFN during August 2022 engagement sessions (e.g., for subsistence/harvestable foods, important vegetation communities, and wildlife habitat) do not appear to have been considered during VC selection. Question/Recommendation: Update Section 9 to incorporate concerns raised in the August 2022 submission and demonstrate how these comments have been addressed or considered in the assessment as VCs, or KIs for existing VCs (i.e., wetlands, woodland caribou). | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 238 | ERFN (February 22, 2023) | Section 9.2.1, 9.3.1, and 9.4.1: Influence of IK, LK and Engagement on MP considerations. | Comment #ERFN-138: Relevant criteria for VC selection according to the EIS includes: "contributing roles to biodiversity, ecosystem function, and maintenance of wildlife habitat," and "contributions to environmental, socio-economic, and cultural values of Indigenous groups, the public and other Interested Parties" (EIS 9.2.1, 9.3.1, and 9.4.1), among others. Question/Recommendation: Overall changes in habitat for wildlife and plants of cultural importance within the Project area, LSA and RSA must be considered as a measurable parameter. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 239 | ERFN (February 22, 2023) | Section 9: Influence of IK, LK and Engagement on Mitigation and Monitoring considerations. | <p>Comment #ERFN-139: Wetlands were recognized in the EIS as important for multiple reasons and designated a VC. However, the potential impacts and their mitigation and monitoring were not adequately characterized or discussed.</p> <p>Question/Recommendation:</p> <p>(i) Changes in aerial extent of wetlands as the single MP for this VC is insufficient to monitor all changes in these habitats – they are key lifecycle habitat (breeding/foraging/cover) areas for species of management concern as they relate to both the EIS and ERFN (e.g., small furbearers such as beaver, mink; large ungulates such as moose; game birds/species at risk; supports growth of subsistence foods such as cranberries).</p> <p>(ii) Drawdown effects on wetlands were not identified as a potential effect, even though water withdrawal requirements exist for majority of Project timeline, and Project design incorporates an inward hydraulic gradient.</p> <p>(iii) Overall changes in habitat for wildlife and plants of cultural importance within the Project area, LSA and RSA must be considered as a measurable parameter.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 240 | ERFN (February 22, 2023) | Section 9.1.4, (9.2.4, 9.3.4 and 9.4.4): Influence of IK, LK and Engagement on Mitigation and Monitoring considerations | <p>Comment #ERFN-140: “Reclamation design planning is at a conceptual or pre-feasibility stage. Presently, most Project features are planned to be reclaimed by re- instating (to the extent practical) predominant topographical contours and drainage features, and preparing the site (e.g., via grading, and scarifying and/or other surface preparations) in a manner that promotes natural revegetation.... Certain Project features (e.g., the clean waste rock pile) may be integrated into the end-landscape... to create a safe, stable, and self- sustaining landscape.” (pp. 9-28)</p> <p>Concerns were raised in engagement sessions about documenting caribou calving locations and participating in mitigating possible effects(SVS, 2022).The loss of wetland areas may reduce the amount of habitat available for moose and caribou calving, as well as other stages of the irrespective life histories. This interaction will directly impact the availability of this important resource.</p> <p>Question/Recommendation:</p> <p>Section 9 and Table 3.5-1 should be updated to reflect recommendations for reclamation priorities identified in the ERA and ERA-annex, in addition to federal recovery strategies (i.e., Woodland caribou, wolverine) mitigations and management recommendations for species at risk, and species-specific IK and LK. Denison must consider all pathways of effects, including those which are indirect, such as the loss or conversion of lands used as habitat by species of cultural importance</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 241 | ERFN (February 22, 2023) | Section 9.1.3.3: Influence of IK, LK and Engagement on VC selection. | <p>Comment #ERFN-141: Permafrost was investigated but not adequately characterized to support conclusions made in the EIS. Potential presence is established, and engagement concerns were raised “specifically referencing cumulative effects through mention of climate change and the vulnerability of northern environments,” “potential effect of exploration on various characteristics of the biophysical environment” (pp. 4-25); and “possible changes to permafrost on the Wheeler River” (pp. 4-33).</p> <p>Question/Recommendation:</p> <p>Sections 6and9 should be updated to include verification of the presence/absence/extent of permafrost within the Project Area or permafrost interactions with the Project within the CEA.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 242 | ERFN (February 22, 2023) | Section 9.1.4: Assessment of Project- related Effects. | <p>Comment #ERFN-142: “Activities during Post- Decommissioning (comprising site inspections, monitoring and on-site engagement with interested parties) were deemed to have no interaction because they do not involve any land clearing, surface preparations or major earthworks” (EIS 9.1.4).</p> <p>Post-Decommissioning activities should incorporate changes issued by regulatory bodies, required mitigations or actions identified through the Denison Environmental Monitoring System/adaptive management process, and/or Indigenous/third party engagement recommendations.</p> <p>Question/Recommendation:</p> <p>Update Section 9 to include further detail regarding post-decommissioning activities resulting in earthworks for: changes issued by regulatory bodies, required mitigations or actions identified through the Denison Environmental Monitoring System/adaptive management process, and/or Indigenous/third party engagement recommendations.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 243 | ERFN (February 22, 2023) | Section 9.1.1.1 VC Selection (Terrain, Soil, and Organic Matter/Peat) and 9.2.3.2 Listed Plant Species VC | <p>Comment #ERFN-143: Baseline studies for the Terrestrial Environment component of the EIS were conducted from 2017-2019 and were refined in 2019 with a focus on the Phoenix development only. Soil and terrain baseline data was presented at broad scale and coarse resolution (1:20,000) in the original investigations (Appendix 9-B), and baseline vegetation data categorized disturbed forest stands as novel regenerating forest types. This was defined and corrected further by the literature review and mapping contained in Appendix 9-C. Vegetation/wildlife habitat characterization were completed over two surveys in July-Aug 2017 (Appendix 9-B; with no sampling completed for waterbodies/disturbed non-vegetated lands), before the project footprint was altered – in consultation with the SK MOE, the EIS can carry forward with existing information with the condition that additional rare plant pre-disturbance surveys would accompany project approval.</p> <p>Question/Recommendation: ERFN appreciate the recognition of a data deficiency and concur that additional rare vascular plant surveys are required in ecosites not sampled previously to fully investigate the terrestrial environment component of the project and related effects. As baseline survey efforts focused on mid- and late-season rare vascular species, and further information on wetlands in the RSA is proposed to better characterize wildlife habitat and availability of subsistence harvestable food/medicinal plant resources, early-season surveys that also target wetland habitats are recommended.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 244 | ERFN (February 22, 2023) | Section 9.2.4.2.2 Change in the Concentrations of COPC in Vegetation | <p>Comment #ERFN-144: Per the ERA, vegetation and soil collection and chemistry were completed at 10 permanent sample plots in August 2017 – terrestrial lichens, current year's growth of blueberry(leaf, stem, berries), and soil samples were collected. Radionuclide levels are relatively consistent(lichen, blueberry and soils); however, several metal/elemental parameters were elevated when compared to Rio Rinto's Roughrider Project.</p> <p>Question/Recommendation: The EIS identified Labrador tea and browse as also being estimated for metals/radionuclides COPCs in the ERA – this was not included in the ERA; however, red-backed voles were also tested during the small mammal baseline program (Appendix 9-B). Update section to reflect same.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 245 | ERFN (February 22, 2023) | Section 9.3.1.1 VC Selection (Ungulates, Furbearers, and Woodland Caribou) | <p>Comment #ERFN-145: This VC list omits several species which have been identified by ERFN as commercially important for trapping purposes, including Lynx, Muskrat, Fisher, Fox, Otter, and Mink. As noted in the ERFN Traditional Knowledge Study, concern was raised about the impacts of the mine and associated infrastructure on the ability to trap and trapping success. Presence of lynx, fisher, fox, otter, muskrat, beaver and mink were identified in the baseline winter tracking studies (Appendix 9-B).</p> <p>Question/Recommendation: Presence of all ERFN-identified traditionally important species were observed in the baseline winter tracking studies (Appendix 9-B). Overall changes in habitat for wildlife and plants of cultural importance within the Project area, LSA and RSA must be considered as a measurable parameter</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 246 | ERFN (February 22, 2023) | Section 9.4.3 Existing Environment (Raptors, Migratory Breeding Birds, and Bird Species at Risk) | <p>Comment #ERFN-146: Appendix 9-C identifies knowledge gaps for information to fully describe the wildlife assemblage in the RSA, including avian species of management concern. Species Detection Survey Protocols (SK MOE 2021) were not implemented for the baseline avian surveys.</p> <p>Recommendations for sensitive timing windows and setback distances from high disturbance activities should be considered for rusty blackbird, which may also use the RSA. The baseline survey did not account for early- season breeding species of management concern (i.e., owls, woodpeckers, game birds).</p> <p>Question/Recommendation: Additional surveys are recommended utilizing appropriate species detection survey protocols to account for VCs and additional species of management concern with the potential to occur in the project area.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 247 | ERFN (February 22, 2023) | Section 9 (General) VC Selection | Comment #ERFN-147: Some small mammals were shown to observe elevated levels of select COPCs during baseline studies (Appendix 9-B) but were not discussed in the EIS. Bats and Amphibians were also not considered in the EIS as VC or KIs, even though both bat species and one amphibian species are listed under SARA. Traditional species of cultural importance for gathering and subsistence were also not included. Question/Recommendation: Provide a rationale why these components were not considered. | |
| 248 | ERFN (February 22, 2023) | Section 9 (General) VC Selection | Comment #ERFN-148: Several iterations in the EIS state baseline studies were not designed to establish relative abundance estimates for furbearer VCs, whereas certain baseline surveys (Appendix 9-B) were designed to provide quantitative data on the occurrence and relative abundance (i.e., semi-aquatic furbearer shoreline study, winter track count). Question/Recommendation: Provide rationale for not incorporating relative abundance. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 249 | ERFN (February 22, 2023) | Section 9.3.3 Existing Environment; EIS Section 9.3.5 Mitigation Measures | Comment #ERFN-149: Appendix 9-C identifies knowledge gaps for information to fully describe the wildlife assemblage in the RSA, including ungulates (woodland caribou and moose), but there is no recognition of the implications of these gaps or suggestions to address them. Question/Recommendation: ERFN notes if recent aerial ungulate survey data are unavailable, the Proponent should consider management and development recommendations available for the region and management areas, in addition to the federal recovery strategy for caribou, as part of the EIS. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 250 | ERFN (February 22, 2023) | Section 9.3.5 Mitigation Measures | Comment #ERFN-150: The mitigations for linear disturbances identify ongoing research into the effectiveness of disrupting predator-prey dynamics along linear disturbances. Appendix 9-B includes recommendations for reclamation of linear disturbances around the Project Area. Question/Recommendation: ERFN acknowledges the efforts by Denison and the recommendations provided in Appendix 9-B for the reclamation of linear disturbances, and requests the Proponent to consider prioritizing progressive reclamation in these areas as a commitment within the EIS, in addition to utilizing ongoing research data to adjust and inform reclamation planning and implementation. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 251 | ERFN (February 22, 2023) | Section 9.1.5, 9.2.5, 9.3.5, 9.4.5 (General) Mitigation Measures | Comment #ERFN-151: Spill response plan. Question/Recommendation: It is recommended that monitoring during Project Activities occur to minimize discrete spills wherever possible, per the Spill Response Plan. Spill Response Plan should include reportable quantities, spills report line directly to proponent, and specific procedures for documenting and reporting spills to regulatory bodies. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 252 | ERFN (February 22, 2023) | Section 9.2.5.2.4 Invasive Plant Management | Comment #ERFN-152: Additional mitigation measures include use of herbicides or other bio-controls to address invasive species establishment. Denison does not provide evidence discussing the potential impacts to the Terrestrial Environment VCs from the use of herbicides or other bio-controls. Question/Recommendation: Denison must provide information on how impacts will be mitigated if herbicides or other bio-controls are used. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 253 | ERFN (February 22, 2023) | Section 9 (General) Wildlife mitigations | Comment #ERFN-153: Fencing for deterrence of entrapment in certain Project areas Question/Recommendation: Fencing should be buried deep enough to prevent potential interactions with burrowing animals, and high enough to prevent wildlife movement over the fence. Fencing should be monitored for entrapped wildlife at regular intervals identified within the EMS, and a plan should be in place for the non-lethal removal of trapped wildlife if required. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 254 | ERFN (February 22, 2023) | Section 10.1.1.2 Key Indicators and Measurable Parameters | Comment #ERFN-154: Public Health is Identified as a Key Indicator and is informed by Measurable Parameters which include: "Evaluation of risk of exposure to COPCs through use of hazard quotient, incremental lifetime cancer risk, or radiation dose," is a very narrow view of human health as it is affected by this project. This ignores a wide range of physical and psychological factors which may influence the health and wellbeing of ERFN citizens. Question/Recommendation: Denison should provide additional analysis of the Public Health Key Indicator which includes Measurable Parameters to qualitatively or quantitatively assess mental health, psycho- social factors and wellness as it may be influenced by this project. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 255 | ERFN (February 22, 2023) | Section 10.1.1.3 Spatial and Temporal Boundaries | Comment #ERFN-155: The spatial boundaries for the assessment of Human Health are not appropriate as it ignores the many persons who use the area surrounding the project but do not reside within the LSA or RSA catchment area. Most ERFN land users live further south in Patuanak/ Wapachewunak Reserve but use the area around the project to harvest and exercise rights, therefore must be considered within the geographic scope of the assessment Question/Recommendation: Denison reassesses the Public Health key indicator to include Patuanak/Wapachewunak Reserve, as the closest population centre. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 256 | ERFN (February 22, 2023) | Section 10.1.3.2 Traditional Foods Diet | Comment #ERFN-156: Denison note that Walleye and Lake Whitefish are the most commonly consumed fish within the study area to inform the HHRA. While these are important species, they may not be fully representative of the full risks posed by fish. For example, longer- living fish such as Lake Trout are consumed, and as top predators are at a greater risk for bioaccumulation Question/Recommendation: Denison should consider bioaccumulation risks associated with other country foods consumed. This includes considering and incorporating species which are both consumed in the greatest quantities, but also are representative of the greatest risk for use in the HHRA. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 257 | ERFN (February 22, 2023) | Section 10.1.4.1 Potential Interactions Between the Project and Valued Component/Key Indicators | Comment #ERFN-157: Table 10.1-3 Outlines a list of project phases/activities and an indication of whether they are likely to interact with Public Health. This table, however, fails to provide information about the effects of pathways or how the proposed activities may result in impacts on public health. Question/Recommendation: ERFN request Denison provide a breakdown of the effects pathways and predicted or plausible impacts for each of the project activities which may influence public health. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 258 | ERFN (February 22, 2023) | Section 10.1.4.2.1 Air Emissions During Construction, Operation, and Decommissioning | Comment #ERFN-158: As outlined in Appendix 6A, elevated levels of NO2 and Radon are expected to be observed outside of the area established as the LSA and in some cases the RSA to assess human health. Therefore, the assessment of potential project-related effects associated with air emissions during construction, operation, and decommissioning should be considered in complete. Question/Recommendation: Denison provides a revised assessment of Potential project-related effects as a result of air emissions during construction, operation, and decommissioning in areas beyond the geographical scope of elevated atmospheric emissions are predicted. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 259 | ERFN (February 22, 2023) | Section 10.1.4.2.1 Air Emissions During Construction, Operation, and Decommissioning | <p>Comment #ERFN-159: Denison note that there are several instances in which exceedances of air quality criteria for NO₂, PM₁₀ and uranium are expected, they were not identified for further assessment in the human health risk assessment, "as these COPCs are unlikely to be associated with a human health or environmental risk." The adequate rationale is not provided to dismiss these potential contributors to human health risk, and air quality exceedance of any COPC, should be sufficient rationale within itself to carry forward any factor.</p> <p>Question/Recommendation: ERFN are confused as to why Denison has chosen to dismiss the consideration of COPCs which exceed air quality criteria from further human health risk assessment. By removing these potential risk sources, Denison appears to be picking and choosing which factors are important prior to carrying out any analysis. ERFN recommend that Denison amend the Human Health Risk Assessment and include NO₂, PM₁₀ and uranium as possible human health risk factors until appropriate evidence can be presented to demonstrate that these will not present harm.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 260 | ERFN (February 22, 2023) | Section 10.1.4.2.1 Air Emissions During Construction, Operation, and Decommissioning | <p>Comment #ERFN-160: Denison notes that "a pond may be constructed beside the clean waste rock pad to collect runoff if required. Any runoff from the clean waste rock pond will be directed to the process water pond". This statement contradicts itself, as in the first sentence, Denison indicates that they may establish a water collection pond to collect runoff from the clean waste rock pile, however, this is followed by stating that runoff will be directed to the process water pond. It is unclear the purpose of this additional pond that may be constructed.</p> <p>Question/Recommendation: Denison should provide additional information on the rationale for the construction of this additional pond and what role it will play in both mitigating risk to human health and providing overall contact water management.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 261 | ERFN (February 22, 2023) | Section 10.1.4.2.1 Air Emissions During Construction, Operation, and Decommissioning | <p>Comment #ERFN-161: It is unclear under which circumstances effluent may be discharged to Whitefish Lake as Denison states they intend to process water by circulating it through the injection and recovery wells.</p> <p>Question/Recommendation: Please provide additional information regarding the source of water to be discharged to Whitefish Lake</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 262 | ERFN (February 22, 2023) | Section 10.1.4.2.1 Air Emissions During Construction, Operation, and Decommissioning | <p>Comment #ERFN-162: Denison appears to be confusing the application of multiple water quality applications. Specifically, they state: "The most restrictive federal or provincial guidelines for surface water quality, based on Canadian drinking water quality guidelines, are the CCME water quality guidelines for the protection of freshwater aquatic life, the federal environmental quality guidelines, and the Saskatchewan environmental quality guidelines." These are all separate water quality guidelines and apply to different aspects of water quality management.</p> <p>Question/Recommendation: Denison must be clear as to the guidelines which are being used at all times during the analysis to ensure that they are applied appropriately.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 263 | ERFN (February 22, 2023) | Section 10.1.4.2.1 Air Emissions During Construction, Operation, and Decommissioning | <p>Comment #ERFN-163: Denison notes that effluent was assessed using a benchtop model simulation of the material processing and effluent treatment process. Using the derived effluent, a handful of constituents were assessed including cadmium, chromium, selenium, and lead. Other COPCs exist beyond these parameters and should be assessed appropriately.</p> <p>Question/Recommendation: Denison should perform additional broad-suite analysis of all parameters as set by CCME water quality guidelines for the protection of freshwater aquatic life and the Metal and Diamond Mining Effluent Regulations.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 264 | ERFN (February 22, 2023) | Section 10.1.4.2.1 Air Emissions During Construction, Operation, and Decommissioning | <p>Comment #ERFN-164: Total dissolved solids (TDS) within itself is not known to be detrimental to the aquatic environment, however, can have adverse aesthetic impacts. That said, TDS is comprised of many other dissolved constituents, such as chloride, calcium, sodium, potassium, fluoride, and others, which may be harmful in elevated concentrations. Given TDS is expected to exceed the water quality guideline by more than 10-fold, it is necessary to identify the contributing factors before TDS can be ruled out as a potential risk.</p> <p>Question/Recommendation: Denison should provide an analysis of the constituents which contribute to high TDS and propose a method of reducing TDS to meet water quality guidelines.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 265 | ERFN (February 22, 2023) | Section 10.1.4.2.1 Air Emissions During Construction, Operation, and Decommissioning; Table 10.1-4 | <p>Comment #ERFN-165: Molybdenum is concerning high. CCME note that the long-term concentration of molybdenum for the protection of aquatic life is 0.073 ug/L which is several orders of magnitude less than what was observed in effluent tests. Similarly, sulphate is also very high, which once released into the environment may influence pH and acidification of the downstream environment.</p> <p>Question/Recommendation: Denison must demonstrate how it plans to minimize the source effluent of molybdenum and sulphate associated with this project.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 266 | ERFN (February 22, 2023) | Section 10.1.6.1.1 Human Receptors Selection and Characterization; Table 10.1-6 | <p>Comment #ERFN-166: The human receptors outlined in Table 10.1-6 are not fully representative of land users and those who may be impacted. There is a need to consider other more vulnerable human receptor groups such as youth, Elders, and pregnant females who interact with the land and consume high levels of traditional foods similar to Fisher/Trapper. Similarly, other human health receptors should be considered for permanent residents.</p> <p>Question/Recommendation: Denison should reanalyze their human health risk assessment including the use of vulnerable personas such as youth, pregnant female, and Elder.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 267 | ERFN (February 22, 2023) | Section 10.1.6.1.3 Exposure Assessment and Pathway Modelling | <p>Comment #ERFN-167: In assessing exposure pathways, it is noted that COPCs may travel through multiple ecological receptors before being consumed or otherwise taken up by humans. However, it is unclear whether Denison has considered the potential for bioaccumulation, additive, or synergistic effects when viewing the exposure pathway through a cumulative effects lens.</p> <p>Question/Recommendation: Denison should provide clarity into all assumptions which went into the pathway modelling including considerations for cumulative effects and bioaccumulation of COPCs en route to human end points.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 268 | ERFN (February 22, 2023) | Section 10.1.6.1.4 Human Health Risk Assessment Results; Table 10.1-8 | <p>Comment #ERFN-168: Denison does not provide a Hazard Quotient (HQ) for Aquatic Plants. However, aquatic plants may be directly consumed by ERFN land users. As a result, this represents a knowledge gap within the assessment.</p> <p>Question/Recommendation: Denison should assess the hazard quotients associated with aquatic plant consumption. If no information related to the TVR is available use available proxy (e.g., terrestrial plants) to estimate a conservative hazard quotient.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 269 | ERFN (February 22, 2023) | Section 10.1.6.1.4 Human Health Risk Assessment Results; Table 10.1-8 | <p>Comment #ERFN-169: Although in most cases project incremental HQ is not on its own a key driver in Project Total HQ exceeding individual or total benchmarks, the high baseline emphasizes the need to minimize additional inputs. ERFN does not accept arguments that suggest that since the baseline is already elevated, any additional inputs are negligible. Rather, any additional inputs only worsen the risks which are already present.</p> <p>Question/Recommendation: For all COPCs where individual or total HQs are above benchmarks, Denison must proactively identify solutions for minimizing additional inputs.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 270 | ERFN (February 22, 2023) | Section 10.2.1.1 Valued Component Selection | <p>Comment #ERFN-170: Denison notes that unwanted constituents, specifically iron and radium, will be removed from the recovered lixiviant material prior to uranium precipitation. This unwanted precipitate does however contain a valuable amount of uranium and therefore will be stored and shipped to be processed at an eligible licensed facility. It is unclear where this facility may be located, and furthermore, it is unclear whether the impacts of transportation of this material and the potential for accidents or malfunctions has been considered elsewhere in this EIS.</p> <p>Question/Recommendation: Denison must provide additional information about its plans to move waste products containing radium and uranium offsite for additional processing.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 271 | ERFN (February 22, 2023) | Section 10.2.4 Mitigation Measures | <p>Comment #ERFN-171: Mitigation measures should ensure there are redundant protections in place to minimize risk to worker health. Specifically, in any instance where the use of powered air purifying respirator (PAPR) will be effective in reducing radiation exposure, it should be applied. This then can be made redundant through the use of personal protective equipment such as the use of N95 or a self-contained breathing system.</p> <p>Question/Recommendation: Denison should take an additive approach rather than an either/or approach to identifying and applying mitigations for limiting radiation exposure to workers.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 272 | ERFN (February 22, 2023) | Table 3.5-1: How Indigenous Knowledge was Incorporated into Existing Environment and Effects Assessment Sections | <p>Comment #ERFN-172: Not all of the information in this table explains how the knowledge was incorporated or used to inform the effects assessment sections. Rather, in many instances, it states what the knowledge was instead of how it was used.</p> <p>Question/Recommendation: Provide a reference table identifying and acknowledging all of the information that was provided by ERFN and indicates how the information was incorporated and weighted into the assessment of the effects. If needed, ERFN can support by providing this information if the TK report is not clear enough.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 273 | ERFN (February 22, 2023) | Section 4.1.2 Denison's Indigenous Peoples Policy and Investment and Sustainability Philosophy | <p>Comment #ERFN-173: The EIS states that "Denison is committed to operating the Project in a fully sustainable manner, considering not only the maintenance of high standards of safety and environmental compliance." (p.4-3). It is not clear what "fully sustainable" means or how the definition was informed.</p> <p>Question/Recommendation: Provide clear definition, with backed-up literature and evidence, as to what "fully sustainable" means. Further, clarify how ERFN values were included in the understanding of "fully sustainable." That is, has this definition been informed by Indigenous Knowledge and worldviews, and if so, then how have project planning and activities adjusted and if not, then provide an explanation as to why.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 274 | ERFN (February 22, 2023) | Section 11.0 Land and Resource Use General comment | <p>Comment #ERFN-174: Denison has separated out the quality of life, land and resource use, economics and other VCs as if they can be considered separately.</p> <p>Question/Recommendation: Provide an explanation as to how land and resource use was considered in quality of life effects assessment.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 275 | ERFN (February 22, 2023) | Section 11.0 Land and Resource Use | <p>Comment #ERFN-175: Repeatedly, Denison states that there is "limited amount of Indigenous uses in proximity to the Project" and it appears these conclusions have been made from Denison's interpretation of ERFN's TK report. It was made clear to Denison that there is extensive use in the area and that the report is limited in scope and is not statistically representative of ERFN rights holders. Further, Denison has failed to frame the EIS from a rights-based approach. The rights of the Indigenous peoples of Canada recognized and affirmed by section 35 of the Constitution Act, 1982 (Section 22(1)(c)) are collective rights, and assuming minimal impact based on the inaccurate understanding of a few land users does not adequately assess impacts to Indigenous Rights.</p> <p>Other instances of inaccurate wording of use include:</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| | | | <ul style="list-style-type: none"> - “Overall, given the limited use of the ILRU LSA, adverse effects that are low in magnitude, the limited geographic extents of effects, and the reversibility of effects, the conclusion relative to changes to ILRU is not significant.” - “The absence of the Key Lake gate and the removal of the process of providing identification will provide recreational users and local Indigenous communities with greater access to the ILRU LSA, which is not currently used intensively” (p. 11-70 – emphasis added) - “Overall, given limited use of the ILRU LSA, adverse effects that are low in magnitude, the limited geographic extents of effects, and the reversibility of effects, the conclusion relative to changes to ILRU is not significant.” (p. 11-74) - “Big game hunting is absent in the Project Area and is sparse and infrequent in the ILRU LSA. Indigenous harvests of terrestrial species are primarily conducted south of the Key Lake gate and/or closer to communities.” (p.11-49) <p>Question/Recommendation: ERFN made it clear in their submissions that the information provided was not statistically representative and does not include the entire IK or land use of ERFN members. ERFN’s Traditional Knowledge Study & Health and Socio- Economic Study Report states: “the results in this Study showcase the information shared by some of ERFN’s land users, trappers and Elders and cannot be considered a complete representation of ERFN knowledge and use in the Study Area. Nevertheless, these results demonstrate that the Project is likely to have significant impacts on ERFN’s Aboriginal and Treaty Rights and Interests without appropriate and effective measures including mitigation, accommodation, monitoring/follow- up, environmental management and protection planning, along with an ongoing role in environmental oversight. ERFN continues to assert that it is only through a collaborative and co-production approach to the EA that these measures will be appropriately designed and implemented.”</p> <p>There remains a disconnect between Denison’s conclusions of impacts and the results that were provided in ERFN’s Traditional Knowledge Study & Health and Socio- Economic Study Report.</p> <p>Denison must ensure that it considers the collectively held rights of ERFN protected by section 35 of the Constitution Act and Treaty 10. Individual ERFN land users have important interests to be considered, and in some instances, they exercise rights held by the collective. However, such users do not represent the constitutional interests of the collective; the elected Chief and Council bear that critical and all-encompassing responsibility Denison must recognize that inherent Aboriginal rights or Treaty Rights must not be infringed upon, and where impacts cannot be avoided, accommodation measures must be complete.</p> <p>(i) Provide reasoning as to why these statements were made and evidence that Denison understands the impact that these statements have. That is, they belittle the information provided and misrepresent potential impacts on the collective rights of ERFN.</p> <p>(ii) Provide adequate funding for ERFN to undertake a comprehensive Rights Impact Assessment that is led independently by ERFN</p> <p>(iii) It is expected that Denison will remove all of these inaccurate statements, and all other similar statements in the EIS, and re-evaluate impacts based on an understanding of collective rights and recognition of the cumulative impacts of past activities</p> | |
| 276 | ERFN (February 22, 2023) | Section 11.1.7 Cumulative Effects | <p>Comment #ERFN-176: The EIS states, “existing projects were not considered as part of the CEA because they were captured and assessed within baseline conditions” (p. 11-69). However, Denison has not shown how CE from past projects was acknowledged within the baseline of ILRU. Rather, in many instances, as noted above, Denison has misinterpreted ERFN’s Traditional Knowledge Study & Health and Socio- Economic Study Report. There is limited recognition of the discussion on impacts from past projects and how this has altered current baseline conditions, including the likelihood that current baseline conditions have moved beyond ERFN’s acceptable threshold of impact.</p> <p>Question/Recommendation: Until Section 11.1.7, and Section 11 in general, adequately considers cumulative effects of past projects and impacts to ERFN’s harvesting activities, and ability to access ancestral lands as they were prior to contact from a rights-impacts lens, Section 11.1.7 is considered inadequate and incomplete.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 277 | ERFN (February 22, 2023) | Section 11.1.5 Mitigation Measures | <p>Comment #ERFN-177: Denison has stated that there will be no further mitigation or monitoring for Resource Availability, Availability of Lands/Waters, and in general ILRU monitoring. This is unsatisfactory as ERFN is in disagreement that impacts to ILRU will not be significant.</p> <p>Question/Recommendation: Prior to approval, Denison needs to work with ERFN to develop a program that monitors changes to ERFN's relationship and use of the area. This needs to be led by ERFN and occur with frequency across all phases of the project. It will provide relevant and useful information to Denison and ERFN to monitor potential changes and impacts from the project and any additional monitoring activities that may need to occur.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 278 | ERFN (February 22, 2023) | Section 11.1.4.5.1 Aesthetic Experience | <p>Comment #ERFN-178: Denison states that "to control road dust during summer (May to October), water and/or chemical dust suppressant will be applied to all site roads (Section 6.1.5 in Section 6)." p. 11-56. There is no description of chemical dust suppressant and Section 6.1.5 only indicates that water will be used twice daily as a dust suppressant.</p> <p>Question/Recommendation: (i) Confirm how dust will be managed – is it water or chemical dust suppressant? (ii) If the latter, provide information on the product that will be used and all impacts to plants and wildlife.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 279 | ERFN (February 22, 2023) | Section 11.1.4.3 Resource Availability for Subsistence Harvesting | <p>Comment #ERFN-179: With respect to furbearer habitat, Denison states "effects are predicted to belong-term but reversible because the alteration of available furbearer habitat is expected to be reversed as sensory disturbances diminish with the end of Project Operation activities and subsequent Decommissioning of Project components." p. 11-50.</p> <p>While there is recognition that this impact may be reversible to furbearing animals, it is not clear how this is a reversible to the used of the area by ERFN. This long-term impact will last for at least a generation. It is clear from past projects, settlements, and colonial activities that a lot of knowledge can be lost within a generation when you remove the access and ability for knowledge transfer.</p> <p>Question/Recommendation: Provide an explanation as to how predictions across all of section 11.1.4 considered potential for contribution to the degradation of cultural practices and knowledge transfer. Provide analysis on the potential impacts of project activities on knowledge transfer and land use for ERFN citizens who have rights across their entire ancestral territory. This needs to be done with the assumption that removal of an area for land use will result in an impact to ERFN's collectively held section 35 rights.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 280 | ERFN (February 22, 2023) | Section 11.1.3.2.1 English River First Nation/Patunuak | <p>Comment #ERFN-180: There is concern as to how well Denison reviewed the reports from ERFN. For example, in Section 11.1.3.2.1 English River First Nation/Patunuak on p. 11-30 Denison states "no access routes or culture/historical trails were identified as intersecting with the Project site (ERFN and SVS 2022b)." ERFN dispute this statement and urge Denison to re-review ERFN's report and remind Denison of the information provided in this report: "Participants spoke of using the Fox Lake Road, which runs through the Wheeler River Project site, as an access route for harvesting activities throughout an area stretching from the Key Lake mine to McArthur River mine ... One participant expressed concerns that this route (1018-14) may be blocked by Project activity. Another participant stressed how this entire area (1004-18) is used by ERFN people as a contemporary gathering place."</p> <p>Question/Recommendation: Denison will need to do a more carefully review of ERFN's reports and include all information provided in the EIS. That is, all information summarized will need to be confirmed for accuracy and gaps in the information summarized will need to be filled.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 281 | ERFN (February 22, 2023) | Section 11.1.3 Existing Environment | <p>Comment #ERFN-181: This section does not adequately discuss or highlight the history and experience of ERFN. Additional valuable information that frames the existing environment and impacts to land use was provided in ERFN's Traditional Knowledge Study & Health and Socio-Economic Study Report.</p> <p>Question/Recommendation: Provide ERFN with the capacity and opportunity to edit and add to this section so that the EIS is framed with additional and relevant information.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 282 | ERFN (February 22, 2023) | Section 16.6.3 Heritage Resources | <p>Comment #ERFN-182: Heritage Resource Management Plan.</p> <p>Question/Recommendation:</p> <p>In Section 16.6.3 Denison states that a "Heritage Resources Management Plan (HRMP) has been developed by Denison and outlines the steps that will be taken should anymore archaeological sites be identified Even though they say that these steps include "discussions with local indigenous leadership." this is not evident. Prior to this document being approved, ERFN requests the opportunity to complete a third-party review and provide feedback to Denison.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 283 | ERFN (February 22, 2023) | Section 16.6.3 | <p>Comment #ERFN-183: Cultural Heritage Monitors.</p> <p>Question/Recommendation:</p> <p>Prior to the approval of the project, Denison must commit to hiring ERFN Cultural Heritage Monitors who will be present during any construction and/or land disturbance work. This area is still considered to have high potential for archeological sites even if Denison was not able to locate many sites during their assessments.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 284 | ERFN (February 22, 2023) | Section 12.1.2.1, 12.2.2.1, 12.3.2.1 Influence of Indigenous Knowledge, Local Knowledge and Engagement on the Assessment, English River First Nation | <p>Comment #ERFN-184: EIS Section 12.1.2.1, 12.2.2.1, and 12.3.2.1 sets out a list of the submissions and reports provided by ERFN that included Traditional Knowledge and perspectives that have informed Section 12.1, 12.2 and 12.3 of the assessment respectively. ERFN notes that these lists do not include ERFN's submission of comments to Denison on a draft of the EIS provided to ERFN before its submission to CNSC, despite this submission including important information regarding our Traditional Knowledge and perspectives that was meant to inform changes to these sections of the Draft EIS. ERFN notes that as a result, numerous comments on this section of the EIS below are a restatement of concerns raised in our August 2022 submission that remain unaddressed. ERFN also notes that the contents of ERFN's August 2022 submission are also not reflected in Table 4.3-2 which is meant to outline Key Issues and Concerns raised English River First Nation in previous engagements and submissions and demonstrate how these comments have been addressed or considered in the Draft EIS.</p> <p>Question/Recommendation:</p> <p>Section 12 must be updated to incorporate the concerns raised in the August 2022 submission and restated in the comments below.</p> <p>In addition, Table 4.3-2 should be updated to reflect the Key Issues and Concerns raised in ERFN's August 2022 submission and demonstrate how these comments have been addressed or considered in Section 12 of the EIS.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 285 | ERFN (February 22, 2023) | Section 12.1.1.2 Key Indicators and Measurable Parameters | <p>Comment #ERFN-185: Section 12.1.1.2 states that a Key Indicator (KI) "is an important aspect of a VC that may be affected by the Project and its activities" and that a measurable parameter "is the metric associated with the KI that can be used to characterize changes to attributes of the environment that may change as a result of the Project and/or other human developments and natural factors" (p. 12-7).</p> <p>For the valued component of Cultural Expression and this section of the assessment, Table 12.1-1 sets out Denison's selection of KIs to include:</p> <ol style="list-style-type: none"> 1. Knowledge Transfer 2. Traditional diet <p>While ERFN is supportive of Cultural Expression being included as an important facet of Quality of Life and identified as a key value component included in the scope of the effects assessment, the KIs and measurable parameters selected by Denison in Section 12.1.1.2 are insufficient and do not reflect a holistic consideration of Cultural Expression, even by Denison's own definition set out in Section 12.1. ERFN notes that concerns have been raised in previous engagement with ERFN and in our August 2022 submission of comments on the Draft EIS regarding the limited scope of these KIs and that additional KIs and measurable parameters must be included to reflect a more holistic understanding of Cultural Expression informed by Indigenous perspectives. Because the selection of these KIs and measurable parameters is a foundational step in the assessment that informs the scope and approach to the subsequent characterization of existing conditions, assessment of project-related effects, identification of</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| | | | <p>mitigation measures and assessment of residual effects and cumulative effects, the insufficient scope of KIs and measurable parameters selected by Denison therefore results in a fundamental deficiency of Section 12.1 of the assessment of the effects.</p> <p>Section 12.1 should be revised to include an analysis of additional KIs and measurable parameters of Cultural Expression more closely related to values identified for protection by ERFN citizens. These may include:</p> <ul style="list-style-type: none"> - Ability to practice traditional activities - Cultural Identity - Connection to ERFN Traditional Territory - Ability to speak ERFN dialects of Dene and Cree - Intergenerational knowledge transfer - Collecting, processing, using, and sharing traditional medicines - Spiritual and cultural vitality | |
| 286 | ERFN (February 22, 2023) | Section 12.1.4.1 Potential Project – Valued Component and Key Indicator Interactions | <p>Comment #ERFN-186: Table 12.1-2 outlines potential interactions between project phases and activities, and KIs for Cultural Expression. ERFN notes that Employment and Expenditures are not identified to have potential interactions.</p> <p>ERFN disagrees with this assessment as employment may alter the ability for ERFN citizens to engage in traditional activities and intergenerational knowledge transfer, as citizens will be unable to engage in on-the-land activities and cultural knowledge sharing during rotational work periods.</p> <p>Question/Recommendation: Denison should revise Table 12.1-2 to recognize potential interactions between employment and KIs for Cultural Expression</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 287 | ERFN (February 22, 2023) | Section 12.1.6 Residual Effects Evaluation | <p>Comment #ERFN-187: Section 12.1.6 of the EIS defines a significant adverse residual effect on Cultural Expression as “an effect that is highly different from baseline conditions and trends and cannot be managed or mitigated through adjustments to existing programs, policies, or other mitigation.” The EIS goes on to state that “because residual adverse effects on Cultural Expression are not expected to result in this level of change, effects are expected to be not significant for the Project.”</p> <p>ERFN does not agree with this assessment of the potential residual effects of the Project, which is fundamentally deficient based on the limited scope of KIs and measurable parameters that were selected for analysis. ERFN also does not agree that the mitigation measures presented in Section 12.1.5 are sufficient to address effects of the Project on Cultural Expression that will be highly different from baseline conditions.</p> <p>Question/Recommendation: Until Section 12.1 is revised to include a more holistic consideration of KIs and measurable parameters for Cultural Expression that ERFN has set out above, Denison’s assessment of the nature of potential Residual Effects should be considered incomplete and deficient. In addition, until ERFN confirms CNSC that Denison and ERFN have reached mutually agreed- upon terms of mitigation and accommodation that address the effects of the Project on Cultural Expression, this EIS should not be considered complete or approved by CNSC. [Additional questions on this topic directed to regulators or government entities are included in the CNSC table]</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 288 | ERFN (February 22, 2023) | Section 12.2.1.2 Key Indicators and Measurable Parameters | <p>Comment #ERFN-188: Section 12.2.1.2 states that a Key Indicator (KI) “is an important aspect of a VC that may be affected by the Project and its activities” and that a measurable parameter “is the metric associated with the KI that can be used to characterize changes to attributes of the environment that may change as a result of the Project and/or other human developments and natural factors” (p. 12-44).</p> <p>For the valued component of Community Well-Being and this section of the assessment, Table 12.2- 1 sets out Denison’s selection of KIs to include:</p> <ol style="list-style-type: none"> 1. Population and Demographics (from in/out migration as people seek employment opportunities), 2. Income of local workers (from participation in employment and/or contracting activities), and 3. Community cohesion (from changes in income and participation in a commuter rotation system). <p>While ERFN is supportive of Community Well-Being being identified as a key value component</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| | | | <p>and included in the scope of the effects assessment, the KIs and measurable parameters selected by Denison are insufficient and do not reflect a holistic consideration of well-being informed by Indigenous determinants of well-being, despite Denison's acknowledgment that communities in the LSA are predominantly (95.2%) Aboriginal (Section 12.2.3.1, p. 12-56). ERFN notes that concerns have been raised in previous engagement with ERFN and in our August 2022 submission of comments on the Draft EIS regarding the limited scope of these KIs and that additional KIs and measurable parameters must be included to reflect a more holistic understanding of Community Well-Being informed by Indigenous perspectives. Because the selection of these KIs and measurable parameters is a foundational step in the assessment that informs the scope and approach to the subsequent characterization of existing conditions, assessment of project related effects, identification of mitigation measures and assessment of residual effects and cumulative effects, the insufficient scope of KIs and measurable parameters selected by Denison therefore results in a fundamental deficiency of Section 12.1 of the assessment of the effects.</p> <p>Question/Recommendation: ERFN has shared with Denison (ERFN and SVS 2022a), that the four components of ERFN health and well-being, often referred to as the "the medicine wheel," is the core guiding principle to overall ERFN health and well-being, and include:</p> <ul style="list-style-type: none"> - Physical health - Mental health - Spiritual health - Emotional health <p>The KIs selected by Denison and subsequent steps of the assessment of the effects must be amended to include more holistic KIs and parameters relevant to these ERFN determinants of Community Well-Being, in collaboration with ERFN and based on the results of studies and submissions provided by ERFN to date. Potential KIs/parameters could include, but are not limited to:</p> <ul style="list-style-type: none"> - Food security - Access to traditional foods - Psychosocial Impacts - Spiritual and cultural vitality o Ability to practice traditional activities o Cultural Identity o Connection to ERFN Traditional Territory o Ability to speak ERFN dialects of Dene and Cree o Intergenerational knowledge transfer o Collecting, processing, using, and sharing traditional medicines | |
| 289 | ERFN (February 22, 2023) | Section 12.2.4.1 Potential Interactions Between the Project and Valued Components/Key Indicators | <p>Comment #ERFN-189: In Section 12.2.4.1, Denison sets out the assessment of potential interactions between the Project and VC/KIs, based on "IK, LK, discussions with Indigenous groups, government agencies, and the public, KPIs for the Project, the professional judgment of members of the Project team, and consideration of existing conditions in the study areas for the VCs and KIs" (Page 12-73). ERFN notes the only project activities Denison has determined will interact with the VC/KIs considered in this section of the assessment are employment and expenditures, and Denison states that no other construction activities, operation activities, or decommissioning activities are anticipated to have any interactions with Community Well-Being. ERFN does not agree with this assessment of the Project's potential interactions with Community Well-Being, and it is ERFN's position that numerous other Project activities will have potential adverse effects on ERFN's Community Well-Being.</p> <p>Question/Recommendation: This assessment should be considered incomplete and fundamentally deficient. The assessment must be redone with a more holistic consideration of KIs and pathways to effects developed in collaboration with ERFN and based on the results of studies completed by ERFN to date.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 290 | ERFN (February 22, 2023) | Section 12.2.4.2 Potential Project Related Effects | <p>Comment #ERFN-190: While Section 12.2.4.2.1 does consider the effects of population changes related to the Project on demand for housing and general concerns with the in- and-out migration of LSA residents, it doesn't address the full range of potential impacts associated with a transient workforce.</p> <p>Question/Recommendation: Section 12.2.4.2 must include an assessment of all potential effects of a transient workforce and changes to population dynamics, including those disproportionately experienced by women and other segments of the population. This should incorporate findings of research like the 2017 study completed by Lake Babine Nation and Nak'azdli Whut'en (Indigenous Communities and Industrial Camps), and/or related research in the context of the LSA.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 291 | ERFN (February 22, 2023) | EIS Section 12.2.4.2 Potential Project Related Effects | <p>Comment #ERFN-191: While Section 12.2.4.2.2 does include consideration of the effects of increased income on existing issues for LSA residents including substance abuse and domestic violence, corresponding mitigation measures in Section 12.2.5 are limited to training and programming on the Project site, which is not sufficient to address these potential impacts and should not be considered sufficient to prevent residual effects.</p> <p>Question/Recommendation: Section 12.2.5 must also include Denison's commitments to support the establishment and improvement of social services and wellness programs located in, led and implemented by each of the Indigenous communities in the LSA through the provision of funding and other resources.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 292 | ERFN (February 22, 2023) | EIS Section 12.2.4.2 Potential Project- Related Effects | <p>Comment #ERFN-192: Despite acknowledging in its characterization of the existing environment for income of local workers in Section 12.2.3.2 that "the traditional economy in the LSA provides important non-cash income to citizens and contributes to the overall sense of well-being for communities" (p. 12-64), and that "Wheeler River is a culturally and economically important area for ERFN and a place where fishing, hunting, and trapping occur throughout the year" (p. 12-65), the assessment of potential project related effects for this KI in Section 12.2.4.2 only considers effects on personal income for residents of the LSA through employment on the Project.</p> <p>Question/Recommendation: The assessment of effects for income and financial well-being must be expanded to include participation in the traditional and subsistence economy, the Project's potential effects on ERFN's fishing, hunting and trapping and the relationship between participation in the traditional economy and the overall sense of well-being for communities, which Denison acknowledges in Section 13.3.2.3.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 293 | ERFN (February 22, 2023) | EIS Section 12.2.4.2 Potential Project- Related Effects | <p>Comment #ERFN-193: Despite acknowledging in its characterization of the existing environment for community cohesion in Section 12.2.3.3 that ERFN's practice of traditional activities such as hunting, fishing, trapping and gathering is a crucial component of community cohesion and well-being (p. 12-70), Denison's assessment of effects for this KI in Section 14.2.4.2.3 only considers time spent by LSA residents employed by the Project away from their communities and families during work rotation. While employment and participation in the Project by ERFN citizens is optional, the Project has broader direct impacts on the Ancestral Territory, effecting all ERFN citizens. Therefore, regardless of whether employment interferes with aspects of Community Well-Being, the existence of the Project will change the manner in which all ERFN citizens interact with Nuhtsiye-kwi Benéne, and in turn ERFN's overall community cohesion, Community Well-Being and Quality of Life.</p> <p>Question/Recommendation: The assessment of effects for community cohesion must be expanded to include all the Project's potential effects on ERFN's practice of traditional activities, including fishing, hunting and trapping.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 294 | ERFN (February 22, 2023) | Section 12.2.6 Residual Effects Evaluation | <p>Comment #ERFN-194: Section 12.1.6 of the EIS defines a significant adverse residual effect on Cultural Expression as "an effect that is highly different from baseline conditions and trends and cannot be managed or mitigated through adjustments to existing programs, policies, or other mitigation." The EIS goes on to state that "because residual adverse effects on Cultural Expression are not expected to result in this level of change, effects are expected to be not significant for the Project." ERFN does not agree with this assessment of the potential residual effects of the Project, which is fundamentally deficient based on the limited scope of KIs and measurable parameters that were selected for analysis. ERFN also does not agree that the mitigation measures presented in Section 12.2.5 are sufficient to address effects of the Project on Cultural Expression that will be highly different from baseline conditions.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| | | | <p>Question/Recommendation:</p> <p>Until Section 12.2 is revised to include a more holistic consideration of KIs and measurable parameters for Community Well-Being that ERFN has set out above, Denison's assessment of the nature of potential Residual Effects should be considered incomplete and deficient. In addition, until ERFN provides confirmation to CNSC that Denison and ERFN have reached mutually agreed upon terms of mitigation and accommodation that address the effects of the Project on Community Well-Being, this EIS should not be considered complete or approved by CNSC.</p> <p>[Additional questions on this topic directed to regulators or government entities are included in the CNSC table]</p> | |
| 295 | ERFN (February 22, 2023) | Section 12.3.3.1 Methods and Limitations | <p>Comment #ERFN-195: Traffic volume data for Highways 914 and 165 are based on short term traffic counts conducted over a 48- hour counting period, however, continuous traffic monitoring data and subsequent average daily traffic volume reports are not produced for these highways. This traffic data is infrequently updated and only provides a snapshot of actual traffic conditions which may not be representative of actual conditions. The impacts of the Project to ERFN's rights and interests related to increased traffic and access to the Project area is a crucial concern, and an accurate baseline of traffic data is vital to the integrity of the subsequent assessment of potential effects, development of mitigation measures, residual effects evaluation and characterization of cumulative effects.</p> <p>Question/Recommendation:</p> <p>Denison should establish long-term traffic monitoring stations along Highway 914 and 165 to provide a more accurate description of existing traffic conditions along these key access routes for the Project.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 296 | ERFN (February 22, 2023) | Section 12.3.6.1 Residual Effects Characterization | <p>Comment #ERFN-196: Denison states a significant effect on the Infrastructure and Services VC (including the measurable parameters of traffic and community infrastructure and services, and emergency services) would result if projected demands are above the current capacity, are routinely above the current levels for an extended period of time, are unlikely to return to existing conditions, and cannot be mitigated through adjustments to programs, policies, plans, or through other mitigations. Local and regional emergency services are limited and could be easily overwhelmed by even moderate scale emergencies.</p> <p>Question/Recommendation:</p> <p>Denison must demonstrate plans to be largely self-reliant on internal emergency response measures, and able to sustain emergency management until transportation is available to or from the Project area either by air or ground.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 297 | ERFN (February 22, 2023) | Section 12.3.4.2.1 Potential Effect 1 – Change in Traffic | <p>Comment #ERFN-197: While Section 12.3.4.2.1 describes Denison's assessment of changes to traffic volume during Project construction, operation and decommissioning, this section of the EIS does not go onto describe how the effects of increased traffic may interact with traditional land use and Quality of Life, which is the overall valued component considered in Section 12 of the EIS.</p> <p>Question/Recommendation:</p> <p>Section 12.3.4.2.1 should be modified to include an analysis of how the Project's change to traffic conditions and road use will result in effects to traditional land use and Quality of Life, and include mitigation measures to address these potential effects.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 298 | ERFN (February 22, 2023) | Section 13.1 Scope of the Assessment | <p>Comment #ERFN-198: The guiding questions are narrowly focused and could be expanded to understand impacts from a GBA+ perspective. The questions do not ask how the Project will help to retain economic benefits for LSA communities.</p> <p>Question/Recommendation:</p> <p>The assessment could be enhanced by reviewing the findings from a GBA+ perspective. The assessment should make clear recommendations to help LSA maximize potential economic effects.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 299 | ERFN (February 22, 2023) | Section 13.1 Scope of the Assessment | Comment #ERFN-199: "Characterize existing conditions"; This could be enhanced by forecasting the baseline conditions without the project to match the temporal boundaries of the project, as well as characterizing existing conditions. Forecasting key indicators and measurable parameters without the project based on trends and existing conditions could enhance the assessment. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 300 | ERFN (February 22, 2023) | Section 13.1.2 Key Indicators and Measurable Parameters | Comment #ERFN-200: Based on the Terms of Reference, the Traditional Economy could be a separate VC. However, the Draft EIS considers Traditional Economy as a KI. Question/Recommendation: Given the importance of the Traditional Economy to ERFN, selecting it as a separate VC with a set of Key Indicators could enhance the assessment and monitoring of the potential Project's effects. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 301 | ERFN (February 22, 2023) | Section 13.1.2 Key Indicators and Measurable Parameters | Comment #ERFN-201: Typo, the Economy VC is comprised of five, not four KIs. Question/Recommendation: Please fix typo. | The typo is corrected in the EIS Section 13.1.2. |
| 302 | ERFN (February 22, 2023) | Section 13.1.2 Key Indicators and Measurable Parameters | Comment #ERFN-202: Direct/Indirect/Induced for employment and income – Direct employment/income could be outside of the LSA or RSA. Question/Recommendation: Acknowledge that Direct employment in this assessment is limited to the direct employment by Denison and contractors in the Study areas. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 303 | ERFN (February 22, 2023) | Section 13.1.2 Key Indicators and Measurable Parameters | Comment #ERFN-203: Indirect/Induced for employment; the suggested measure for indirect and induced employment is aggregated employment and unemployment rates; Input-output modelling could be used to estimate indirect and induced employment. Question/Recommendation: Enhance measurement of indirect and induced employment through input-output modelling. This would help understand the other enabled employment impacts of the project. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 304 | ERFN (February 22, 2023) | Table 13.1-1: Key Indicators and Measurable Parameters for Economy | Comment #ERFN-204: Measurable parameters employment and training; employment is limited to direct project-related employment opportunities. There are 2 issues: 1. It is implied that many of these opportunities will be captured by fly- in/fly-out workers that won't impact the LSA. 2. There's no estimating of the quantity of indirect and induced employment. Indirect and induced employment can often represent the same number of jobs provincially as direct employment. The question for all these jobs is how many of them will be captured in the LSA and RSA. Recommendations: 1. Estimate indirect and induced employment impacts using input- output modelling. 2. Estimate the number of direct and indirect jobs that will be captured in the LSA and RSA vs. out of the study area. Induced jobs in the study areas could be proportional to the percentage of | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| | | | total direct and indirect jobs captured in the study areas. Regardless of the methodology Denison uses, an estimate of the economic impact on local employment in the LSA and RSA would add to the assessment. | |
| 305 | ERFN (February 22, 2023) | Table 13.1-1: Key Indicators and Measurable Parameters for Economy | Comment #ERFN-205: Measurable parameters – Income; Wages and salaries paid by Denison are only part of the income impact in the study areas. Not all the income will be captured in the study areas, and some income will be generated through indirect and induced activities. Question/Recommendation: Income impacts in the community should be based on the same employment capture assumptions that are used for capturing employment. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 306 | ERFN (February 22, 2023) | Table 13.1-1: Key Indicators and Measurable Parameters for Economy | Comment #ERFN-206: Measurable parameters – Income; Income disparity is not included in the measurable parameters; Projects that can create relatively high-paying jobs for some of the residents in a community can create income disparity. This can result in increases in household costs for all residents. The impact of the project on income disparity could be important. Question/Recommendation: Consider adding income disparity as a measurable parameter of the Income key indicator. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 307 | ERFN (February 22, 2023) | Table 13.1-1: Key Indicators and Measurable Parameters for Economy | Comment #ERFN-207: Business opportunities does not look at the impact of the project on the labour supply for existing businesses. Relatively high-paying jobs associated with the project could result in existing businesses not being able to hire and retain the employees necessary to operate their businesses. Question/Recommendation: The assessment could be enhanced by including impact on labour for existing businesses as a measurable parameter for the Business Opportunities Key Indicator. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 308 | ERFN (February 22, 2023) | Table 13.1-1: Key Indicators and Measurable Parameters for Economy | Comment #ERFN-208: Measurable parameters: Doesn't specify that measurable parameters will be looked at in a disaggregated fashion. Question/Recommendation: The assessment could be enhanced by collecting disaggregated data on these measurable parameters when it was available. Project impacts of the key indicators are likely not homogeneous across all demographic factors. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 309 | ERFN (February 22, 2023) | Section 13.1.3.2 Temporal Boundaries | Comment #ERFN-209: The existing environment focuses on the past three census periods (2006, 2011, 2016). The assessment would benefit from reviewing and incorporating data from the latest census. Question/Recommendation: Incorporate demographic and economic data from the 2021 Census. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 310 | ERFN (February 22, 2023) | Section 13.1.3.2 Temporal Boundaries | Comment #ERFN-210: The temporal boundaries seem appropriate, but the existing conditions without the project do not forecast what the measurable indicators will be without the project. Question/Recommendation: Forecast baseline measurable indicators without the project for the temporal boundaries presented in the assessment. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 311 | ERFN (February 22, 2023) | Section 13.2 Existing Environment | Comment #ERFN-211: Most of the data presented in 13.2.1.4/13.2.1.5/13.2.1.6 only shows percentages of participation. The associated nominal values are unclear. Question/Recommendation: Because the nominal values are important for understanding the scale of impact of the project, add nominal values throughout the sections. This is important because the entire LSA has only 875 people in their labour force. How is that spread across the different communities? Small changes in these variables could be material to the different communities. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 312 | ERFN (February 22, 2023) | Section 13.2.1 Key Indicator: Employment and Training | Comment #ERFN-212: The Draft EIS stated, “due to the small populations of La Plonge and Patuanak, data from Statistics Canada have been suppressed to protect confidentiality. Accordingly, data for the LSA are not fully representative, but the effect on reported statistics is believed to be minimal at the LSA level, given the low population of those two localities” (p. 13-18). Question/Recommendation: The random rounding for small populations makes the census data unreliable as an absolute indicator. Denison has done a good job using qualitative interview data to add to the baseline understanding of unemployment. Given the challenges in the census at capturing unemployment for these small populations, specific details for measuring unemployment as part of the monitoring plan would be valuable. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 313 | ERFN (February 22, 2023) | Section 13.2.1 Key Indicator: Employment and Training (all indicators) | Comment #ERFN-213: The data are not presented from a GBA+ perspective, limiting the assessment's estimate of the Project adverse or disproportionate impacts separated based on gender, sexual orientation, race, or other factors which have historically been used to disadvantage populations interacting with mining projects. Question/Recommendation: Complete the assessment using a GBA+ framework. [Additional questions on this topic directed to regulators or government entities are included in the CNSC table] | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 314 | ERFN (February 22, 2023) | Section 13.2.1.5 Employment by Sector | Comment #ERFN-214: The employment by industry sector shows that the LSA has a higher concentration of employment in mining than the RSA and the province as a whole. This suggests that not all the jobs associated with the project will go to a fly-in/fly-out work force. Employment in the LSA could be impacted by the project: Many workers are already in the mining industry. Question/Recommendation: Do not rule out effects due to the fly-in/fly-out nature of the project (municipal revenue, indirect and induced employment, and income). | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 315 | ERFN (February 22, 2023) | Section 13.2.2.1 Total Personal Income | Comment #ERFN-216: Personal Income data is presented for the LSA for Indigenous and non-Indigenous individuals, but the make- up of the population (Indigenous vs non- Indigenous) was not presented. Question/Recommendation: Include nominal values to show the size of the Indigenous and non-Indigenous populations in the LSA. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 316 | ERFN (February 22, 2023) | Section 13.2.3 Key Indicator: Traditional Economy | Comment #ERFN-218: Some baseline data is missing from this section. Traditional economy baseline data is presented in the project's effects section for the first time. Specifically, the commercial harvester who had traplines near the project site was not identified in this section, nor was the typical locations of non-commercial harvesting identified. These are referenced in the effects section. It would be helpful if they were previously introduced. Question/Recommendation: Add the baseline elements of the Traditional Economy referenced in the effects section to the baseline section. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 317 | ERFN (February 22, 2023) | Section 13.2.3 Key Indicator: Traditional Economy | Comment #ERFN-219: Kineepik Métis Local and Pinehouse Lake member concerns and thoughts about the impact of the project should likely be in the effects section, not the baseline. Question/Recommendation: Move information related to the effects of the project to the project effects section. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 318 | ERFN (February 22, 2023) | Section 13.2.4 Key Indicator: Business Opportunities | Comment #ERFN-220: There is no discussion on challenges local businesses have in finding labour to operate their businesses. Question/Recommendation: Adding the challenges of local businesses to finding labour would enhance this section. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 319 | ERFN (February 22, 2023) | Table 13.3-1: Potential Project Interactions for Economy | Comment #ERFN-221: The Traditional Economy may have interactions with other phases/activities of the Project, and the interactions are not limited to only employment and expenditures. Project activities and the presence of the Project may interact with current and future Traditional users. Question/Recommendation: Work with traditional users and Knowledge Holders to review the approach of outcomes of the assessment to the Traditional Economy. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 320 | ERFN (February 22, 2023) | Section 13.3.2 Potential Project-related Effects | Comment #ERFN-222: The assessment does not quantify anticipated effects for LSA communities and relies on a qualitative and subjective assessment. Question/Recommendation: Review existing baseline data and run scenarios (best, likely, worst case) to estimate potential capture with the LSA for economic benefits. Denison should conduct an analysis to estimate KI changes in LSA and RSA. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 321 | ERFN (February 22, 2023) | Section 13.3.2.1 Potential Effect 1 – Employment and Training (p.13-61) | Comment #ERFN-223: The Draft EIS states, “training programming will be determined in consultation with COI and are anticipated to involve existing training facilities and programs (Process Operation Technical [SIIT] Meadow Lake, Chemical Technology [Saskatchewan Polytechnic]) as well as specific ISR training, where required. Denison will initially prioritize Indigenous and non-Indigenous communities in the LSA in terms of employment and training opportunities” (p. 13-61). However, Denison has not made firm commitments as of now. Question/Recommendation: (i) Clarify how Denison plans to prioritize Indigenous and non-Indigenous local communities in terms of employment and training. (ii) Establishing a local recruitment and training centre within a nearby community would enhance the positive impacts of the Project on Employment and Training. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 322 | ERFN (February 22, 2023) | Section 13.3.2.1 Potential Effect 1 – Employment and Training | Comment #ERFN-224: Presentation of historic baseline participation and employment rates in the effects section. The effects of the project on these measurable indicators are missing. Question/Recommendation: Remove the presentation of baseline data of these indicators. Add the estimated effects of the project on these indicators. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 323 | ERFN (February 22, 2023) | Section 13.3.2.1 Potential Effect 1 – Employment and Training | Comment #ERFN-225: The draft EIS states, “training opportunities are anticipated to be delivered by institutions in northern Saskatchewan or Saskatchewan more broadly and will be determined in consultation with LSA communities” (p. 13-64) Question/Recommendation: Supporting local hiring practices through the establishment of a local recruitment and training centre within a nearby community for ensuring Indigenous and non-Indigenous members have a pathway to having higher quality positions than general labour or junior positions. This would enhance the positive Project impact on Employment and Training. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 324 | ERFN (February 22, 2023) | Section 13.3.2.3 Potential Effect 3- Traditional Economy | Comment #ERFN-226: The potential effects on the Traditional Economy are likely underestimated. The erosion of traditional economic practices resulting from the cumulative effects of resource projects is a concern voiced by ERFN. Question/Recommendation: Work with traditional users and Knowledge Holders to develop a robust compensation plan, considering future users. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 325 | ERFN (February 22, 2023) | Section 13.3.2.4 Potential Effect 4 – Business Opportunities | Comment #ERFN-228: The impact of the project on business to hire and retain labour to support existing business operations has not been addressed. Question/Recommendation: Forecast the impact of the project on existing businesses access to labour to support existing operations. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 326 | ERFN (February 22, 2023) | Section 13.3.2.4 Potential Effect 4 – Business Opportunities | Comment #ERFN-229: The Draft EIS states, “Denison has established an internal procurement approach that requires the procurement of all goods and services for the Project to first consider businesses based within the LSA communities prior to looking elsewhere in northern Saskatchewan, southern Saskatchewan, and/or outside of Saskatchewan throughout all phases of the Project” (p. 13-68). There were limited specifics associated with this commitment. Question/Recommendation: Clarify how Denison plans to develop procurement strategies that favour local works and businesses. Engage Indigenous and non-Indigenous businesses in the development of these procurement strategies | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 327 | ERFN (February 22, 2023) | Section 13.4 Mitigation and Enhancement Measures | Comment #ERFN-230: Mitigation measures are vague and require more clarity. How Indigenous and local hiring will be prioritized and maximized, the likelihood and type of local procurement and training opportunities should be clearly outlined. Question/Recommendation: Develop a robust and clear set of actions to maximize potential benefits to LSA. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 328 | ERFN (February 22, 2023) | Section 13.4 Mitigation and Enhancement Measures | <p>Comment #ERFN-231: The workforce transition plan will be a key mitigation measure to protect the LSA communities against any boom- bust effects of the Project. More clarity on this plan, including financial commitments to ensure the long-term economic benefits for the LSA, are needed. This plan should also address transition planning for any local businesses working with the Project.</p> <p>Question/Recommendation: Provide details with financial commitments in the workforce transition plan. This should be developed prior to Project approvals and should be revisited on an ongoing basis.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 329 | ERFN (February 22, 2023) | Section 13.5.1 Residual Effects Characterization | <p>Comment #ERFN-232: The residual impacts on employment are said to be positive and low to moderate, without quantifying the impact. At points in the analysis, it is said that there will be little impact on employment and residency due to the fly-in/fly-out nature of the project. Then in this section it is said that the impact on employment could have a moderate effect on the economy. This could cascade to a moderate impact on income disparity, business access to labour, and municipal government cost driven by community growth.</p> <p>Question/Recommendation: Quantify the impacts on employment. Cascade the impacts on employment to impacts on income, business opportunity and government finance.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 330 | ERFN (February 22, 2023) | Section 13.5.1.2 Income | <p>Comment #ERFN-233: The residual impact on Income is seen as positive and moderate. This analysis does not consider the impact on income inequality and how that could impact the LSA and RSA. This might change to direction of the impact.</p> <p>Question/Recommendation: Include income disparity as a measurable impact in the analysis and determine if it changes the direction of the impact of the project on Income.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 331 | ERFN (February 22, 2023) | Section 13.5.1.3 Traditional Economy | <p>Comment #ERFN-234: The residual impact of the project on the traditional economy is seen as having a magnitude of negligible to low. The characterization of the ability of the workforce to participate in the traditional economy as being minimal or low does not seem to be supported by the evidence presented. Evidence presented indicated that some workers at other similar facilities felt that their ability to participate in the traditional economy had been negatively impacted (13-67).</p> <p>Question/Recommendation Provide additional evidence to support the magnitude of the impact as being negligible to low or adjust the magnitude of the impact. The magnitude of the negative impact could potentially be reduced if Denison proposed additional time off be granted to workers to participate in traditional seasonal harvesting activities.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 332 | ERFN (February 22, 2023) | Section 13.5.1.3 Traditional Economy | <p>Comment #ERFN-235: The residual impact of the project on the traditional economy is seen as having a reversibility as fully reversible. The assessment doesn't address the contribution of participating in the traditional economy's impact on social customs and relationships. This effect was identified in the baseline (p. 13-51), but not assessed in section 13.3.2.3. If there is a more than low impact on the traditional economy, this could have a lasting impact on social customs and relationships. This might make return to the traditional economy not as fully reversible as the analysis proposes.</p> <p>Question/Recommendation: Provide additional evidence as to how impacts to the traditional economy won't impact the social customs and relationships, or how if it does these will be able to be reversed after decommissioning.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 333 | ERFN (February 22, 2023) | Section 13.5.1.4 Business Opportunities | Comment #ERFN-236 and ERFN-237: The residual impact of the project on business opportunities has a direction of positive. The assessment does not include the impact of the project of existing businesses' access to labour to support ongoing business operations. If the project negatively impacts existing businesses' access to labour the direction of the impact on business opportunity could change. Question/Recommendation: Assess the impact of the project on existing businesses access to labour. Re-assess the direction of the residual impact if necessary. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 334 | ERFN (February 22, 2023) | Section 13.5.2. Summary of Project- related Residual Adverse Effects on Economy | Comment #ERFN-238: The effects of the Traditional Economy are likely underestimated. The effects from a GBA+perspective are unknown. The potential boom- bust effects of the Project are not considered. Question/Recommendation: Assess the impact of the project on GBA+.Re-assess the direction of the residual impact if necessary. [Additional questions on this topic directed to regulators or government entities are included in the CNSC table] | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 335 | ERFN (February 22, 2023) | Section 13.5.2 Summary of Project- related Residual Adverse Effects on Economy | Comment #ERFN-239: The residual adverse effects and economy summary may need to be updated if some of the additional analysis is done. Question/Recommendation: Re-assess the residual adverse effects on the economy after updating the residual effects on the other key indicators. Revise as necessary the Economy Summary. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 336 | ERFN (February 22, 2023) | Section 13.7 Monitoring and Follow- up | Comment #ERFN-240: There is very little information on how the economic environment will be monitored. Question/Recommendation: Develop a clear monitoring and follow-up plan with ERFN, addressing each of the Key Indicators and outlining the measurements and reporting that will be undertaken. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 337 | ERFN (February 22, 2023) | Section 14.2 Scope, Scale, and Objectives of the Assessment | Comment #ERFN-241: Denison notes that the overall objective of Section 14 Accidents and Malfunctions is to "evaluate the potential effects to human health or the biophysical environment resulting from radiological and conventional accidents and malfunctions in consideration of proposed environmental protection measures" however, continue to state that "some hazards related to work safety were identified; however, worker safety (i.e., risks and consequences) is beyond the scope of this assessment." The lack of full consideration of worker safety with respect to radiological hazards suggests that Denison have failed to identify and consider the full range of accidents, as many of the greatest risks with this project are directly related to worker health and safety, and expand well beyond the health of any one individual (e.g., impacts to worker health and safety may have direct impacts on aquatic or terrestrial conditions, as well as socio-economic perceptions of the mine). Question/Recommendation: Denison must include assessment and consideration of all worker safety risks and consequences associated with accidents and malfunctions for this section to be considered complete. Without this section reviewers are unable assess the broader impacts of the projects and the overall risks to both the environment and society in which this project is set. This request is in alignment with REGDOC-2.9.1 Section A.3.4 which notes that "[t]he applicant should provide an assessment of potential health and environmental effects resulting from postulated radiological and conventional malfunctions or accidents." Our interpretation of this wording is that it applies to both environmental and human health which includes both public and worker health. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 338 | ERFN (February 22, 2023) | Section 14.4 Influence of Indigenous Knowledge, Local Knowledge, and Engagement on the Assessment | <p>Comment #ERFN-242: Examples of Influence of Indigenous Knowledge, Local Knowledge, and Engagement on the Assessment outlined in section 14.4 only demonstrate that concerns were raised during engagement activities, however, Denison fails to demonstrate how it included specific Traditional Knowledge both in the assessment of Accidents and Malfunctions, as well as how Traditional Knowledge would be used in monitoring and or response in the event of an accident or malfunction. As a result, ERFN assert that Denison has done a poor job of meaningfully considering the input from ERFN and others.</p> <p>Question/Recommendation: Denison must demonstrate how Traditional Knowledge, not only community concerns, was considered in the assessment of accidents and malfunction including risks, monitoring, and proposed interventions and mitigations.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 339 | ERFN (February 22, 2023) | Section 14.4 Influence of Indigenous Knowledge, Local Knowledge, and Engagement on the Assessment; Table 14.4- 1 | <p>Comment #ERFN-243: Table 14.4-1 outlines a summary of engagement records related to accidents and malfunctions; however, Denison does not provide sufficient information regarding the concern which was raised and context in which it was raised. Specifically, in many cases, Denison only present a handful of words as the "comment" and then speaks to assessment consideration, but reviewers are unable to identify the concern which is being raised in most cases. As a result, Denison is able to present a solution for assessment consideration to a concern which is not identified.</p> <p>Question/Recommendation: Denison must provide complete engagement records outlining full comments/concerns with the context in which they were presented in order to demonstrate that these concerns were indeed appropriately considered in relation to the assessment of accidents and malfunctions.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 340 | ERFN (February 22, 2023) | Section 14.4 Influence of Indigenous Knowledge, Local Knowledge, and Engagement on the Assessment; Table 14.4- 1 | <p>Comment #ERFN-244: Table 14.4-1 outlines many of the concerns raised through engagement with ERFN and others, however, Denison only point to these concerns being addressed and considered in the Emergency Response Plan and other documents which have not yet been drafted. ERFN find it inappropriate for Denison to continue to defer meaningful discussions about potential impacts and ability to respond beyond the EIS stage. It is necessary to fully understand Denison's mitigation and response for all foreseeable events at this stage in order to evaluate possible residual effects of this project.</p> <p>Question/Recommendation: Denison must provide a draft version of the Emergency Response Plan which outlines all foreseeable effects pathways associated with accident or malfunction, monitoring options to ensure accidents or malfunctions are appropriately detected, and possible consequences and interventions as a result of an accident or malfunction.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 341 | ERFN (February 22, 2023) | Section 14.5.1 Overview | <p>Comment #ERFN-245: Denison has identified several risk scenarios as part of the accidents and malfunctions analysis; however, it has not conducted an effects pathway assessment with ERFN directly, allowing Denison and ERFN citizens to communicate concerns associated with the project and potential accidents and malfunctions. As a result, ERFN see that Denison's accidents and malfunctions assessment to be narrow in scope and only speak to western science perspectives.</p> <p>Question/Recommendation: Denison should provide appropriate capacity and support to enable ERFN to engage Denison in establishing an effects pathway assessment to ensure that monitoring, mitigation, and intervention associated with all potential environmental impacts appropriately consider ERFN TK and input, based on how the land is used and the societal impacts of this project.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 342 | ERFN (February 22, 2023) | Section 14.5.2 Process Hazards Analysis | <p>Comment #ERFN-246: Denison note that while there are standards and regulatory documents which govern the assessment of risk and probability for an accident or malfunction associated with a reactor facility, similar REGDOCs do not exist for a mining environment. ERFN agree that REGDOCs focusing on risk and probability assessment for a reactor facility is not overly appropriate to a uranium mine facility. However, there remain additional hazards which do not occur at non-nuclear facilities(e.g., non-uranium metal mines), that should be considered.</p> <p>Question/Recommendation: Denison should demonstrate how it utilized lessons learned from other uranium mines in the regional context(e.g., McClean Lake, Cigar Lake, and McArthur River), as well as other ISR facilities in the United States and elsewhere to ground the Hazards Analysis.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 343 | ERFN (February 22, 2023) | Section 14.5.2 Process Hazards Analysis; Figure 14.5-2 | <p>Comment #ERFN-247: Denison outlines in Figure 14.5-2 a matrix considering likelihood and consequence severity of an accident or malfunction. This approach is used widely in environmental assessment, however, the definitions used to delineate consequence are not appropriately framed through the lens of ERFN land users who live near the facility and use the lands resources which would be affected to exercise rights and traditional practices. As a result, ERFN find the term consequence severity to be superficial.</p> <p>Question/Recommendation: Denison must consider, in its hazard analysis risk matrix, not only the potential impacts to human and environmental health, but also consider by extension the impacts to society, land use, traditional and non-traditional economic factors, and importantly, perceptions in the event of an accident or malfunction. For example, while an accident or malfunction may only have a narrow physical footprint in which the environment is impacted, this incident, especially if associated with a radiological event, could have a much larger perceived area of impact. As a result, the consequence severity may be much greater when viewed through the perspective of ERFN land users rather than what is measurable through western scientific methods.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 344 | ERFN (February 22, 2023) | Section 14.5.4 General Design and Mitigation Considerations | <p>Comment #ERFN-248: Section 14.5.4 outlines general design and mitigation considerations for the project. In the preface for this subsection, Denison outline intentions and commitments to "setting high standards for various aspects of its operations, which will serve to mitigate potential Project-related effects." However, only provide a generic overview of measures and features which they are considering. They do not present options and analysis for the consideration of these measures and therefore ERFN are unable to conduct any sort of meaningful assessment of whether they will be effective.</p> <p>Question/Recommendation: Denison must do more to appropriately identify, assess, and proactively propose meaningful options for mitigations to be considered. Specifically, ERFN expects that Denison outline specific hazards, and discussion on measures which will proactively prevent impact and alternative measures to serve as contingency.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 345 | ERFN (February 22, 2023) | Section 14.5.4 General Design and Mitigation Considerations | <p>Comment #ERFN-249: Denison note that "the processing plant will be designed with expert consideration of potential environmental and health and safety effects to mitigate interactions to the extent possible." While ERFN do not suspect that this wording implies that other aspects of the project will not be designed with expert consideration of potential environmental and health and safety effects in mind, this statement perfectly exemplifies the frustration ERFN faces in meaningfully evaluating the potential mitigation measures, which are absent.</p> <p>Question/Recommendation: ERFN requests that Denison provide detailed design and activity options based on each identified risk such that the effectiveness and appropriateness of each measure can be adequately assessed.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 346 | ERFN (February 22, 2023) | Section 14.5.6 Definition of Bounding Scenarios | <p>Comment #ERFN-250: Denison notes that "the processing plant will be designed with expert consideration of potential environmental and health and safety effects to mitigate interactions to the extent possible." While ERFN do not suspect that this wording implies that other aspects of the project will not be designed with expert consideration of potential environmental and health and safety effects in mind, this statement perfectly exemplifies the frustration ERFN faces in meaningfully evaluating the potential mitigation measures, which are absent.</p> <p>Question/Recommendation: ERFN request that Denison provide detailed design and activity options based on each identified risk such that the effectiveness and appropriateness of each measure can be adequately assessed.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 347 | ERFN (February 22, 2023) | Section 14.5.6 Definition of Bounding Scenarios; Table 14.5-2 | <p>Comment #ERFN-251: Loss of freeze capacity is identified as High Risk. Based on the risk matrix outlined in Figure 14.5-2 the overall risk is based on both likelihood and consequence severity. It is however unclear the circumstance which led the loss of the freeze capacity to be evaluated as high risk(similarly, failure of the freeze wall is identified as moderate risk, however, again the factors which led to this initial risk characterization are not discussed). ERFN agrees that the consequence severity for loss of freeze capacity and failure of freeze wall to be amongst the greatest for this project, however, what is unclear is whether Denison is suggesting the likelihood is also elevated.</p> <p>Question/Recommendation: ERFN requests that Denison provides an overview of factors which led them to the characterization of risk as presented, including both likelihood, consequence severity, and</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| | | | rational for why those risks were determined to fall within each respective likelihood and consequence severity levels. | |
| 348 | ERFN (February 22, 2023) | Section 14.6.1.1.1 Release Characterization | <p>Comment #ERFN-252: ERFN questions the approach used to assess the dissolution rate of uranium on a number of factors.</p> <p>a) Denison uses concentrate samples from the McClean Lake operation as a proxy for yellow cake produced at the Wheeler River project, without providing discussion as to whether these are truly interchangeable for the purposes of assessing solubility. Given the significant differences in processing, it is unclear whether McClean Lake samples are an appropriate proxy.</p> <p>b) The information provided outlining the rate at which uranium will come out solution is not clear. Specifically, ERFN raise concerns that solubility (4,800 ug/L) is used directly to measure the rate of dissolution. Solubility and dissolution rate should have an inversely proportionate relationship.</p> <p>c) Denison make an assumption that only dissolved(soluble) uranium will be mobilized by water. This is not accurate as flowing water can mobilized material which is not dissolved either as bed load or as suspended load, which may travel significantly downstream.</p> <p>d) Denison indicates that "that most (98% of the mass) of the uranium concentrate is expected to settle within a short distance of the release (i.e., within approximately 20 m of the release point), even under high flow conditions in the Wheeler River due to a relatively slow water velocity (<0.8 m/s)." This is a very narrow range of expected impacts; however, insufficient information has been made available to understand the spatial modelling that has been conducted to support this assertion</p> <p>Question/Recommendation: Denison must provide additional information regarding the methods used to model possible uranium flow, including providing a particle dispersion map of the downstream environment to illustrate expected movement and areas which could be effected in the event of an accident and spill.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 349 | ERFN (February 22, 2023) | Section 14.6.1.3 Evaluation of Probability | <p>Comment #ERFN-253: Generalized national or provincial transportation accident statistics is not an appropriate proxy given the unique conditions which face transportation of material from the Wheeler River site. Specifically, generalize statistics do not consider the increased risks of driving on a remote roadway, that is poorly lit and has frequent encounters with wildlife.</p> <p>Question/Recommendation: Denison must consider the additive or interactive effects of the road conditions unique to the Wheeler River project, which may increase accident rates beyond that of conventional roadway accident statistics.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 350 | ERFN (February 22, 2023) | Section 14.6.1.4.2 Exposure Assessment | <p>Comment #ERFN-254: The assessment of risk associated with a vehicular accident in which uranium is spilled into Wheeler River does not consider either the psychological/ perceived impacts of the spill, in which ERFN citizens may be less likely to want to interact with the river following an accident regardless of whether the spill was appropriately cleaned up, or the impacts to fish and aquatic habitat as a result of cleanup efforts. Given the need to clean the physical substrate significant amounts of fish habitat would be destroyed in order to effectively remediate a spill site.</p> <p>Question/Recommendation: Denison must consider the secondary implications of mitigation measures and interventions in the event there is an accident resulting in a spill.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 351 | ERFN (February 22, 2023) | Section 14.6.3.1 Scenario Description | <p>Comment #ERFN-255: Denison note that the freeze wall will require a minimum of 12 months to thaw in the event of freezing system failure. It is unclear where this value originated from and the factors which contribute to such a slow thawing cycle.</p> <p>Question/Recommendation: ERFN requests that Denison provide modelling data for the thawing rates of freeze wall based on the geological properties to be encountered by the freeze wall.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 352 | ERFN (February 22, 2023) | Section 14.6.3.3 Evaluation of Probability | <p>Comment #ERFN-256: Denison notes that a probability value of 1×10^{-7} was established for the likelihood of loss of freeze capacity based on professional judgement. ERFN contests this value as entirely speculative and offered without substance. There are a wide range of factors that may contribute to short and long-term reductions or losses in freeze capacity (e.g., power failure, equipment failure, maintenance), which are not discussed.</p> <p>Question/Recommendation: Denison must provide a more meaningful assessment of specific factors which could lead to the loss or reduction of freeze capacity, demonstrating how they may contribute to an overall likelihood of loss of freeze capacity.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 353 | ERFN (February 22, 2023) | Section 14.6.3.4 Evaluation of Consequences | <p>Comment #ERFN-257: Denison argues in sections 14.6.3.1, 14.6.3.3 and 14.6.3.4 without substance that the risk of groundwater contamination due to the loss of freeze capacity is very unlikely. The lack of evidence presented to substantiate these claims is alarming to ERFN. ERFN agree that under normal circumstances the likelihood of the freeze wall failing allowing for groundwater contamination is on the lower end of the likelihood spectrum, however, ERFN are not currently assessing effectiveness under normal circumstances, but rather as a result of accident or malfunction. Based on the discussion provided in section 14.6.3.4, there is great concern to ERFN that Denison would be a) able to detect the failure of a freeze wall and b) identify the exposure pathway to enable Denison to take appropriate action before catastrophic environmental impacts are observed.</p> <p>Question/Recommendation: ERFN is gravely concerned about the information put forward by Denison in section 14.6.3 regarding the risk assessment associated with likelihood and consequences of failure by the freeze wall. Denison has not presented a viable method to monitor the effectiveness of the freeze wall. Additionally, Denison indicates that there are no viable methods of detecting impacts or intervening until they are observed, indicating failure of the freeze wall. Finally, when speaking to the likelihood of an accident or malfunction, Denison only offer a best guess. ERFN requests that CSNC and Denison take seriously the possible threat to the environment and by extension ERFN Rights and interests associated with the failure of the freeze wall. ERFN cannot overstate the need to provide additional analysis of contingency measures to avoid containment in the event the freeze wall fails to contain mining fluids and other sources of groundwater contamination associated with Wheeler River activities.</p> <p>[Additional questions on this topic directed to regulators or government entities are included in the CNSC table]</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 354 | ERFN (February 22, 2023) | Section 14.6.4.1 Scenario Description | <p>Comment #ERFN-258: Denison suggests that the "low temperature of the formation in and around the compromised section of the freeze wall would most likely cause the fluids to freeze and seal or partially seal the opening, further reducing the rate of contamination." It is unclear how mining fluids may influence the freezing point of groundwater, and therefore allow mining fluids to either thaw the freeze wall or be immune to subsequent freezing by surrounding materials.</p> <p>Question/Recommendation: ERFN request Denison provide a breakdown of expected freezing points for mining fluids or other liquids within the mining theatre which may interact with the freeze wall.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 355 | ERFN (February 22, 2023) | Section 14.6.4.1 Scenario Description | <p>Comment #ERFN-259: Denison speculates that migration of fluids from the mining theatre beyond a compromised freeze wall section would be slow due to low temperatures.</p> <p>a) This assertion is not supported by ground water modelling or other evidence accounting for groundwater flow, especially as liquids are being injected and extracted via ISR mine operations.</p> <p>b) If migration is indeed slow, it would imply that the detection of impacts would also be slow. This may mean that impacts from a compromised freeze wall may not be observed until after the mine has completed its production life. ERFN is therefore concerned that the inability to detect impacts may result in a legacy of contamination which may not be the responsibility of Denison if they are not detected until after the mine has completed closure and reclamation activities.</p> <p>Question/Recommendation:</p> <p>(i) Denison should provide detailed scenario based modelling to demonstrate expected flow rather beyond a compromised freeze wall.</p> <p>(ii) Denison should include an appropriate groundwater monitoring program surrounding the project to run throughout the entire lifecycle of the mine to best capture potential contamination and migration of mining fluids.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 356 | ERFN (February 22, 2023) | Section 14.6.5.2 Design and Mitigation Considerations | <p>Comment #ERFN-260: Radon is an odorless, colourless gas. While a burst pipe of vessel under pressure may result in obvious signs of a leak, leaky valves and or fittings may allow for radon to escape undetected.</p> <p>Question/Recommendation:</p> <p>Denison should identify measures to ensure that valves and fittings are inspected and maintained in routine intervals. Also, ERFN recommend that radon detectors be installed and monitored near all enclosed infrastructure where radon gas may escape.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 357 | ERFN (February 22, 2023) | Section 14.6.6.1.1 Release Characterization | <p>Comment #ERFN-261: Denison assumes that in the event of an explosion 90% of the uranium would be trapped within the damaged dryer unit, however, fail to substantiate this assumption.</p> <p>Question/Recommendation:</p> <p>Denison should base assumptions on maximum risk scenarios rather than minimum or probable risk scenarios. As a result, ERFN request that the LPF be equated to 1 rather than 0.1.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 358 | ERFN (February 22, 2023) | Section 14.6.6.2 Design and Mitigation Considerations | <p>Comment #ERFN-262: In speaking to design and mitigation considerations Denison only make hypothetical or aspirational commitments (e.g. "Denison would make sure that the design of the plant includes control measures to reduce exposure levels to workers and members of the public to levels that are as low as achievable."). These are not specific design considerations or hard commitments.</p> <p>Question/Recommendation:</p> <p>Denison should commit to best practices, including the implementation of specific measures rather than simply stating plans to commit the implementation of design and mitigation considerations.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 359 | ERFN (February 22, 2023) | Section 14.8 Key Findings and Conclusions | <p>Comment #ERFN-263: Denison has presented an accidents and malfunctions assessment that speaks only to a handful of concerns, while presenting in many cases minimal evidence to substantiate its assertions and assumptions. ERFN is very concerned by the lack of consideration for contingency planning associated with the identified risks.</p> <p>Question/Recommendation:</p> <p>ERFN does not consider section 14 sufficiently comprehensive or meaningful for the purposes of assessing risks.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 360 | ERFN (February 22, 2023) | Section 15.2.1. Existing Environmental Conditions | <p>Comment #ERFN-264: ERFN agree that the probability of a significant seismic event effecting the project site is low, however, it is not zero. Further, given the inherent design of the project, which relies on the establishment of multiple closely spaced deep wells to be drilled for injection and extraction, well design must be such that it can withstand significant shear forces associated with horizontal movement. Denison presents an inconclusive outline of design considerations to be incorporated to minimize risks to well structures, and the freeze wall as a result of a significant seismic event.</p> <p>Question/Recommendation: ERFN request Denison provide an analysis looking at other similar projects to identify specific design considerations to mitigate risks to below-ground infrastructure as a result of seismic activity.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 361 | ERFN (February 22, 2023) | Section 15.2.1. Existing Environmental Conditions | <p>Comment #ERFN-265: Human induced seismic activity has been observed in association with the use of injection wells. This have been most notably observed in association with hydraulic fracturing in the extraction of shale gas, where high- pressure fluid liquid is forced into geological formations with the intention of fracturing the rock to release trapped gasses. However, similar human induced seismic activity has been observed in other instances where injection wells are used, resulting in large changes of water or gas form underground reservoirs, creation of voids space, changes in pore-pressure, all have been associated with increases in seismic activity (Ellsworth, 2013). ERFN is concerned that similar human induced seismic activity may increase as a result of the extraction process being proposed by Denison.</p> <p>Question/Recommendation: ERFN request that Denison provide evidence using examples of other in situ recovery uranium mines around the world to discuss the potential risks of increased seismic activity as a result of the proposed activity.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 362 | ERFN (February 22, 2023) | Section 15.2.2. Effects on the Project | <p>Comment #ERFN-266: Although seismic activity is unlikely, it is still possible. Given the inherent hazards associated with this project there is a need to ensure that project infrastructure can withstand all likely seismic events.</p> <p>Question/Recommendation: ERFN request that Denison provide information on the magnitude and duration of a seismic event for which infrastructure will be designed to withstand. Included should be an analysis of the likelihood of such and event to occur at the project site.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 363 | ERFN (February 22, 2023) | Section 15.3.2 Effects on the Project | <p>Comment #ERFN-267: Denison notes that although potential exists for forest fires to occur during the life of the Project, fire is not expected to have a detrimental effect on the Project given the design features and mitigation measures that Denison with have in place with the Fire Protection Program, which will be developed specifically for the Project and based on proven programs at existing northern sites. Denison does not provide additional information on what mitigations will be included in the Fire Protection Program, nor does it provide information on which existing programs they will be based on. Forest fires present perhaps one of the greatest environmental threats to the safe operation of this project, as fires are frequent in the region, inherently difficult to control, and likely to increase as a result of climate change.</p> <p>Question/Recommendation: (i) ERFN request that Denison provide additional information on fire mitigation and suppression measures that are to be established and maintained to minimize the risk of fire to the project. Specifically, more information is needed to describe how infrastructure used in the extraction, handling, processing, and storage of uranium ore and products will be safeguarded against fire (such as the use of fire proof building materials). (ii) Additional information is requested on the existing northern sites used to inform the development of the Fire Protection Program. (iii) Denison does not contemplate risks or consequences of an uncontrolled fire affecting the project site. ERFN request that additional information be provided modelling atmospheric dispersal potential of radioactive material from stockpiles and facilities in the event fire were to impact the project footprint.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 364 | ERFN (February 22, 2023) | Section 15.3.2 Effects on the Project | <p>Comment #ERFN-268: Denison notes that the potential for increased forest fire frequency and severity due to climate change in the coming decade, referencing Section 15.3.2. However, no additional information about the potential interplay between forest fires and climate change is discussed in this section beyond this sentence.</p> <p>Question/Recommendation: ERFN requests that Denison revise this section to either accurately cite the appropriate section reference or provide additional discussion on the potential impacts of increase forest fire frequency and severity on the project as a result of climate change.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 365 | ERFN (February 22, 2023) | Section 15.4.2 Effects on the Project Table 15.4- 1 | <p>Comment #ERFN-269: Denison notes that in response to major precipitation events, suitable equipment and design systems will be selected for the project to operate under heavy precipitation conditions, however, do not specify what design standard will be selected.</p> <p>Question/Recommendation: Given that climate change has the potential to increase the frequency and severity of heavy precipitation events, ERFN request that Denison specify a design standard which outlines the return period for an event (e.g., 1 in 100, 1 in 500 event).</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 366 | ERFN (February 22, 2023) | Section 15.4.2 Effects on the Project Table 15.4- 1 | <p>Comment #ERFN-270: Non-contact surface runoff may include water which contains elevated amounts of suspended solids or other water quality constituents which are greater than allowable for discharge to the environment as a result of contact with roadway surfaces, or modified landcover. The likelihood of poor water quality is greater in surface runoff during extreme and prolonged precipitation or melt events.</p> <p>Question/Recommendation: Please provide an outline of how Denison plans to monitor and appropriately intervene in instances where non-contact surface water runoff does not meet appropriate water quality standards as a result of an extreme or prolonged precipitation or melt event.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 367 | ERFN (February 22, 2023) | Section 15.4.2 Effects on the Project Table 15.4- 1 | <p>Comment #ERFN-271: While it is logical for the water management infrastructure to be designed to allow for water to be transferred from pond to pond as required, during a significant or prolonged precipitation or melt event, water storage ponds are likely to all rise proportionately, making this mitigation potentially fruitless.</p> <p>Question/Recommendation: Please identify design considerations including maximum storage capacity, operational freeboard, spillway location and design, and excess treatment capacity which may allow for additional treated effluent discharge to environment in the event total pond capacity is exceeded.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 368 | ERFN (February 22, 2023) | Section 15.4.2 Effects on the Project Table 15.4- 1 | <p>Comment #ERFN-272: Denison notes that the system as proposed is designed to recycle a significant amount of the process water encountered, minimizing the amount of water that is needed to be withdrawn from Whitefish Lake. However, it is unclear from the description provided whether or not operational plan to be developed include considerations for minimum or maximum water levels within the storage ponds.</p> <p>Question/Recommendation: Please outline whether water storage ponds require a minimum amount of water to maintain operations of mine processes and function of the ponds themselves.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 369 | ERFN (February 22, 2023) | Section 15.4.2 Effects on the Project Table 15.4- 1 | <p>Comment #ERFN-273: Water takings and recycle may be effected during periods of extended drought. Increased water taking from Whitefish Lake may impact the water level in the lake, fish habitat, and use.</p> <p>Question/Recommendation: Please outline total water balance including maximum expected water takings from Whitefish Lake.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| 370 | ERFN (February 22, 2023) | Section 15.4.2 Effects on the Project Table 15.4- 1 | <p>Comment #ERFN-274: The use of additional energy generation on site as a result of air conditioning will increase the carbon footprint of the project.</p> <p>Question/Recommendation:</p> <ul style="list-style-type: none"> (i) Please provide analysis of how increased air temperatures will alter the overall carbon emissions to be produced by this project. (ii) In the event that diesel generators are required as a result of a power outage, please provide a synopsis of how operations may be impacted, including a reduction in operations to minimize carbon emissions associated with running generators. (iii) It is recommended that during summer months, alternative energy options are utilized rather than diesel generators to provide backup power. This will minimize the carbon and nitrogen dioxide footprint. <p>Please provide information on how the use of emergency diesel backup generators has been included into the predicted nitrogen dioxide and carbon emissions/air quality assessment.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 371 | ERFN (February 22, 2023) | Section 15.4.2 Effects on the Project Table 15.4- 1 | <p>Comment #ERFN-275: Denison do not provide a discussion on the potential impacts of wind erosion on stockpiles or other dry- stacked materials during an extremely high wind event.</p> <p>Question/Recommendation:</p> <ul style="list-style-type: none"> (i) ERFN recommend that PM15, metals, and radioactive material be modelled under extreme wind conditions, demonstrating potential dispersal, and associated implications. (ii) ERFN request that Denison develop appropriate mitigation plans for minimizing dust from roadways, stockpiles, and dry-stacked materials as a result of extremely high winds - including those associated with tornadic events. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 372 | ERFN (February 22, 2023) | Section 15.5 Climate Change | <p>Comment #ERFN-276: Denison notes that concerns related to climate change were raised during engagement and consultation activities, however, these concerns pertain to climate change rather than GHG emissions specifically. While this may be technically accurate, climate change and the release of GHG emissions should be considered as synonymous as the cause-and-effect relationship is well established. Denison will be responsible for the emission of significant amounts of GHG, which although are difficult to quantify in their impact on the local and regional environment, contribute to climate change which is experienced at local, regional, and global levels.</p> <p>Question/Recommendation:</p> <p>Denison must recognize the inherent connectedness between its operation and climate change. Further, it is necessary that Denison implement meaningful and realistic approaches to minimizing its GHG emissions and contributions to climate change.</p> | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 373 | ERFN (February 22, 2023) | EIS Section 15.5.3 Effects on the Project | <p>Comment #ERFN-277: Throughout much of the assessment on the effects of the environment on the project, Denison downplays the potential uncertainty due to natural events. This includes providing minimal discussion on the potential for flooding, excess snowfall, and tornadic events, as well as insufficient discussion on planned mitigation options for addressing effects of the environment identified.</p> <p>Question/Recommendation:</p> <ul style="list-style-type: none"> (i) Denison should provide analysis of potential effects of the environment on the project as a result of surface water flooding, excess snowfall events, and tornados on the project. (ii) Denison should provide additional information linking mitigation measures to possible effects of the environment, including specific design standards to demonstrate the project will be designed to minimize risks. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |
| 374 | ERFN (February 22, 2023) | Section 15 General | <p>Comment #ERFN-278: The Wheeler River project is located in an area of discontinuous permafrost. This aspect is not identified or examined with respect to the potential impacts of the environment on this project.</p> <ul style="list-style-type: none"> (i) ERFN see this as a potential significant oversight as works conducted and infrastructure constructed on discontinuous permafrost may be impacted by permafrost melt. As frost heave and slumping may adversely impact the project site. (ii) Permafrost has an ability to trap methane and other GHGs from escaping into the environment. Permafrost which is melted or disturbed may release those gases. If permafrost will be disrupted by project activities, Denison must consider GHGs to be released as part of its impacts on the environment <p>Question/Recommendation:</p> <ul style="list-style-type: none"> (i) Denison must provide discussion on the presence or absence of discontinuous permafrost in RSA, and whether that permafrost will be impacted by project activities. | As part of an agreed-upon process between ERFN and Denison Mines, ERFN further directed Denison to provide responses to 15 Main Areas of Concern identified by ERFN, which summarized comment numbers 104 to 374 (see Main Areas of Concern for ERFN #1-15 incorporated into this table) in the CNSC Consolidated Comments from Indigenous Nations and Communities and the Public on the Wheeler River Project Draft Environmental Impact Statement. |

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| | | | (ii) Where permafrost may be impacted, Denison must quantify the amount of GHG that will be released from melting or disturbed permafrost areas. | |
| 375 | Ya'thi Nene Land and Resource Office (YNLRO) (March 4, 2023) | EIS Executive Summary, p. 2 | <p>YNLR Comment March 4, 2023 Comments #1, 2 and 3, Appendix A: YNLR sees a potential benefit of the in-situ approach as it is designed to reduce the surface disturbance of the Project, and the potential leakage of contaminants from excavated rock and tailings. However:</p> <ul style="list-style-type: none"> - YNLR is concerned that the extraction of source water for the Project may have a negative effect on stream flows both below- and aboveground. - YNLR is concerned with the potential effects of contaminants released during and after the Project. <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Denison acknowledges these concerns and notes the comment from YNLR references the Executive Summary. Both of the areas of interest raised by the comment are addressed in the main part of the draft EIS and supporting appendices. Denison refers YNLR to the following sections for comprehensive evaluation of these aspects of the Project:</p> <ul style="list-style-type: none"> • Potential changes in surface water quantity as the result of the Project, including consideration of water taking activities, are presented in the hydrology assessment (draft EIS, Section 8.1). • Potential changes to groundwater quantity and quality as the result of the Project, including consideration of the long-term implications of the mining method, are presented in the groundwater assessment (draft EIS, Section 7). Specifically, the 'future centuries' temporal scope of the assessment for Groundwater considers the period for which the highest COPC concentrations in groundwater are predicted to interact with surface water based on groundwater modeling described in Appendix 7-C. Due to the relatively long travel time (relatively low groundwater velocities) between the mining area (Section 7.6.2.2.3) and the surface water environment where groundwater/surface water interactions are expected, as well as the potential for chemical reactions along the groundwater flow pathway, a 'future centuries' scenario was deemed appropriate to fully assess potential future effects beyond the Project timeline (i.e., 0 to 38 years). The 'future centuries' temporal scope was also developed in recognition of the concerns raised by Interested Parties through the engagement process around the potential for the Project to influence water quality into the future. <p>These assessments, completed in a transparent and rigorous manner, concluded that residual effects of the Project would not be significant. Follow-up and monitoring programs will be employed to confirm mitigation measures are functioning as planned and to confirm EA predictions. For example, a groundwater monitoring plan, including an excursion contingency plan and measures for adaptive management will be implemented for the Project.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 375. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |

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| 376 | YNLRO (March 4, 2023) | EIS Executive Summary, p. 2 | <p>YNLR Comment March 4, 2023 Comment #4, Appendix A: based on the information from p. 2 of the Project Overview: YNLR assumes no permanent work camp will be constructed. YNLR expects that a sizeable proportion of the Project workers will be hired from the local and regional area.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Denison's Indigenous Peoples Policy sets out priority for Indigenous employment and procurement (among other items). With respect to employment, as noted in Section 13.3.2.1 of the EIS, Residents of Saskatchewan's North (i.e., those resident in the northern administration district of Saskatchewan, inclusive of YNLR) are prioritized for employment as an expected condition of the Surface Lease Agreement, similarly for goods and services to service the Project. With respect to procurement, Denison has established an internal procurement policy approach. The approach requires that Denison consider businesses within the local study area first and the Northern Administrative District second, prior to looking elsewhere (southern Saskatchewan and/or outside of Saskatchewan) throughout all phases of the Project. YNLR businesses would fall in the category of northern Saskatchewan businesses, which would place them in line for second preference if project needs cannot be met within the local study area.</p> <p>Details on the Project components are provided in EIS Section 2. The Project will be operated as a fly-in/fly-out mine, meaning the opportunities for interactions between the workforce and Indigenous communities are limited as workers will be transported by air directly to the site. The proposed camp or accommodations facility is anticipated to be a turnkey building manufactured off site and assembled and commissioned on site. The building's design will be sized to accommodate a peak load of about 190 individuals during Operation; however, due to its modularized design, additional modules can be easily installed should additional beds be required in the future.</p> <p>Section 13 provides the assessment for the key indicator of employment and training, which is a component of the Economy Valued Component. A summary of residual environmental effects on employment and training is found in Table 13.5-2. Employment opportunities represent direct and indirect benefits associated with construction and operation of projects, particularly in the vicinity of communities where unemployment is typically high.</p> <p>Additionally, because the property is located on Crown Land, a mineral surface lease agreement will be negotiated with the Province, specifically the Ministries of Environment and Government Relations. The agreement grants surface rights for the purpose of accessing the land to extract minerals under the Crown Resources Land Regulations. The mineral surface lease agreement provides long term rental of Crown land for mining and milling in Saskatchewan. The agreement also contain specific commitments for environmental protections for the life of the project, OH&S protocols, reporting requirements, and socio-economic benefits for residents of northern Saskatchewan.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 376. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
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| 377 | YNLRO (March 4, 2023) | EIS Executive Summary, p. 2 | <p>YNLR Comment March 4, 2023 Comment #5, Appendix A: YNLR is concerned with the potential increase in road and off- road traffic affecting wildlife and fisheries sustainability.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Please note that the Project will not change public access to the area. The existing gate on Highway 914 near Cameco's Key Lake Operation will remain in place and no changes to the gate and the process for controlling access to Highway 914 north of the Key Lake Operation are proposed as part of the Wheeler River Project. The proposed operation is fly-in, so Project related traffic to the area would only be related to deliveries of materials to and from the site. On-site staff will not have access to personal (or company) vehicles and will largely be "confined" to the camp and work areas during their shifts. Refer to draft EIS, Section 12 Quality of Life for the assessment of potential Project effects on the Key Indicator of Infrastructure and services (traffic) and the associated measurable parameter of change in traffic volumes and types and risk of accident.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 377. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 378 | YNLRO (March 4, 2023) | EIS Executive Summary, p. 2 | <p>YNLR Comment March 4, 2023 Comment #6, Appendix A: YNLR supports this built-in precautionary approach to the Project's risk assessment. However, given the lengthy timeline of the Project, YNLR would like to see that lost (i.e., unmitigated) wildlife and fisheries habitat be offset in some manner. A response to this should be approached through an anticipated impact benefit agreement.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Through the EA process to date, Denison believes it has identified areas where offset may be required based on Project-Environment interactions. To this end, Denison has made a specific commitment to develop a Caribou Mitigation Plan (submitted in response to provincial and federal EIS review comments) that includes provision for potential habitat offset. Details of the habitat offset will be developed in collaboration with Saskatchewan Ministry of Environment.</p> <p>It is also important to consider the site decommissioning plan within this context, though such restoration activities are not typically discussed as "offsets". Denison's decommissioning commitment is to return the land back to the Province of Saskatchewan for unrestricted surface land use post-closure. The Project's Conceptual Decommissioning Plan (CDP) is included in the draft EIS. The details of decommissioning and restoration will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP.</p> <p>No other specific needs for "offset" have been identified based on the effects assessment.</p> <p>Denison will continue to engage with YNLR on topics of interest.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 378. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's</p> |

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| | | | | concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR. |
| 379 | YNLRO (March 4, 2023) | EIS Executive Summary, p. 2 | <p>YNLR Comment March 4, 2023 The EIS Executive Summary outlines mitigation measures, monitoring requirements, and commitments needed for Denison to have confidence that Project is operating as planned and that the actual effects resulting from Project Construction, Operation, and Decommissioning are at or below predicted effects. Comment #7, Appendix A: Despite these reassuring statements, YNLR is aware that predictions may fall short, hence the need for close collaboration with Indigenous Peoples, communities, and organizations, including their input into the design and implementation of transparent and statistically-robust project monitoring programs.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) Denison states that they will inform YNLR of the development of their monitoring plan. This does not meet the YNLR request for input and collaboration into the design of monitoring programs.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) While encouraging, this still does not address YNLR's concerns as stated in their responses in their letters of 02 February 2024 and 13 March 2024. From the beginning, of their review of Denison's EIS and revised EIS YNLR, has been consistent in their request to be "involved in all monitoring and other plans at a conceptual level when experimental design and methodologies are being developed". Denison has been consistent in their responses "to share further information about plans as they are developed". The Denison response, explicitly, does not address YNLR's concerns stated in YNLR's letters of 02 February 2024 and 13 March 2024. Hence these concerns remain. YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Denison acknowledges the comment and is committed to ongoing engagement and dialogue with interested parties with respect to monitoring. Details of follow-up and monitoring plans will be prepared in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies. YNLR will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: programs will meet regulatory requirements, programs will confirm the effectiveness of mitigation measures and predictions made in the assessment, programs will be implemented in an adaptive management framework (if/where applicable) to reduce effects during the lifetime of the Project, and programs will have spatial boundaries that are sufficiently extensive to measure EIS predictions.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) Denison is committed to working with YNLR to share information about monitoring plans as they are developed through the permitting and licensing process. In a meeting between YNLR and Denison on February 22, 2024, it was noted by YNLR's consultants that the areas of immediate interest to YNLR are surface and groundwater, aquatics, wildlife, and Woodland Caribou monitoring. As noted in the meeting, the detailed monitoring plans are not yet developed given the stage of the Project in the regulatory process. Given the number of plans and procedures to be developed it would be helpful for Denison and YNLR to work together to establish a process for next steps. Further, as an outcome of a meeting between Denison and YNLR on February 22, 2024, Denison provided YNLR a document from the draft Wheeler River Environmental Impact Statement (EIS) titled Summary of Monitoring. The document outlines the conceptual monitoring program for all stages of the Project and how they tie to each Valued Component assessed in the EIS.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) YNLR expressed the desire to be involved in the program design and development of all monitoring and other plans at a conceptual level when experimental design and methodologies are being deployed, stating that, "YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development." Denison feels it is important to clarify the processes related to the development of various monitoring programs for the Project and the manner in which involvement can occur with interested Indigenous nations, such as those represented by the YNLR. As a starting point, the EIS contains conceptual level information for various monitoring plans associated with the Project, commensurate with the requirements for an environmental assessment, the primary basis of which is informed by regulatory guidance and requirements. The conceptual monitoring plans also take into account any input received through engagement activities, where appropriate. As the Project advances into permitting and licensing, the conceptual monitoring plans evolve into detailed monitoring plans, the designs of which must adhere to Provincial and Federal regulatory requirements but can be further enhanced by the involvement of the YNLR and other Indigenous communities. Denison provided the summary of monitoring and follow-up programs (Section 16 of the EIS) to the YNLR as an outcome of the February 22, 2024 meeting, with the request to identify those items of further interest to the YNLR to enable the co-development of a path forward. It is Denison's perspective that, in order to advance a meaningful process to further involve the YNLR in the development of the monitoring plans, it is necessary for Denison to understand the key areas of interest to the YNLR. This was the basis of Denison's request whereby the YNLR identify a starting point for this exchange, based on the conceptual monitoring programs</p> |

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| | | | | provided in the EIS. In the absence of specific feedback on the conceptual monitoring plans/programs, Denison re-iterates its commitment to providing the YNLR with the detailed monitoring plans, as developed through the permitting and licensing process, for input and collaboration as the Project advances. |
| 380 | YNLRO (March 4, 2023) | EIS Executive Summary, p. 2, 12, 44, 45 and 47 | <p>YNLR Comment March 4, 2023</p> <p>Comments #8, 10, 21 and 22, Appendix A: YNLR remains concerned about the nature and disposition of project contaminants during and after the mining process.</p> <ul style="list-style-type: none"> - YNLR supports the Project outcome of lower aboveground disturbance, it retains concerns about the management inputs and outputs of the ISR method, particularly project water sources, quantity, and release along with its associated contaminants. - The release of contaminants before and after the Project's completion worries YNLR, which sets a high priority on clean and abundant groundwater and surface water. The Indigenous People, communities, and organizations YNLR represents will be here long after mine decommissioning, so minimizing this risk with statements regarding the length of time it takes is not helpful. - As with groundwater, YNLR places a high value on the quantity and quality of surface waters. Monitoring of water will be critical, and YNLR expects to be consulted and heavily involved with respect to this activity. <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023)</p> <p>No timeline for consultation has been offered. The response simply restates Denison's original comments in the EIS.</p> <p>Denison promises dialogue. YNLR wants to see the predecommissioning monitoring plan for contaminant releases so that mitigation can be applied long before decommissioning. YNLR wants to be involved with all monitoring plans and programs from conception to implementation.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024)</p> <p>While encouraging, this still does not address YNLR's concerns as stated in their responses in their letters of 02 February 2024 and 13 March 2024. From the beginning, of their review of Denison's EIS and revised EIS YNLR, has been consistent in their request to be "involved in all monitoring and other plans at a conceptual level when experimental design and methodologies are being developed". Denison has been consistent in their responses "to share further information about plans as they are developed". The Denison response, explicitly, does not address YNLR's concerns stated in YNLR's letters of 02 February 2024 and 13 March 2024. Hence these concerns remain. YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development.</p> <p>YNLR has provided its responses on caribou offsets and other aspects of caribou restoration and mitigation planning in the responses contained in their letters of 02 February 2024 and 13 March 2024. The concerns expressed in those responses remain valid and unaddressed. YNLR did request from Denison, in their meeting of 22 Feb 2024, specific information as to where their caribou offsets are located and what was the information and methodology used to determine these offsets, however, Denison declined to provide this information. Additionally, YNLR is also on record with CNSC and Denison (see attached letters at appendix 3) that there is a divergence of opinion of the results of the YNLR and Denison Cumulative Effects analysis. Given that the results of the CE analysis is the basis for how much land, suitable for caribou, is required for offsetting: YNLR's interest in the details of Denison's caribou offset plan is a valid concern (see Appendix 3 for a review of YNLR's GIS based Method for Assessing Cumulative Environmental Effects). Respecting preliminary decommissioning plans: decommissioning plans are based on the extent to which restoration and offsetting are carried out prior to decommissioning, therefore while their receipt from Denison is appreciated any conclusions that can be determined from this plan is incomplete without the former requested information on offset</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023)</p> <p>Denison acknowledges the comment and concerns raised by YNLR. Denison believes the assessment of potential effects, such as those highlighted in the review comment, have been considered in a robust manner in the EIS and appropriate mitigations have been proposed. Denison is committed to ongoing engagement and dialogue with interested parties on key Project aspects such as that referenced in the review comment.</p> <p>With specific reference to site decommissioning the following is noted. Denison's decommissioning commitment is to return the land back to the Province of Saskatchewan for unrestricted surface land use post-closure. The Project's Conceptual Decommissioning Plan (CDP) is included in the draft EIS. The details of decommissioning and restoration will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024)</p> <p>Denison is committed to working with YNLR to share information about monitoring plans as they are developed through the permitting and licensing process. In a meeting between YNLR and Denison on February 22, 2024, it was noted by YNLR's consultants that the areas of immediate interest to YNLR are surface and groundwater, aquatics, wildlife, and Woodland Caribou monitoring. As noted in the meeting, the detailed monitoring plans are not yet developed given the stage of the Project in the regulatory process. Given the number of plans and procedures to be developed it would be helpful for Denison and YNLR to work together to establish a process for next steps. As an outcome of a meeting between Denison and YNLR on February 22, 2024, Denison provided YNLR a document from the draft Wheeler River Environmental Impact Statement (EIS) titled Summary of Monitoring. The document outlines the conceptual monitoring program for all stages of the Project and how they tie to each Valued Component assessed in the EIS.</p> <p>YNLR has shared comments with respect to Woodland Caribou offsets, including those related to the definition of offsets, timing, and mitigation measures as part of present-day mitigation measures for the Project, and should be applied in advance of decommissioning. YNLR has also requested to see the predecommissioning monitoring plan for containment releases. As an outcome of a meeting between Denison and YNLR on February 22, 2024, Denison provided a document titled Summary of Monitoring, which outlines the Project's commitments for monitoring programs for all phases of the Project from preconstruction to post decommissioning. Details of monitoring will be developed prior to, and applicable for each phase of the Project, including decommissioning. Denison has also provided YNLR with the Preliminary Decommissioning Plan, of which Denison offers to include YNLR in discussions as more details are developed for the Preliminary Decommissioning Plan. Denison has also provided YNLR with the Draft Caribou Management Framework, which outlines mitigation and restorative measures within the Provincial government framework. Denison welcomed feedback on the Draft Caribou Management Framework and remains open and willing to receive additional feedback.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024)</p> <p>YNLR expressed the desire to be involved in the program design and development of all monitoring and other plans at a conceptual level when experimental design and methodologies are being deployed, stating that, "YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development."</p> |

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| | | | plans. Therefore, YNLR concerns stated in their comments remain valid and unaddressed. | <p>Denison feels it is important to clarify the processes related to the development of various monitoring programs for the Project and the manner in which involvement can occur with interested Indigenous nations, such as those represented by the YNLR. As a starting point, the EIS contains conceptual level information for various monitoring plans associated with the Project, commensurate with the requirements for an environmental assessment, the primary basis of which is informed by regulatory guidance and requirements. The conceptual monitoring plans also take into account any input received through engagement activities, where appropriate. As the Project advances into permitting and licensing, the conceptual monitoring plans evolve into detailed monitoring plans, the designs of which must adhere to Provincial and Federal regulatory requirements but can be further enhanced by the involvement of the YNLR and other Indigenous communities. Denison provided the summary of monitoring and follow-up programs (Section 16 of the EIS) to the YNLR as an outcome of the February 22, 2024 meeting, with the request to identify those items of further interest to the YNLR to enable the co-development of a path forward.</p> <p>It is Denison's perspective that, in order to advance a meaningful process to further involve the YNLR in the development of the monitoring plans, it is necessary for Denison to understand the key areas of interest to the YNLR. This was the basis of Denison's request whereby the YNLR identify a starting point for this exchange, based on the conceptual monitoring programs provided in the EIS. In the absence of specific feedback on the conceptual monitoring plans/programs, Denison re-iterates its commitment to providing the YNLR with the detailed monitoring plans, as developed through the permitting and licensing process, for input and collaboration as the Project advances.</p> <p>Denison is committed to the development of a caribou mitigation and offsetting plan for the Project. This plan will be developed ahead of construction and independent of the development of the Project's detailed decommissioning plan.</p> <p>Denison provided the YNLR with a draft Caribou Management Framework which outlines mitigation and restorative measures within the Provincial Government framework. Denison continues to remain open to feedback from the YNLR on the draft Caribou Management Framework. Further, Denison's previous offer to involve the YNLR in discussions with respect to the development of the decommissioning plans still stands. Decommissioning plans at this stage are conceptual as outlined in the EIS and will continue to be refined through each phase of the Project as it progresses.</p> |
| 381 | YNLRO (March 4, 2023) | EIS Executive Summary Freeze Wall, p. 12 and 13 | <p>YNLR Comment March 4, 2023</p> <p>Comments #11, 12 and 13, Appendix A: Containment of the mining solution and uranium bearing solution within the mining area will be achieved through a defence-in-depth approach with three levels of containment.</p> <ul style="list-style-type: none"> - YNLR assumes that information and data exist with respect to the environmental safety of freeze wall technology in uranium mining operations within Saskatchewan. Has Denison reviewed these data and are they considered/presented as part of this EIS? If not, why not? - What happens to the freeze wall and its retained contaminants at the end of the Project's life? – despite safeguards and remediation, it has potential to release contaminants after mining is completed. - Monitoring and adaptive management are important components of sustainable uranium mining. YNLR expects to be consulted/included in the design and implementation of the Project's environmental monitoring programs. <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023)</p> <p>This statement is misleading because ground freezing to contain contaminants in a uranium mining extraction project has never been done in Canada before. Independent assessment comments are needed here. It is unclear that groundwater contaminates monitoring outside of the freeze wall is unnecessary to monitor this risk of leakage and confirm the conclusions of the predictive modeling. It is good that Denison later alludes that monitoring is necessary; however, prior comments as to the extent of YNLR involvement in planning and execution of monitoring is reiterated.</p> <p>It is noted that Denison has committed to ground water monitoring; however, prior comments as to the extent of YNLR involvement in planning and execution of monitoring is reiterated.</p> <p>TK will have no input into ground water contamination until health risks are noted decades or</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023)</p> <p>Denison notes this comment is on the Executive Summary and that more detailed information is available in the main part of the draft EIS e.g., Section 2 Project Description and Section 7 Geology and Groundwater (and associated appendices).</p> <p>Ground freezing technology is well established and used widely throughout the world. Its use in a mining environment was pioneered in Saskatchewan's potash mining industry for shaft sinking activities, and later adapted for use in Saskatchewan's uranium industry. Ground freezing to control and eliminate groundwater from entering mining areas is a fundamental component of two existing Athabasca Basin underground uranium mines: Cameco Corporation's McArthur River Operation and Cigar Lake Operation. Freeze walls, when fully developed, are capable of withstanding significant external pressures because the ice in the pore voids greatly improves the bulk strength of the soil. For example, in the province of Saskatchewan, ground freezing is used to support the sinking of deep potash mine shafts, which must penetrate through the Mannville formation at a depth between 400 and 500 m below surface. The Mannville formation is often described as saturated, unconsolidated beach sand and it would not support shaft excavation in a thawed state. Freezing is used to create a structural and impermeable wall up to 5 m thick, which can resist a stress gradient driven by full hydrostatic and/or lithostatic pressures on the outside of the wall, and an open to atmosphere excavation within the shaft. This loading condition is much more extreme than any condition the freeze walls at the Phoenix deposit will experience because the interior side of the freeze wall where active ISR mining is occurring is not open to atmosphere and is fluid filled in the same way that the regional groundwater system is on the exterior side of the freeze wall, creating a balanced pressure system, where loading is equal on both the interior and exterior sides. While freeze walls are very strong when fully developed, they are also plastic in nature. This means that they can slowly deform without failing in response to localized ground deformations. As the freeze wall deforms towards a lower stress zone, it maintains its thickness and integrity. While the above example</p> |

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| | | <p>centuries later. Therefore, the relevance of this statement from Denison saying that TK will inform the ground water monitoring plan is questionable.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) While encouraging, this still does not address YNLR's concerns as stated in their responses in their letters of 02 February 2024 and 13 March 2024. From the beginning, of their review of Denison's EIS and revised EIS YNLR, has been consistent in their request to be "involved in all monitoring and other plans at a conceptual level when experimental design and methodologies are being developed". Denison has been consistent in their responses "to share further information about plans as they are developed". The Denison response, explicitly, does not address YNLR's concerns stated in YNLR's letters of 02 February 2024 and 13 March 2024. Hence these concerns remain. YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development.</p> <p>YNLR appreciates the offer of Denison's Technical expert to brief YNLR on their concerns with freeze-wall technology. Unfortunately, Denison's freeze-wall technical expert is no more independent than Denison's Cumulative Effects technical expert, that YNLR staff spoke to on 22 Feb 2024. Hence, YNLR's concerns as stated in their response remains. Going forward on this item, YNLR will engage with CNSC for access to an independent technical expert on freeze-wall technology.</p> <p>Denison's above statement is a reassertion of their comment addressed by YNLR in their letters of 02 February 2024 and 13 March 2024. Therefore, YNLR's concerns as to their involvement in monitoring, remain valid and unaddressed.</p> | <p>referred to potash shafts, other examples can be drawn from the experience at the McArthur River or Cigar Lake uranium mines. At McArthur River, open stopes are generated directly adjacent to a freeze wall that is a nominal 4 m thick. At Cigar Lake, open mine cavities 10 m high and several metres in diameter commonly exist within the frozen ground. Neither site has had a breach of the freeze wall during mining activity. Given that the freeze wall at Denison will be much thicker than at McArthur River and that it will be located up to 25 m from the ore zone, it is not anticipated that it will be exposed to a stress environment that will put it at risk.</p> <p>Since the mine design includes the freeze wall as a tertiary management strategy, movement of mining solution is restricted and contained horizontally during operations. Wellfield pumping is the primary form of containment and provides the hydraulic containment to keep mining solution within the 50 m mining area (see Section 2.2.1.4.2). During the operation phase, and under normal operational conditions there is no interaction between the mining zone and surface water or down gradient groundwater environments, and the groundwater assessment (Section 7) focuses on the post-decommissioning period following removal of the freeze wall, once the groundwater flow paths return to pre-mining conditions. During mining area remediation (see Section 2.3.3.1.1), the freeze wall will remain in place until decommissioning objectives are achieved. Refinement of the mining area decommissioning objectives and associated modelling will be done through updates to the Decommissioning Plan, and will be bounded by the objectives evaluated in the EIS. To carefully evaluate how constituents dissolved in the remediated groundwater within the mining area may migrate away from and interact with the environment, a rigorous numerical model of groundwater flow and chemical constituent behaviour along the groundwater flow path was used as a predictive tool. The model is based on proven scientific principles and processes (e.g., groundwater flow, contaminant transport, and geochemical reaction processes) and allowed future conditions to be evaluated. Migration of dissolved constituent concentrations along the groundwater flow path from the mining area to Whitefish Lake (the local surface water receptor) is predicted to take hundreds to thousands of years, with concentrations remaining below values that would result in an environmental risk.</p> <p>Given the nature of the ISR mining method that will be employed by the Project groundwater monitoring is an important consideration. The groundwater monitoring plan would be developed in consideration of how Project facilities and activities could interact with the groundwater environment and groundwater users to define monitoring needs (locations, frequencies and constituents). Data generated from the groundwater monitoring plan would serve various purposes, such as to assess performance and the controls associated with the ISR process, demonstrate compliance with internal action levels, assess performance of emissions control systems, and contribute to the understanding of the potential influence of the Project on the groundwater environment. The groundwater monitoring program would demonstrate, during each Project phase, that:</p> <ul style="list-style-type: none"> • excursions are not occurring; if excursions do occur, an early warning/timely signal will be provided of when and where they are occurring such that appropriate further evaluation and actions can be undertaken; • commitments made in the EA are being achieved; and • protection of groundwater end use/receiving environment is being achieved. <p>The groundwater monitoring plan would be informed by existing local and traditional knowledge, ongoing engagement activities with interested parties, information generated by development of EIS and its supporting documents, relevant guidance, such as CSA Standard N288.7-15, Groundwater Protection Programs at Class I Nuclear Facilities and Uranium Mine and Mills as well as any applicable licenses, approvals, and permits.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) Denison would be pleased to coordinate a meeting between YNLR and the technical expert Denison utilized, Greg Newman from Newman's Geotechnique, to design the freeze wall and confirm its effectiveness for the geological and hydrogeological conditions for an ISR mine at Wheeler River. A meeting could be the most effective means for YNLR to seek information about the areas of concern with respect to the freezing technology.</p> <p>Denison is committed to working with YNLR to share information about monitoring plans as they are developed through the permitting and licencing process. In a meeting between YNLR and Denison on February 22, 2024, it was noted that detailed monitoring plans are not yet developed given the stage of the Project in the regulatory process. Given the number of plans and</p> |
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| | | | | <p>procedures to be developed it would be helpful for Denison and YNLR to work together to establish a process for next steps.</p> <p>Further, as an outcome of a meeting between Denison and YNLR on February 22, 2024, Denison provided YNLR a document from the draft Wheeler River Environmental Impact Statement (EIS) titled Summary of Monitoring. The document outlines the conceptual monitoring program for all stages of the Project and how they tie to each Valued Component assessed in the EIS. Denison would like to clarify that the current rigorous groundwater modelling does not indicate there will be groundwater contamination nor health risks from the Project. The groundwater monitoring program will be robust and meet all regulatory standards for the type of mining proposed for the Project. Further, Denison would like to note that consideration of local and Traditional Knowledge in all facets of the Wheeler River Project will be guided by local and Traditional Knowledge Holders to the extent they wish to share information. As an example, Traditional Knowledge may or may not be relevant to groundwater monitoring results, but may have relevance to the considerations in the planning for such monitoring.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024)</p> <p>YNLR expressed the desire to be involved in the program design and development of all monitoring and other plans at a conceptual level when experimental design and methodologies are being deployed, stating that, “YNLR interprets the notion of ‘sharing’ information after its been developed as being non-collaborative and we prefer being ‘involved’ in the program/plan design and development.”</p> <p>Denison feels it is important to clarify the processes related to the development of various monitoring programs for the Project and the manner in which involvement can occur with interested Indigenous nations, such as those represented by the YNLR. As a starting point, the EIS contains conceptual level information for various monitoring plans associated with the Project, commensurate with the requirements for an environmental assessment, the primary basis of which is informed by regulatory guidance and requirements. The conceptual monitoring plans also take into account any input received through engagement activities, where appropriate. As the Project advances into permitting and licensing, the conceptual monitoring plans evolve into detailed monitoring plans, the designs of which must adhere to Provincial and Federal regulatory requirements but can be further enhanced by the involvement of the YNLR and other Indigenous communities. Denison provided the summary of monitoring and follow-up programs (Section 16 of the EIS) to the YNLR as an outcome of the February 22, 2024 meeting, with the request to identify those items of further interest to the YNLR to enable the co-development of a path forward.</p> <p>It is Denison’s perspective that, in order to advance a meaningful process to further involve the YNLR in the development of the monitoring plans, it is necessary for Denison to understand the key areas of interest to the YNLR. This was the basis of Denison’s request whereby the YNLR identify a starting point for this exchange, based on the conceptual monitoring programs provided in the EIS. In the absence of specific feedback on the conceptual monitoring plans/programs, Denison re-iterates its commitment to providing the YNLR with the detailed monitoring plans, as developed through the permitting and licensing process, for input and collaboration as the Project advances.</p> <p>Denison respects the YNLR’s desire to seek other expertise. In any event, should the YNLR wish to meet with the qualified professional utilized to design the freeze wall, Denison would be happy to facilitate.</p> <p>Denison has offered to involve the YNLR in groundwater monitoring plans and notes that the timeline and detail for the development of these plans extends beyond the environmental assessment process. Denison remains open to the YNLR’s involvement in groundwater monitoring plans now and in the future. Further, Denison reiterates that it will continue to consider local and Traditional Knowledge in all facets of the Project to the extent holders of such knowledge wish to share information with us.</p> |
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| 382 | YNLRO (March 4, 2023) | EIS Executive Summary, p.16 | <p>YNLR Comment March 4, 2023 Comment #14, Appendix A: Will the released radon gas be of any concern to natural resources, such as fish and wildlife?</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Inhalation pathway to terrestrial wildlife and birds was included in the Ecological Risk Assessment (EcoRA). Please refer to the draft EIS Appendix 10-A Section 5 and an excerpt is provided below for reference: Exposure pathways consider the various routes by which radionuclides and/or chemicals may enter the body of the receptor, or for radionuclides, may exert effects from outside the body. Exposures to environmental media may be direct (i.e., by contact) or indirect (i.e., via constituent transport through the food chain). For each type of ecological receptor, draft EIS Appendix 10-A Table 5-5 summarizes the relevant exposure pathways to various environmental media including air, surface water, soil, and sediment. Airborne COPCs partition to soil and plants. For most COPCs, ingestion pathways dominate over inhalation and air immersion. The latter pathways are considered minor pathways in the EcoRA, but inhalation was included in the IMPACT model and is thus included in draft EIS Appendix 10-A Table 5-5. Exposure to constituents that may deposit from air to surface water was not considered, as that pathway is considered negligible according to CSA N288.1-20. As such, a pathway of radon in air to aquatic receptors such as fish was not evaluated. Radiological dose to aquatic receptors is evaluated through water and sediment exposure, as appropriate based on the receptor's characteristics. For fish, aquatic plants, and aquatic invertebrates, contact with water and constituent uptake from water via bioaccumulation represents the main exposure pathway. Direct contact or uptake from sediment are also considered for benthic invertebrates and bottom-feeding fish.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 382. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 383 | YNLRO (March 4, 2023) | EIS Executive Summary, p.18 Land and Resource Use, p. 11- 50 to 11-52 | <p>YNLR Comment March 4, 2023 Comment #15, Appendix A: While Project water reuse is laudable, its overall conservation and management are significant concerns for YNLR, particularly the quantities removed from the ecosystem and the fate of contaminated water released back into the ecosystem from the Project that end up in Wollaston Lake. YNLR expects to be consulted/included in the design and implementation of the Project's environmental monitoring programs. Comment #85, Appendix A: YNLR remains concerned with the potential effects of Project contamination on culturally important natural resources. These concerns stem from the nature of the materials being mined, and the novel method (ISR) by which they are being extracted. Northern residents and Indigenous Peoples will be living here long after the mine is exhausted, thus effective monitoring is critical, as is the inclusion of impacted Aboriginal and Treaty rights holders in the design and implementation of arm's length, transparent, and statistically-robust monitoring programs.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) The monitoring plans are not yet drafted and therefore this is an unacceptable. response. The request is reiterated for Denison to support a collaborative approach at the concept and methodology development stage. "Monitoring plans when drafted" makes this an unacceptable response to the YNLR concern, this does not go beyond the statement in the EIS and therefore the further response here continues to be unacceptable; prior comments as to the extent of YNLR involvement in planning and execution of monitoring is reiterated.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) The specific activity of water withdrawal from Whitefish Lake was assessed in the draft EIS, Section 8.1. The conservative estimate of water withdrawal would result in a reduction of flow of about 3% at times of low flow and the lake level could change by 1cm; this minor change is beyond the ability of monitoring techniques to practically measure, and the assessment concluded that the Project would not result in a significant effect on surface water quantity (hydrology). It is noted that there will be a separate permitting process that will consider water withdrawal for Project support that will occur following the EIS. Monitoring, including of water withdrawal rates and of potential effects (e.g., change in water flow, change in lake levels) will be implemented as the Project moves forward. Denison is committed to sharing information with Indigenous Communities of Interest (COIs) in a mutually agreed-upon fashion. Overall, the approach that will be utilized with respect to Indigenous community engagement will be aligned with Denison's Indigenous Peoples Policy. Denison's Indigenous Peoples Policy commits the company to respecting Indigenous knowledge and values regarding environmental stewardship and Indigenous peoples' connection to the land. The relevant monitoring plans for the species/resources that support a traditional diet will reflect and incorporate these values and will be reflective of the Indigenous COIs priorities. The monitoring plans when drafted will include more detail about communication methods and their effectiveness would be assessed through ongoing engagement with Indigenous communities. As outlined in Denison's Indigenous Peoples Policy, Denison is committed to respecting Indigenous knowledge and values regarding environmental stewardship and Indigenous</p> |

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| | | <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024)</p> <p>While encouraging, this still does not address YNLR's concerns as stated in their responses in their letters of 02 February 2024 and 13 March 2024. From the beginning, of their review of Denison's EIS and revised EIS YNLR, has been consistent in their request to be "involved in all monitoring and other plans at a conceptual level when experimental design and methodologies are being developed". Denison has been consistent in their responses "to share further information about plans as they are developed". The Denison response, explicitly, does not address YNLR's concerns stated in YNLR's letters of 02 February 2024 and 13 March 2024. Hence these concerns remain. YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development.</p> | <p>peoples' connection to the land, and to minimize potential effects, wherever possible. Through continued and focussed engagement with the YNLR since the YNLR identified its interest in the Project in 2019, Denison has come to better understand the Athabasca Denesų́líné communities' relationship to the Project site and current use of the areas for traditional purposes. Denison acknowledges that the Hatchet Lake Denesų́líné First Nation has the potential for established Indigenous and Treaty Rights proximal to the Project. The Hatchet Lake Denesų́líné First Nation, as represented by the YNLR will be identified as an Indigenous COI in the revised draft EIS. Denison continues to work with its Indigenous Communities of Interest with reserves and residential communities most proximal to the Project. Denison is committed to continual improvement in relation to such collaborative monitoring programs, in order to adapt to areas of interest which can change over time. YNLR will be informed throughout the monitoring program design and implementation process.</p> <p>A list of commitments, including specific commitment or mitigation measures related to Project effects as an outcome of engagement, made in the draft EIS, throughout the Federal information request period and the Provincial comment response period, will be included with the submission of the final EIS. For clarity, this would not include any private, confidential accommodations made under contractual agreements.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024)</p> <p>Denison is committed to working with YNLR to share information about monitoring plans as they are developed through the permitting and licencing process. In a meeting between YNLR and Denison on February 22, 2024, it was noted by YNLR's consultants that the areas of immediate interest to YNLR are surface and groundwater, aquatics, wildlife, and Woodland Caribou monitoring. As noted in the meeting, the detailed monitoring plans are not yet developed given the stage of the Project in the regulatory process. Given the number of plans and procedures to be developed it would be helpful for Denison and YNLR to work together to establish a process for next steps.</p> <p>Further, as an outcome of a meeting between Denison and YNLR on February 22, 2024, Denison provided YNLR a document from the draft Wheeler River Environmental Impact Statement (EIS) titled Summary of Monitoring. The document outlines the conceptual monitoring program for all stages of the Project and how they tie to each Valued Component assessed in the EIS.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024)</p> <p>YNLR expressed the desire to be involved in the program design and development of all monitoring and other plans at a conceptual level when experimental design and methodologies are being deployed, stating that, "YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development."</p> <p>Denison feels it is important to clarify the processes related to the development of various monitoring programs for the Project and the manner in which involvement can occur with interested Indigenous nations, such as those represented by the YNLR. As a starting point, the EIS contains conceptual level information for various monitoring plans associated with the Project, commensurate with the requirements for an environmental assessment, the primary basis of which is informed by regulatory guidance and requirements. The conceptual monitoring plans also take into account any input received through engagement activities, where appropriate. As the Project advances into permitting and licensing, the conceptual monitoring plans evolve into detailed monitoring plans, the designs of which must adhere to Provincial and Federal regulatory requirements but can be further enhanced by the involvement of the YNLR and other Indigenous communities. Denison provided the summary of monitoring and follow-up programs (Section 16 of the EIS) to the YNLR as an outcome of the February 22, 2024 meeting, with the request to identify those items of further interest to the YNLR to enable the co-development of a path forward. It is Denison's perspective that, in order to advance a meaningful process to further involve the YNLR in the development of the monitoring plans, it is necessary for Denison to understand the key areas of interest to the YNLR. This was the basis of Denison's request whereby the YNLR identify a starting point for this exchange, based on the conceptual monitoring programs provided in the EIS. In the absence of specific feedback on the conceptual monitoring plans/programs, Denison re-iterates its commitment to providing the YNLR with the detailed monitoring plans, as developed through the permitting and licensing process, for input and collaboration as the Project advances.</p> |
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| 384 | YNLRO (March 4, 2023) | EIS Executive Summary, p. 26 | <p>YNLRO Comment March 4, 2023 Comments #16 and 17, Appendix A: YNLR supports Denison's corporate Indigenous Peoples Policy (IPP) and looks forward to collaborating with Denison to ensure that the Project's socioeconomic benefits reach local Indigenous People. YNLR acknowledges that Denison incorporated the YNLR report into the EIS and looks forward to further working with the company collaboratively regarding the rights of Indigenous People. YNLR is interested in an impact benefit agreement with Denison ensuring mutual benefits from the Project and co-management of environmental monitoring and mitigation.</p> <p>YNLRO Comment March 13, 2024 (Response to Denison Comment November 22, 2023) "YNLR will be informed throughout the monitoring program design and implementation process." Once again this is an unacceptable delay and does not go beyond the original statements in the EIS. Prior comments made, as to the extent of YNLR collaborative involvement, in planning and execution of monitoring is reiterated.</p> <p>YNLRO Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) While encouraging, this still does not address YNLR's concerns as stated in their responses in their letters of 02 February 2024 and 13 March 2024. From the beginning, of their review of Denison's EIS and revised EIS YNLR, has been consistent in their request to be "involved in all monitoring and other plans at a conceptual level when experimental design and methodologies are being developed". Denison has been consistent in their responses "to share further information about plans as they are developed". The Denison response, explicitly, does not address YNLR's concerns stated in YNLR's letters of 02 February 2024 and 13 March 2024. Hence these concerns remain. YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) As outlined in Denison's Indigenous Peoples Policy, Denison is committed to respecting Indigenous knowledge and values regarding environmental stewardship and Indigenous peoples' connection to the land, and to minimize potential effects, wherever possible. Through continued and focussed engagement with the YNLR since the YNLR identified its interest in the Project in 2019, Denison has come to better understand the Athabasca Denesųtiné communities' relationship to the Project site and current use of the areas for traditional purposes. Denison acknowledges that the Hatchet Lake Denesųtiné First Nation has the potential for established Indigenous and Treaty Rights proximal to the Project. The Hatchet Lake Denesųtiné First Nation, as represented by the YNLR will be identified as an Indigenous COI in the revised draft EIS. Denison continues to work with its Indigenous Communities of Interest with reserves and residential communities most proximal to the Project. Denison is committed to continual improvement in relation to such collaborative monitoring programs, in order to adapt to areas of interest which can change over time. YNLR will be informed throughout the monitoring program design and implementation process. A list of commitments, including specific commitment or mitigation measures related to Project effects as an outcome of engagement, made in the draft EIS, throughout the Federal information request period and the Provincial comment response period, will be included with the submission of the final EIS. For clarity, this would not include any private, confidential accommodations made under contractual agreements.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) Denison is committed to working with YNLR to share information about monitoring plans as they are developed through the permitting and licencing process. In a meeting between YNLR and Denison on February 22, 2024, it was noted by YNLR's consultants that the areas of immediate interest to YNLR are surface and groundwater, aquatics, wildlife, and Woodland Caribou monitoring. As noted in the meeting, the detailed monitoring plans are not yet developed given the stage of the Project in the regulatory process. Given the number of plans and procedures to be developed it would be helpful for Denison and YNLR to work together to establish a process for next steps. Further, as an outcome of a meeting between Denison and YNLR on February 22, 2024, Denison provided YNLR a document from the draft Wheeler River Environmental Impact Statement (EIS) titled Summary of Monitoring. The document outlines the conceptual monitoring program for all stages of the Project and how they tie to each Valued Component assessed in the EIS.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) YNLR expressed the desire to be involved in the program design and development of all monitoring and other plans at a conceptual level when experimental design and methodologies are being deployed, stating that, "YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development." Denison feels it is important to clarify the processes related to the development of various monitoring programs for the Project and the manner in which involvement can occur with interested Indigenous nations, such as those represented by the YNLR. As a starting point, the EIS contains conceptual level information for various monitoring plans associated with the Project, commensurate with the requirements for an environmental assessment, the primary basis of which is informed by regulatory guidance and requirements. The conceptual monitoring plans also take into account any input received through engagement activities, where appropriate. As the Project advances into permitting and licensing, the conceptual monitoring plans evolve into detailed monitoring plans, the designs of which must adhere to Provincial and Federal regulatory requirements but can be further enhanced by the involvement of the YNLR and other Indigenous communities. Denison provided the summary of monitoring and follow-up programs (Section 16 of the EIS) to the YNLR as an outcome of the February 22, 2024 meeting, with the request to identify those items of further interest to the YNLR to enable the co-development of a path forward. It is Denison's perspective that, in order to advance a meaningful process to further involve the YNLR in the development of the monitoring plans, it is necessary for Denison to understand the key areas of interest to the YNLR. This was the basis of Denison's request whereby the YNLR identify a starting point for this exchange, based on the conceptual monitoring programs provided in the EIS. In the absence of specific feedback on the</p> |
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Comments from Indigenous Nations and Communities and the Public
Wheeler River Project Draft EIS

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| | | | | conceptual monitoring plans/programs, Denison re-iterates its commitment to providing the YNLR with the detailed monitoring plans, as developed through the permitting and licensing process, for input and collaboration as the Project advances. |
| 385 | YNLRO (March 4, 2023) | EIS Executive Summary, p. 26, 28 and 59 Land and Resource Use, p. 11- 52 and 11- 53 | <p>YNLR Comment March 4, 2023 Comments #18, 19 and 29, Appendix A:</p> <ul style="list-style-type: none"> - Indigenous People, communities, and organizations YNLR represents are rights holders, and are not to be arbitrarily grouped and treated as non-rights holders. This is an important distinction, as the rights they hold are constitutionally protected. This must be respected and recognized in the ongoing dialogue between the company and Indigenous Peoples through their chosen representatives, like YNLR. - The Athabasca Denesųtiné people are rights holders and not stakeholders with respect to the Project. These rights include full access and use of the natural resources of the area. Any proposed infringement on these rights by the Project will need to be discussed well ahead of the Project's start date. <p>Comment #86, Appendix A: The EIS minimizes effects of Lands and Waters availability and access on northern residents and Indigenous Peoples. Any impairment to the ability of Indigenous Peoples to utilize their Aboriginal and Treaty rights to the use of natural resources for their traditional activities constitutes an infringement of those constitutionally protected rights and must be justified. Rigorous examination of these impacts and negotiated compensation for these impacts should therefore be seriously considered.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Denison acknowledges the comment. In March 2019, Denison was notified by the YNLR that the Indigenous communities within the local Athabasca communities identified were interested in the Project and that YNLR held the Duty to Consult from these communities. Since receiving correspondence from the YNLR office in 2019 Denison has been collaboratively working with the YNLR office in a mutually agreed upon manner and will continue to do so. Denison's approach to identifying Indigenous COIs considered several factors as identified in Section 4.3.1 of the EIS. Being signatories of Treaty 10 was among, but not the sole applicable criteria, and not all Treaty 10 communities are considered as Indigenous COIs for the Project. Through continued and focussed engagement with the YNLR since the YNLR identified its interest in the Project in 2019, Denison has come to better understand the Athabasca Denesųtiné communities' relationship to the Project site and current use of the areas for traditional purposes. Denison acknowledges that the Hatchet Lake Denesųtiné First Nation has the potential for established Indigenous and Treaty Rights proximal to the Project. The Hatchet Lake Denesųtiné First Nation, as represented by the YNLR will be identified as an Indigenous COI in the revised draft EIS. With respect to Denison's consideration of Indigenous Knowledge shared by the Athabasca Denesųtiné knowledge sources, Denison notes that Tables 3.5-1 will be updated to better reflect where the YNLR's An Exploration of Recorded Athabasca Denesųtiné Traditional Knowledge, Land Use and Occupancy Information in the Vicinity of the Denison Mines Wheeler River Project, which was included as an Appendix to the EIS, was considered and included as Table 3.5-1 does not reflect all instances the report was utilized.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 385. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 386 | YNLRO (March 4, 2023) | EIS Executive Summary, p. 52 | <p>YNLR Comment March 4, 2023 Comments #24 and 25, Appendix A: Fish, fish habitat, and fish health are all extremely important to northern people of Saskatchewan, and especially Indigenous People. Wild fish are a culturally important source of protein and provide economic opportunities in the form of commercial fishing and recreational angling.</p> <ul style="list-style-type: none"> - YNLR will be eager to and expects to be involved in collaborating with Denison in the future monitoring of these vital natural resources. - Based on existing federal fishers legal and policy requirements, YNLR expects that all fish habitat destroyed or altered by the Project will be more than offset. | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Denison has committed to collaborating with Indigenous Communities of Interest with reserves and residential communities most proximal to the Project on specifics of environmental monitoring regimes, suited to each of their interests and needs. As part of these programs, Denison and the Communities of Interest will be sharing information in an agreed-upon fashion. Denison expects that important country foods harvested for food and cultural purposes (e.g., moose, fish, etc.), surface water quality, and other areas of interest will form parts of these monitoring programs, including other areas of potential concern as they evolve over time. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project. The specific potential for need for approval(s) under the Fisheries Act related to effects on fish</p> |

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| | | | <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) There is no monitoring plan developed yet to substantiate Denison's determination here. YNLR continues to state its desire for collaboration in the development of monitoring analysis and assessment plans.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) While encouraging, this still does not address YNLR's concerns as stated in their responses in their letters of 02 February 2024 and 13 March 2024. From the beginning, of their review of Denison's EIS and revised EIS YNLR, has been consistent in their request to be "involved in all monitoring and other plans at a conceptual level when experimental design and methodologies are being developed". Denison has been consistent in their responses "to share further information about plans as they are developed". The Denison response, explicitly, does not address YNLR's concerns stated in YNLR's letters of 02 February 2024 and 13 March 2024. Hence these concerns remain. YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development.</p> | <p>and fish habitat (i.e., harmful alteration, disruption and destruction) resulting from Project activities has been assessed and presented in the draft EIS. Based on the assessment, Denison has determined that effects can be avoided and mitigated and therefore there will be no need for fish habitat offsets under the Fisheries Act.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) Denison is committed to working with YNLR to share information about monitoring plans as they are developed through the permitting and licensing process. In a meeting between YNLR and Denison on February 22, 2024, it was noted by YNLR's consultants that the areas of immediate interest to YNLR are surface and groundwater, aquatics, wildlife, and Woodland Caribou monitoring. As noted in the meeting, the detailed monitoring plans are not yet developed given the stage of the Project in the regulatory process. Given the number of plans and procedures to be developed it would be helpful for Denison and YNLR to work together to establish a process for next steps.</p> <p>Further, as an outcome of a meeting between Denison and YNLR on February 22, 2024, Denison provided YNLR a document from the draft Wheeler River Environmental Impact Statement (EIS) titled Summary of Monitoring. The document outlines the conceptual monitoring program for all stages of the Project and how they tie to each Valued Component assessed in the EIS.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) YNLR expressed the desire to be involved in the program design and development of all monitoring and other plans at a conceptual level when experimental design and methodologies are being deployed, stating that, "YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development." Denison feels it is important to clarify the processes related to the development of various monitoring programs for the Project and the manner in which involvement can occur with interested Indigenous nations, such as those represented by the YNLR. As a starting point, the EIS contains conceptual level information for various monitoring plans associated with the Project, commensurate with the requirements for an environmental assessment, the primary basis of which is informed by regulatory guidance and requirements. The conceptual monitoring plans also take into account any input received through engagement activities, where appropriate. As the Project advances into permitting and licensing, the conceptual monitoring plans evolve into detailed monitoring plans, the designs of which must adhere to Provincial and Federal regulatory requirements but can be further enhanced by the involvement of the YNLR and other Indigenous communities. Denison provided the summary of monitoring and follow-up programs (Section 16 of the EIS) to the YNLR as an outcome of the February 22, 2024 meeting, with the request to identify those items of further interest to the YNLR to enable the co-development of a path forward. It is Denison's perspective that, in order to advance a meaningful process to further involve the YNLR in the development of the monitoring plans, it is necessary for Denison to understand the key areas of interest to the YNLR. This was the basis of Denison's request whereby the YNLR identify a starting point for this exchange, based on the conceptual monitoring programs provided in the EIS. In the absence of specific feedback on the conceptual monitoring plans/programs, Denison re-iterates its commitment to providing the YNLR with the detailed monitoring plans, as developed through the permitting and licensing process, for input and collaboration as the Project advances.</p> |
| 387 | YNLRO (March 4, 2023) | EIS Executive Summary, p. 54 and 55 | <p>YNLR Comment March 4, 2023 Comment #26, Appendix A: YNLR places a high priority on wildlife and wildlife habitat, from both ecological and sociocultural perspectives. Given the long-time frame of the Project, YNLR are concerned about the lack of significance associated with the residual and cumulative effects assessments of all ecological VCs. YNLR believes that the addition of this mine with its associated disturbances will have a cumulative effect on wildlife, especially for woodland caribou, as the area is already crisscrossed with many kilometres of seismic cut lines through the LSA, RSA and beyond (Figure 9.2-6, page 9-83, EIS and Appendix 9B). YNLR maintains <u>that in order for the Project to meaningfully attempt to mitigate this concern, the company must work with Indigenous partners to create an effective habitat offset plan for this species</u>. This should form part of any project approval. Such a plan should, for instance, include steps to restore the considerable caribou habitat degraded by past mineral exploration activities.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Through the EA process to date, Denison believes it has identified areas where offset may be required based on Project-Environment interactions. To this end, Denison has made a specific commitment to develop a Caribou Mitigation Plan (a preliminary draft of which has been submitted in response to provincial and federal EIS review comments) that includes provision for potential habitat offset. Details of the habitat offset will be developed in collaboration with Saskatchewan Ministry of Environment.</p> <p>It is also important to consider the site decommissioning plan within this context, though such restoration activities are not typically discussed as "offsets". Denison's decommissioning commitment is to return the land back to the Province of Saskatchewan for unrestricted surface land use post-closure. The Project's Conceptual Decommissioning Plan (CDP) is included in the</p> |

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| | | | <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) Public comment #387: The consideration of offsets in the decommissioning plan is not appropriate as a substitute for considerations of offsets in a present-day mitigation plan. Offsets are a method to address current habitat damage from the impacts of development while mitigation is underway. Offsets augment habitat requirements now and into the future. Consideration of offsets in a decommissioning plan is primarily for the damage that could not be mitigated in a preceding mitigation and management plan. YNLR reiterates its stated desire to collaborate, now, with Denison in the development of all plans for monitoring and mitigation. Notification to YNLR by Denison for plans and processes after their development is complete is not acceptable.</p> <p>Restoration of the area to pre disturbance conditions could be considered as an 'offset'. As long the DDP is done well in advance, it doesn't matter. However, the discussion for offsets should really be considered during the life of the mine, not afterwards.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) Public comment #387: While encouraging, this still does not address YNLR's concerns as stated in their responses in their letters of 02 February 2024 and 13 March 2024. From the beginning, of their review of Denison's EIS and revised EIS YNLR, has been consistent in their request to be "involved in all monitoring and other plans at a conceptual level when experimental design and methodologies are being developed". Denison has been consistent in their responses "to share further information about plans as they are developed". The Denison response, explicitly, does not address YNLR's concerns stated in YNLR's letters of 02 February 2024 and 13 March 2024. Hence these concerns remain. YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development.</p> <p>YNLR has provided its responses on caribou offsets and other aspects of caribou restoration and mitigation planning in the responses contained in their letters of 02 February 2024 and 13 March 2024. The concerns expressed in those responses remain valid and unaddressed. YNLR did request from Denison, in their meeting of 22 Feb 2024, specific information as to where their caribou offsets are located and what was the information and methodology used to determine these offsets, however, Denison declined to provide this information. Additionally, YNLR is also on record with CNSC and Denison (see attached letters at appendix 3) that there is a divergence of opinion of the results of the YNLR and Denison Cumulative Effects analysis. Given that the results of the CE analysis is the basis for how much land, suitable for caribou, is required for offsetting: YNLR's interest in the details of Denison's caribou offset plan is a valid concern (see Appendix 3 for a review of YNLR's GIS based Method for Assessing Cumulative Environmental Effects). Respecting preliminary decommissioning plans: decommissioning plans are based on the extent to which restoration and offsetting are carried out prior to decommissioning, therefore while their receipt from Denison is appreciated any conclusions that can be determined from this plan is incomplete without the former requested information on offset plans. Therefore, YNLR concerns stated in their comments remain valid and unaddressed.</p> | <p>draft EIS. The details of decommissioning and restoration will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP.</p> <p>Denison will continue to engage with YNLR on topics of interest.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) Public comment #387: Denison is committed to working with YNLR to share information about monitoring plans as they are developed through the permitting and licencing process. In a meeting between YNLR and Denison on February 22, 2024, it was noted by YNLR's consultants that the areas of immediate interest to YNLR are surface and groundwater, aquatics, wildlife, and Woodland Caribou monitoring. As noted in the meeting, the detailed monitoring plans are not yet developed given the stage of the Project in the regulatory process. Given the number of plans and procedures to be developed it would be helpful for Denison and YNLR to work together to establish a process for next steps. As an outcome of a meeting between Denison and YNLR on February 22, 2024, Denison provided YNLR a document from the draft Wheeler River Environmental Impact Statement (EIS) titled Summary of Monitoring. The document outlines the conceptual monitoring program for all stages of the Project and how they tie to each Valued Component assessed in the EIS.</p> <p>YNLR has shared comments with respect to Woodland Caribou offsets, including those related to the definition of offsets, timing, and mitigation measures as part of present-day mitigation measures for the Project, and should be applied in advance of decommissioning. YNLR has also requested to see the predecommissioning monitoring plan for containment releases. As an outcome of a meeting between Denison and YNLR on February 22, 2024, Denison provided a document titled Summary of Monitoring, which outlines the Project's commitments for monitoring programs for all phases of the Project from preconstruction to post decommissioning. Details of monitoring will be developed prior to, and applicable for each phase of the Project, including decommissioning. Denison has also provided YNLR with the Preliminary Decommissioning Plan, of which Denison offers to include YNLR in discussions as more details are developed for the Preliminary Decommissioning Plan. Denison has also provided YNLR with the Draft Caribou Management Framework, which outlines mitigation and restorative measures within the Provincial government framework. Denison welcomed feedback on the Draft Caribou Management Framework and remains open and willing to receive additional feedback.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) YNLR expressed the desire to be involved in the program design and development of all monitoring and other plans at a conceptual level when experimental design and methodologies are being deployed, stating that, "YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development."</p> <p>Denison feels it is important to clarify the processes related to the development of various monitoring programs for the Project and the manner in which involvement can occur with interested Indigenous nations, such as those represented by the YNLR. As a starting point, the EIS contains conceptual level information for various monitoring plans associated with the Project, commensurate with the requirements for an environmental assessment, the primary basis of which is informed by regulatory guidance and requirements. The conceptual monitoring plans also take into account any input received through engagement activities, where appropriate. As the Project advances into permitting and licensing, the conceptual monitoring plans evolve into detailed monitoring plans, the designs of which must adhere to Provincial and Federal regulatory requirements but can be further enhanced by the involvement of the YNLR and other Indigenous communities. Denison provided the summary of monitoring and follow-up programs (Section 16 of the EIS) to the YNLR as an outcome of the February 22, 2024 meeting, with the request to identify those items of further interest to the YNLR to enable the co-development of a path forward.</p> |
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| | | | | <p>It is Denison's perspective that, in order to advance a meaningful process to further involve the YNLR in the development of the monitoring plans, it is necessary for Denison to understand the key areas of interest to the YNLR. This was the basis of Denison's request whereby the YNLR identify a starting point for this exchange, based on the conceptual monitoring programs provided in the EIS. In the absence of specific feedback on the conceptual monitoring plans/programs, Denison re-iterates its commitment to providing the YNLR with the detailed monitoring plans, as developed through the permitting and licensing process, for input and collaboration as the Project advances.</p> <p>Denison is committed to the development of a caribou mitigation and offsetting plan for the Project. This plan will be developed ahead of construction and independent of the development of the Project's detailed decommissioning plan.</p> <p>Denison provided the YNLR with a draft Caribou Management Framework which outlines mitigation and restorative measures within the Provincial Government framework. Denison continues to remain open to feedback from the YNLR on the draft Caribou Management Framework. Further, Denison's previous offer to involve the YNLR in discussions with respect to the development of the decommissioning plans still stands. Decommissioning plans at this stage are conceptual as outlined in the EIS and will continue to be refined through each phase of the Project as it progresses.</p> <p>Public comment #401 to 411: There have been no further comments from the YNLR on EIS reference no. 401 to 411. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 388 | YNLRO (March 4, 2023) | EIS Executive Summary | <p>YNLR Comment March 4, 2023 Comment #27, Appendix A: Indigenous People have brought forward concerns with the extensive network of seismic cut lines at several places in the EIS.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) YNLR has not been privy to any caribou mitigation and offset discussions to date and would like to be as soon as possible. Consideration of offsets in a site decommissioning plan must be based on the results and analysis of an ongoing mitigation/offset plan that is in-place and functioning from the point of inception. Further to this, the ongoing results of the in-place mitigation/offset plan are obtained for analysis from an active and comprehensive monitoring plan that is also in place from the point of inception. Both of these issues reinforce the YNLR position that they need to be involved in the collaborative development and implementation of monitoring and other plans.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) While encouraging, this still does not address YNLR's concerns as stated in their responses in their letters of 02 February 2024 and 13 March 2024. From the beginning, of their review of Denison's EIS and revised EIS YNLR, has been consistent in their request to be "involved in all monitoring and other plans at a conceptual level when experimental design and methodologies are being developed". Denison has been consistent in their responses "to share further information about plans as they are developed". The Denison response, explicitly, does not address YNLR's concerns stated in YNLR's letters of 02 February 2024 and 13 March 2024. Hence these concerns remain. YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development. YNLR has provided its responses on caribou offsets and other aspects of caribou restoration and mitigation planning in the responses contained in their letters of 02 February 2024 and 13 March 2024. The concerns expressed in those responses remain valid and unaddressed. YNLR did request from Denison, in their meeting of 22 Feb 2024, specific information as to where their</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Through the EA process to date, Denison believes it has identified areas where offset may be required based on Project-Environment interactions. To this end, Denison has made a specific commitment to develop a Caribou Mitigation Plan (a preliminary draft of which has been submitted in response to provincial and federal EIS review comments) that includes provision for potential habitat offset. Details of the habitat offset will be developed in collaboration with Saskatchewan Ministry of Environment. It is also important to consider the site decommissioning plan within this context, though such restoration activities are not typically discussed as "offsets". Denison's decommissioning commitment is to return the land back to the Province of Saskatchewan for unrestricted surface land use post-closure. The Project's Conceptual Decommissioning Plan (CDP) is included in the draft EIS. The details of decommissioning and restoration will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP. Denison will continue to engage with YNLR on topics of interest.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) Denison is committed to working with YNLR to share information about monitoring plans as they are developed through the permitting and licensing process. In a meeting between YNLR and Denison on February 22, 2024, it was noted by YNLR's consultants that the areas of immediate interest to YNLR are surface and groundwater, aquatics, wildlife, and Woodland Caribou monitoring. As noted in the meeting, the detailed monitoring plans are not yet developed given the stage of the Project in the regulatory process. Given the number of plans and procedures to be developed it would be helpful for Denison and YNLR to work together to establish a process for next steps. As an outcome of a meeting between Denison and YNLR on February 22, 2024, Denison provided YNLR a document from the draft Wheeler River Environmental Impact Statement (EIS) titled Summary of Monitoring. The document outlines the conceptual</p> |

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Denison welcomed feedback on the Draft Caribou Management Framework and remains open and willing to receive additional feedback.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024)</p> <p>YNLR expressed the desire to be involved in the program design and development of all monitoring and other plans at a conceptual level when experimental design and methodologies are being deployed, stating that, "YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development."</p> <p>Denison feels it is important to clarify the processes related to the development of various monitoring programs for the Project and the manner in which involvement can occur with interested Indigenous nations, such as those represented by the YNLR. As a starting point, the EIS contains conceptual level information for various monitoring plans associated with the Project, commensurate with the requirements for an environmental assessment, the primary basis of which is informed by regulatory guidance and requirements. The conceptual monitoring plans also take into account any input received through engagement activities, where appropriate. As the Project advances into permitting and licensing, the conceptual monitoring plans evolve into detailed monitoring plans, the designs of which must adhere to Provincial and Federal regulatory requirements but can be further enhanced by the involvement of the YNLR and other Indigenous communities. 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In the absence of specific feedback on the conceptual monitoring plans/programs, Denison re-iterates its commitment to providing the YNLR with the detailed monitoring plans, as developed through the permitting and licensing process, for input and collaboration as the Project advances.</p> <p>Denison is committed to the development of a caribou mitigation and offsetting plan for the Project. This plan will be developed ahead of construction and independent of the development of the Project's detailed decommissioning plan.</p> <p>Denison provided the YNLR with a draft Caribou Management Framework which outlines mitigation and restorative measures within the Provincial Government framework. Denison continues to remain open to feedback from the YNLR on the draft Caribou Management Framework. Further, Denison's previous offer to involve the YNLR in discussions with respect to the development of the decommissioning plans still stands. Decommissioning plans at this stage are conceptual as outlined in the EIS and will continue to be refined through each phase of the Project as it progresses.</p> |
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| 389 | YNLRO (March 4, 2023) | EIS Executive Summary, p. 59 | <p>YNLR Comment March 4, 2023 Comment #28, Appendix A: While the overall direct footprint of the Project is relatively small, YNLR maintains that any wildlife habitat destroyed or altered by the Project should be more than offset or compensated for in some fashion. One example would be the additional disturbance created by the proposed Highway 914 extension. This needs to be accounted for by Denison.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) See above stated comments on CE, WLC and offsets.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment April 05, 2024) While encouraging, this still does not address YNLR's concerns as stated in their responses in their letters of 02 February 2024 and 13 March 2024. From the beginning, of their review of Denison's EIS and revised EIS YNLR, has been consistent in their request to be "involved in all monitoring and other plans at a conceptual level when experimental design and methodologies are being developed". Denison has been consistent in their responses "to share further information about plans as they are developed". The Denison response, explicitly, does not address YNLR's concerns stated in YNLR's letters of 02 February 2024 and 13 March 2024. Hence these concerns remain. YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development. YNLR has provided its responses on caribou offsets and other aspects of caribou restoration and mitigation planning in the responses contained in their letters of 02 February 2024 and 13 March 2024. The concerns expressed in those responses remain valid and unaddressed. YNLR did request from Denison, in their meeting of 22 Feb 2024, specific information as to where their caribou offsets are located and what was the information and methodology used to determine these offsets, however, Denison declined to provide this information. Additionally, YNLR is also on record with CNSC and Denison (see attached letters at appendix 3) that there is a divergence of opinion of the results of the YNLR and Denison Cumulative Effects analysis. Given that the results of the CE analysis is the basis for how much land, suitable for caribou, is required for offsetting: YNLR's interest in the details of Denison's caribou offset plan is a valid concern (see Appendix 3 for a review of YNLR's GIS based Method for Assessing Cumulative Environmental Effects). Respecting preliminary decommissioning plans: decommissioning plans are based on the extent to which restoration and offsetting are carried out prior to decommissioning, therefore while their receipt from Denison is appreciated any conclusions that can be determined from this plan is incomplete without the former requested information on offset plans. Therefore, YNLR concerns stated in their comments remain valid and unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) To be clear, Denison's proposed Project does not require any extension to the existing Highway 914. There is a Highway 914 extension project under evaluation by the Ministry of Highways, but this project is not related to or ancillary to the Wheeler River Project. As noted in response to other comments, through the EA process to date, Denison believes it has identified areas where offset may be required based on Project-Environment interactions. To this end, Denison has made a specific commitment to develop a Caribou Mitigation Plan (a preliminary draft of which has been submitted in response to provincial and federal EIS review comments) that includes provision for potential habitat offset. Details of the habitat offset will be developed in collaboration with Saskatchewan Ministry of Environment. It is also important to consider the site decommissioning plan within this context, though such restoration activities are not typically discussed as "offsets". Denison's decommissioning commitment is to return the land back to the Province of Saskatchewan for unrestricted surface land use post-closure. The Project's Conceptual Decommissioning Plan (CDP) is included in the draft EIS. The details of decommissioning and restoration will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP. No other specific needs for "offset" have been identified based on the effects assessment.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) Denison is committed to working with YNLR to share information about monitoring plans as they are developed through the permitting and licensing process. In a meeting between YNLR and Denison on February 22, 2024, it was noted by YNLR's consultants that the areas of immediate interest to YNLR are surface and groundwater, aquatics, wildlife, and Woodland Caribou monitoring. As noted in the meeting, the detailed monitoring plans are not yet developed given the stage of the Project in the regulatory process. Given the number of plans and procedures to be developed it would be helpful for Denison and YNLR to work together to establish a process for next steps. As an outcome of a meeting between Denison and YNLR on February 22, 2024, Denison provided YNLR a document from the draft Wheeler River Environmental Impact Statement (EIS) titled Summary of Monitoring. The document outlines the conceptual monitoring program for all stages of the Project and how they tie to each Valued Component assessed in the EIS. YNLR has shared comments with respect to Woodland Caribou offsets, including those related to the definition of offsets, timing, and mitigation measures as part of present-day mitigation measures for the Project, and should be applied in advance of decommissioning. YNLR has also requested to see the predecommissioning monitoring plan for containment releases. 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Denison welcomed feedback on the Draft Caribou Management Framework and remains open and willing to receive additional feedback.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) YNLR expressed the desire to be involved in the program design and development of all monitoring and other plans at a conceptual level when experimental design and methodologies are being deployed, stating that, "YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development." Denison feels it is important to clarify the processes related to the development of various monitoring programs for the Project and the manner in which involvement can occur with interested Indigenous nations, such as those represented by the YNLR. As a starting point, the</p> |
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| 390 | YNLRO (March 4, 2023) | EIS Executive Summary Monitoring Programs, p. 74 | <p>YNLR Comment March 4, 2023 Comment #30, Appendix A: YNLR expects to be included as part of the design and implementation of all monitoring programs. All such programs should be transparent, arm's length, include significant involvement and participation of Indigenous People, communities, and organizations and be statistically robust.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) See comments above on YNLR collaboration in the development and implementation of monitoring plans. YNLR needs a general statement concerning requested collaboration in management and monitoring plans.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) While encouraging, this still does not address YNLR's concerns as stated in their responses in their letters of 02 February 2024 and 13 March 2024. From the beginning, of their review of Denison's EIS and revised EIS YNLR, has been consistent in their request to be "involved in all monitoring and other plans at a conceptual level when experimental design and methodologies are being developed". Denison has been consistent in their responses "to share further information about plans as they are developed". The Denison response, explicitly, does not address YNLR's concerns stated in YNLR's letters of 02 February 2024 and 13 March 2024. Hence these concerns remain. YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Denison has committed to collaborating with Indigenous Communities of Interest with reserves and residential communities most proximal to the Project on specifics of environmental monitoring regimes, suited to each of their interests and needs. As part of these programs, Denison and the Communities of Interest will be sharing information in an agreed-upon fashion. Denison expects that important country foods harvested for food and cultural purposes (e.g., moose, fish, etc.), surface water quality, and other areas of interest will form parts of these monitoring programs, including other areas of potential concern as they evolve over time. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project.</p> <p>As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." The monitoring and follow-up program will include measurement of water quality parameters to meet regulatory criteria (i.e., provincial discharge permits, Metal and Diamond Mining Effluent Regulations [MDMER; Government of Canada 2022] and CSA N288.4-19 (CSA Group 2019). At a minimum, this will include collection of non-radiological parameters (e.g., metals, nutrients, hardness, temperature, pH, TDS, TSS, and sulphate) and radiological parameters.</p> <p>Denison has committed to collaborating with Indigenous Communities of Interest with reserves and residential communities most proximal to the Project on specifics of environmental monitoring regimes, suited to each of their interests and needs. As part of these programs, Denison and the Communities of Interest will be sharing information in an agreed-upon fashion. YNLR will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: programs will confirm the effectiveness of mitigation measures and predictions made in the assessment, programs will be implemented in an adaptive management framework (if/where applicable) to reduce effects during the lifetime of the Project, and programs will have spatial</p> |

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| | | | | <p>boundaries that are sufficiently extensive to measure EIS predictions. Additionally, regulators will be involved with setting specific requirements for follow-up and monitoring, as well as reporting, through licence conditions (CNSC) and provincial approvals. A number of monitoring and reporting requirements will be generated through the completion of the environmental assessment process. Denison and its lifecycle regulators will be in regular communication throughout the life of the Project as part of routine reporting, site inspections, licence and permit renewals. Denison is committed to ongoing engagement with regulators and recognizes that this will include information sharing related to follow-up and monitoring results and any needed adaptive management plans. It is also noted for further reference that there are existing, non-Denison monitoring programs such as the CNSC's Independent Environmental Monitoring Program (https://nuclearsafety.gc.ca/eng/resources/maps-of-nuclear-facilities/iemp/index.cfm), and the Eastern Athabasca Regional Monitoring Program (www.earmp.ca/). Results from these programs provide relevant information and can complement Denison's Project-specific monitoring program. One forum for discussion of monitoring results is the Northern Saskatchewan Environmental Quality Committee (https://www.saskatchewan.ca/residents/first-nations-citizens/saskatchewan-first-nationsmetis-and-northern-initiatives/northern-Saskatchewan-environmental-quality-committee).</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) Denison is committed to working with YNLR to share information about monitoring plans as they are developed through the permitting and licencing process. In a meeting between YNLR and Denison on February 22, 2024, it was noted by YNLR's consultants that the areas of immediate interest to YNLR are surface and groundwater, aquatics, wildlife, and Woodland Caribou monitoring. As noted in the meeting, the detailed monitoring plans are not yet developed given the stage of the Project in the regulatory process. Given the number of plans and procedures to be developed it would be helpful for Denison and YNLR to work together to establish a process for next steps. Further, as an outcome of a meeting between Denison and YNLR on February 22, 2024, Denison provided YNLR a document from the draft Wheeler River Environmental Impact Statement (EIS) titled Summary of Monitoring. The document outlines the conceptual monitoring program for all stages of the Project and how they tie to each Valued Component assessed in the EIS.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) YNLR expressed the desire to be involved in the program design and development of all monitoring and other plans at a conceptual level when experimental design and methodologies are being deployed, stating that, "YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development."</p> <p>Denison feels it is important to clarify the processes related to the development of various monitoring programs for the Project and the manner in which involvement can occur with interested Indigenous nations, such as those represented by the YNLR. As a starting point, the EIS contains conceptual level information for various monitoring plans associated with the Project, commensurate with the requirements for an environmental assessment, the primary basis of which is informed by regulatory guidance and requirements. The conceptual monitoring plans also take into account any input received through engagement activities, where appropriate. As the Project advances into permitting and licensing, the conceptual monitoring plans evolve into detailed monitoring plans, the designs of which must adhere to Provincial and Federal regulatory requirements but can be further enhanced by the involvement of the YNLR and other Indigenous communities. Denison provided the summary of monitoring and follow-up programs (Section 16 of the EIS) to the YNLR as an outcome of the February 22, 2024 meeting, with the request to identify those items of further interest to the YNLR to enable the co-development of a path forward.</p> <p>It is Denison's perspective that, in order to advance a meaningful process to further involve the YNLR in the development of the monitoring plans, it is necessary for Denison to understand the key areas of interest to the YNLR. This was the basis of Denison's request whereby the YNLR</p> |
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| | | | | identify a starting point for this exchange, based on the conceptual monitoring programs provided in the EIS. In the absence of specific feedback on the conceptual monitoring plans/programs, Denison re-iterates its commitment to providing the YNLR with the detailed monitoring plans, as developed through the permitting and licensing process, for input and collaboration as the Project advances. |
| 391 | YNLRO (March 4, 2023) | EIS Executive Summary, p. 76 | <p>YNLR Comment March 4, 2023 Comment #31, Appendix A: The EIS states: “On the basis of the Project information and related evaluation and assessment of effects, Denison believes that the Project can be constructed, operated, and decommissioned in a manner that is not likely to cause significant adverse effects to the biophysical or human environments.” This is perhaps an overly optimistic conclusion. However, YNLR is willing to discuss how the company moves forward and is interested in creating more formal processes to achieve this, such as the signing of an impact benefit agreement.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) This is not an open comment or invitation by Denison to address this concern with any process, commitment, or funding. Further to this; there is no indication in the response that Denison even accepts the YNLR comment hence this issue, raised in the original comments to Denison's EIS remains unresolved.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) No further response provided by YNLR as per letter dated June 19, 2024.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Denison notes YNLR's perspective on this.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) Denison and YNLR have collaborated on an appropriate process in relation to the identified comment made by YNLR and both parties are actively working together in this respect.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) No further response from YNLR as per in letter dated June 19, 2024. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> |
| 392 | YNLRO (March 4, 2023) | Section 1.0 Project Introduction and Overview, p. 1-1, 1-5 and 1-18 | <p>YNLR Comment March 4, 2023 Comments #32 and 33, Appendix A: The Project is located within Nuhenéné and of principal concern to YNLR is that the Project be fully sustainable with respect to cultural rights and traditions, socioeconomic equity, and environmental protection. To achieve this end, YNLR expects Denison to work collaboratively with the people of Nuhenéné through the YNLR office. YNLR supports the sustainable mining of uranium within Nuhenéné.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Denison notes YNLR's perspective on this. In March 2019, Denison was notified by the YNLR that the Indigenous communities within the local Athabasca communities identified were interested in the Project and that YNLR held the Duty to Consult from these communities. Since receiving correspondence from the YNLR office in 2019 Denison has been collaboratively working with the Nuhenéné through the YNLR office in a mutually agreed upon manner and will continue to do so.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 392. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 393 | YNLRO (March 4, 2023) | Section 8.0 Aquatic Environment, p. 8.-38 | <p>YNLR Comment March 4, 2023 Comment #34, Appendix A: The EIS recognized that the utilization of water will result in an adverse impact on the drainage but dismissed the issue given that a reduction in the stream flow rate is expected to be less than 3%. It would therefore be prudent to closely monitor the flow regime to identify possible adverse effects throughout the life of the Project.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) This comment by Denison is encouraging in that it accepts YNLR's concern for a monitoring requirement. However, it does nothing to address YNLR's position that is must be</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) In the draft EIS, conservative estimate of water taking would result in a reduction of flow of about 3% at times of low flow and the lake level could change by 1cm. While this incrementally small change in water quantity is beyond the ability of monitoring techniques to practically measure, Denison will conduct hydrological monitoring. Monitoring will likely include streamflow and lake level monitoring as well as continuous monitoring with stage dataloggers with details of monitoring plans to be finalized to support Project permitting and licensing.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024)</p> |

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| | | | <p>collaboratively involved in all plans' development and implementation.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) While encouraging, this still does not address YNLR's concerns as stated in their responses in their letters of 02 February 2024 and 13 March 2024. From the beginning, of their review of Denison's EIS and revised EIS YNLR, has been consistent in their request to be "involved in all monitoring and other plans at a conceptual level when experimental design and methodologies are being developed". Denison has been consistent in their responses "to share further information about plans as they are developed". The Denison response, explicitly, does not address YNLR's concerns stated in YNLR's letters of 02 February 2024 and 13 March 2024. Hence these concerns remain. YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development.</p> | <p>Denison is committed to working with YNLR to share information about monitoring plans as they are developed through the permitting and licencing process. In a meeting between YNLR and Denison on February 22, 2024, it was noted by YNLR's consultants that the areas of immediate interest to YNLR are surface and groundwater, aquatics, wildlife, and Woodland Caribou monitoring. As noted in the meeting, the detailed monitoring plans are not yet developed given the stage of the Project in the regulatory process. Given the number of plans and procedures to be developed it would be helpful for Denison and YNLR to work together to establish a process for next steps.</p> <p>Further, as an outcome of a meeting between Denison and YNLR on February 22, 2024, Denison provided YNLR a document from the draft Wheeler River Environmental Impact Statement (EIS) titled Summary of Monitoring. The document outlines the conceptual monitoring program for all stages of the Project and how they tie to each Valued Component assessed in the EIS.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) YNLR expressed the desire to be involved in the program design and development of all monitoring and other plans at a conceptual level when experimental design and methodologies are being deployed, stating that, "YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development." Denison feels it is important to clarify the processes related to the development of various monitoring programs for the Project and the manner in which involvement can occur with interested Indigenous nations, such as those represented by the YNLR. As a starting point, the EIS contains conceptual level information for various monitoring plans associated with the Project, commensurate with the requirements for an environmental assessment, the primary basis of which is informed by regulatory guidance and requirements. The conceptual monitoring plans also take into account any input received through engagement activities, where appropriate. As the Project advances into permitting and licensing, the conceptual monitoring plans evolve into detailed monitoring plans, the designs of which must adhere to Provincial and Federal regulatory requirements but can be further enhanced by the involvement of the YNLR and other Indigenous communities. Denison provided the summary of monitoring and follow-up programs (Section 16 of the EIS) to the YNLR as an outcome of the February 22, 2024 meeting, with the request to identify those items of further interest to the YNLR to enable the co-development of a path forward. It is Denison's perspective that, in order to advance a meaningful process to further involve the YNLR in the development of the monitoring plans, it is necessary for Denison to understand the key areas of interest to the YNLR. This was the basis of Denison's request whereby the YNLR identify a starting point for this exchange, based on the conceptual monitoring programs provided in the EIS. In the absence of specific feedback on the conceptual monitoring plans/programs, Denison re-iterates its commitment to providing the YNLR with the detailed monitoring plans, as developed through the permitting and licensing process, for input and collaboration as the Project advances.</p> |
| 394 | YNLRO (March 4, 2023) | Section 8.0 Aquatic Environment, p. 8-40, 8-42, 8-98 and 8-99 | <p>YNLR Comment March 4, 2023 Comment #35, Appendix A: Utilizing the extent of the LSA and the fact that it does not overlap with projects located within the same drainage system seems to be quite arbitrary and convenient. By this criterion, each mine does not trigger a cumulative effect according to the EIS, although they are all additive to the water flow regime. This methodology then arbitrarily and conveniently determines that "mitigation measures" for each of the mines is not warranted since there was a determination of no cumulative effects in sections 8.1.7.1, 8.1.7.2, 8.1.7.3 and 8.1.7.4.</p> <p>Comment #36, Appendix A: The determination of Cumulative Effects Characterization and the resultant Determination of Significance is highly subjective, therefore a much more extensive monitoring program is required. Such a program should start prior to the construction phase and carry on at least several years into the operation portion of the Project to at least demonstrate local and cumulative effects of mining projects within the watershed.</p> <p>Comment #37, Appendix A: YNLR agrees that the hydrological monitoring program remain throughout the life of the Project but as per the above, the study should have a much broader</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) In terms of watersheds and nearby uranium operations, only Key Lake Operation's drainage area interacts with the Wheeler River Project. Drainages from both operations would combine at Russell Lake. As such, the Key Lake Operation was included as an existing project in the CEA sections of the aquatic environment. The drainages associated with McArthur River Operation and Cigar Lake Operation are separate from the Project. The RSA is the area that surrounds and includes the LSA, and was established to assess the potential, largely indirect effects of the Project, as well as other activities, in a regional context. The RSA is large enough to capture the extent of potential effects (i.e., zone of influence) on a VC and defines the area within which cumulative effects may occur (i.e., cumulative effects assessment boundary). The RSA for the Surface Water Quality VC is bounded by the regional watershed area in which the Project Area is located. The RSA for this assessment is based on the whole watershed within which the Project is located and extends downstream to include Russell Lake (refer to draft EIS Figure 8.2-3). Given the very low magnitude of predicted changes in water quantity in the LSA (in the draft EIS, conservative estimate of water taking would result in a reduction of flow of about 3% at times of low flow and the lake level could change by 1cm), it would not be measurable further downstream into the RSA. The CEA considers whether residual adverse effects of the Project on a given VC will overlap</p> |

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| | | | <p>mandate in order to measure local and regional effects on VCs.</p> <p>Comment #41, Appendix A: YNLR is concerned that the conclusion that the residual effects from Project operations will not have an adverse effect on surface water is highly speculative. Again, this indicates the need for a comprehensive monitoring program to validate the speculation on water quality with rigorous statistical evidence.</p> <p>Comment #42, Appendix A: YNLR questions the logic track that states, “additional mitigation measures not warranted” because of the determination of no cumulative effects, then “a determination of significance is not warranted” as no cumulative effects were identified for water quality because surface water impacts are expected to remain localized...for all the mining operations in the region. Impacts on water quality and mitigation measures “not warranted” should be demonstrated through field studies and research rather than relying on a theoretical modelling approach.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) These comments do not address the YNLR’s original concern (the residual effects from Project operations will not have an adverse effect on surface water is highly speculative) and the above stated requests for collaboration at the conceptual and methodological stages of monitoring development are reiterated.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) While encouraging, this still does not address YNLR’s concerns as stated in their responses in their letters of 02 February 2024 and 13 March 2024. From the beginning, of their review of Denison’s EIS and revised EIS YNLR, has been consistent in their request to be “involved in all monitoring and other plans at a conceptual level when experimental design and methodologies are being developed”. Denison has been consistent in their responses “to share further information about plans as they are developed”. The Denison response, explicitly, does not address YNLR’s concerns stated in YNLR’s letters of 02 February 2024 and 13 March 2024. Hence these concerns remain. YNLR interprets the notion of ‘sharing’ information after its been developed as being non-collaborative and we prefer being ‘involved’ in the program/plan design and development.</p> | <p>spatially and/or temporally with the same residual adverse effects on the VC resulting from other past, present, and reasonably foreseeable projects or activities. The CEA follows standard methodology as per provincial (e.g., Guidelines for an Environmental Assessment) and federal guidance (e.g., Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012).</p> <p>Cumulative effects assessment is important to Indigenous communities in general because incremental effects to the environment can weaken resource economies, affect important resources such as plants, fish, and wildlife, affect rights-based and cultural activities, and affect both the health of wildlife and humans. Indigenous perspectives can be complementary to the CEA for the Project, and Denison acknowledges the important relationship of the Indigenous Communities of Interest to the lands and waters. The Indigenous Communities of Interest of ERFN and the Kineepik Métis Local #9 at Pinehouse (KML) have shared their Indigenous Knowledge on past, present, and predicted cumulative effects through the following:</p> <ul style="list-style-type: none"> • Wheeler River Project – Summary of Health and Socio-Economic Study Results (ERFN and SVS 2022a); • Wheeler River Project - Summary of Traditional Knowledge Study Results (ERFN and SVS 2022b); • Kineepik Valued Ecosystem Components – KML Pre-statement for Denison EIS (KML and NVP 2022); and • Response to the Environment Impact Assessment For the proposed Ministry of Highways 914 Extension Project (KML and Limnos Environmental 2022). <p>These perspectives on cumulative effects have been summarized in Section 3.4.8 of Section 3. Denison and the Communities of Interest agreed on the high value of this contribution being part of the EIS.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) Denison is committed to working with YNLR to share information about monitoring plans as they are developed through the permitting and licencing process. In a meeting between YNLR and Denison on February 22, 2024, it was noted by YNLR’s consultants that the areas of immediate interest to YNLR are surface and groundwater, aquatics, wildlife, and Woodland Caribou monitoring. As noted in the meeting, the detailed monitoring plans are not yet developed given the stage of the Project in the regulatory process. Given the number of plans and procedures to be developed it would be helpful for Denison and YNLR to work together to establish a process for next steps.</p> <p>Further, as an outcome of a meeting between Denison and YNLR on February 22, 2024, Denison provided YNLR a document from the draft Wheeler River Environmental Impact Statement (EIS) titled Summary of Monitoring. The document outlines the conceptual monitoring program for all stages of the Project and how they tie to each Valued Component assessed in the EIS.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) YNLR expressed the desire to be involved in the program design and development of all monitoring and other plans at a conceptual level when experimental design and methodologies are being deployed, stating that, “YNLR interprets the notion of ‘sharing’ information after its been developed as being non-collaborative and we prefer being ‘involved’ in the program/plan design and development.”</p> <p>Denison feels it is important to clarify the processes related to the development of various monitoring programs for the Project and the manner in which involvement can occur with interested Indigenous nations, such as those represented by the YNLR. As a starting point, the EIS contains conceptual level information for various monitoring plans associated with the Project, commensurate with the requirements for an environmental assessment, the primary basis of which is informed by regulatory guidance and requirements. The conceptual monitoring plans also take into account any input received through engagement activities, where appropriate. As the Project advances into permitting and licensing, the conceptual monitoring plans evolve into detailed monitoring plans, the designs of which must adhere to Provincial and Federal regulatory requirements but can be further enhanced by the involvement of the YNLR and other Indigenous communities. Denison provided the summary of monitoring and follow-up programs (Section 16 of the EIS) to the YNLR as an outcome of the February 22, 2024 meeting, with the request to identify those items of further interest to the YNLR to enable the co-development of a path forward.</p> |
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Comments from Indigenous Nations and Communities and the Public
Wheeler River Project Draft EIS

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| | | | | It is Denison's perspective that, in order to advance a meaningful process to further involve the YNLR in the development of the monitoring plans, it is necessary for Denison to understand the key areas of interest to the YNLR. This was the basis of Denison's request whereby the YNLR identify a starting point for this exchange, based on the conceptual monitoring programs provided in the EIS. In the absence of specific feedback on the conceptual monitoring plans/programs, Denison re-iterates its commitment to providing the YNLR with the detailed monitoring plans, as developed through the permitting and licensing process, for input and collaboration as the Project advances. |
| 395 | YNLRO (March 4, 2023) | Section 8.0 Aquatic Environment, p. 8-92, 8-93 and 8-96 | <p>YNLR Comment March 4, 2023 Comment #40, Appendix A: There are several comments in the EIS that recognize the potential for a negative effect on water quality from the site water management system into Whitefish Lake. Statements taken from residents have identified concerns about the release of elements such as "mercury" because of the mining activity. While the report recognized that detectable concentrations of mercury will not be produced, the local comment should be considered as a proxy for a variety of contaminants such as selenium, arsenic, cobalt, zinc, etc., as well as the concern expressed by residents, rather than being taken literally as mercury as the only contaminant of concern. YNLR reiterates that concerns about water quality are warranted given that the EIS indicates that there will be a continuous (year-round) average discharge of water from the mine site of more than 36,000 litres/hour for the entire life of the Project. This discharge will be especially evident during low flow periods.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) The comment from YNLR references text in Section 8.2 of the draft EIS which is the water quality assessment. Please refer to draft EIS Section 8.1 for the water quantity assessment and information on potential changes in water flow. Denison acknowledges the concern raised by YNLR and believes the water quality assessment, including the assessment of potential water quality effects on ecological and human health, presented in the EIS and supporting documentation is robust and supports the conclusions drawn. With regard to YNLR's concerns around contaminants in treated effluent, we refer YNLR to Appendix 10-A Environmental Risk Assessment (ERA) for Wheeler River. The ERA predicts and assesses the risk to representative human and ecological receptors resulting from exposure to radiological and non-radiological substances expected to be released throughout the Project Phases. The ERA encompasses a human health risk assessment (HHRA) and an ecological risk assessment (EcoRA), which have been prepared to be compliant with Canadian Standards Association Group (CSA) N288.6-12 Environmental Risk Assessments for Class I Nuclear Facilities and Uranium Mines and Mills (CSA, 2012). It also meets the requirements for an ERA outlined in Section 4.1 of Regulatory Document 2.9.1, Environmental Principles, Assessments and Protection Measures (CNSC, 2020). The ERA has been developed with current science and current regulatory attitudes in mind. The predicted radiological and non-radiological to human and ecological receptors demonstrate that the Project can be conducted in a manner that is protective of human and ecological health.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 395. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR</p> |
| | | | | As a result of the continued technical review until October 2024, Denison has included a commitment to assess health risks from local fish consumption by comparing fish tissue data collected during operation from the monitoring program against Health Canada's mercury guideline. |

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| 396 | YNLRO (March 4, 2023) | Section 8.0 Aquatic Environment, p. 8-102 | <p>YNLR Comment March 4, 2023 Comment #43, Appendix A: While appreciating current water quality standards, YNLR suggests that monitoring programs be designed to more than meet regulatory requirements of the license conditions. The EIS recognizes that the Project area lies primarily within an undisturbed area of the boreal forest (aside from the extent of seismic activity carried out within this area). YNLR would like to be involved in specific follow-up and monitoring plans as identified in the EIS.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) See comments above on YNLR collaboration in the development and implementation of monitoring plans. YNLR needs a general statement concerning requested collaboration in management and monitoring plans.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) While encouraging, this still does not address YNLR's concerns as stated in their responses in their letters of 02 February 2024 and 13 March 2024. From the beginning, of their review of Denison's EIS and revised EIS YNLR, has been consistent in their request to be "involved in all monitoring and other plans at a conceptual level when experimental design and methodologies are being developed". Denison has been consistent in their responses "to share further information about plans as they are developed". The Denison response, explicitly, does not address YNLR's concerns stated in YNLR's letters of 02 February 2024 and 13 March 2024. Hence these concerns remain. YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Denison has committed to collaborating with Indigenous Communities of Interest with reserves and residential communities most proximal to the Project on specifics of environmental monitoring regimes, suited to each of their interests and needs. As part of these programs, Denison and the Communities of Interest will be sharing information in an agreed-upon fashion. Denison expects that important country foods harvested for food and cultural purposes (e.g., moose, fish, etc.), surface water quality, and other areas of interest will form parts of these monitoring programs, including other areas of potential concern as they evolve over time. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project.</p> <p>As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." The monitoring and follow-up program will include measurement of water quality parameters to meet regulatory criteria (i.e., provincial discharge permits, Metal and Diamond Mining Effluent Regulations [MDMER; Government of Canada 2022] and CSA N288.4-19 (CSA Group 2019). At a minimum, this will include collection of non-radiological parameters (e.g., metals, nutrients, hardness, temperature, pH, TDS, TSS, and sulphate) and radiological parameters.</p> <p>Denison has committed to collaborating with Indigenous Communities of Interest with reserves and residential communities most proximal to the Project on specifics of environmental monitoring regimes, suited to each of their interests and needs. As part of these programs, Denison and the Communities of Interest will be sharing information in an agreed-upon fashion. YNLR will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: programs will confirm the effectiveness of mitigation measures and predictions made in the assessment, programs will be implemented in an adaptive management framework (if/where applicable) to reduce effects during the lifetime of the Project, and programs will have spatial boundaries that are sufficiently extensive to measure EIS predictions. Additionally, regulators will be involved with setting specific requirements for follow-up and monitoring, as well as reporting, through licence conditions (CNSC) and provincial approvals. A number of monitoring and reporting requirements will be generated through the completion of the environmental assessment process. Denison and its lifecycle regulators will be in regular communication throughout the life of the Project as part of routine reporting, site inspections, licence and permit renewals. Denison is committed to ongoing engagement with regulators and recognizes that this will include information sharing related to follow-up and monitoring results and any needed adaptive management plans. It is also noted for further reference that there are existing, non-Denison monitoring programs such as the CNSC's Independent Environmental Monitoring Program (https://nuclearsafety.gc.ca/eng/resources/maps-of-nuclear-facilities/iemp/index.cfm), and the Eastern Athabasca Regional Monitoring Program (www.earmp.ca/). Results from these programs provide relevant information and can complement Denison's Project-specific monitoring program. One forum for discussion of monitoring results is the Northern Saskatchewan Environmental Quality Committee (https://www.saskatchewan.ca/residents/first-nations-citizens/saskatchewan-first-nationsmetis-and-northern-initiatives/northern-saskatchewan-environmental-quality-committee).</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) Denison is committed to working with YNLR to share information about monitoring plans as they are developed through the permitting and licencing process. In a meeting between YNLR and Denison on February 22, 2024, it was noted by YNLR's consultants that the areas of immediate interest to YNLR are surface and groundwater, aquatics, wildlife, and Woodland Caribou monitoring. As noted in the meeting, the detailed monitoring plans are not yet developed given the stage of the Project in the regulatory process. Given the number of plans and procedures to be developed it would be helpful for Denison and YNLR to work together to establish a process for next steps. Further, as an outcome of a meeting between Denison and YNLR on February 22,</p> |
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| | | | | <p>2024, Denison provided YNLR a document from the draft Wheeler River Environmental Impact Statement (EIS) titled Summary of Monitoring. The document outlines the conceptual monitoring program for all stages of the Project and how they tie to each Valued Component assessed in the EIS.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) YNLR expressed the desire to be involved in the program design and development of all monitoring and other plans at a conceptual level when experimental design and methodologies are being deployed, stating that, “YNLR interprets the notion of ‘sharing’ information after its been developed as being non-collaborative and we prefer being ‘involved’ in the program/plan design and development.”</p> <p>Denison feels it is important to clarify the processes related to the development of various monitoring programs for the Project and the manner in which involvement can occur with interested Indigenous nations, such as those represented by the YNLR. As a starting point, the EIS contains conceptual level information for various monitoring plans associated with the Project, commensurate with the requirements for an environmental assessment, the primary basis of which is informed by regulatory guidance and requirements. The conceptual monitoring plans also take into account any input received through engagement activities, where appropriate. As the Project advances into permitting and licensing, the conceptual monitoring plans evolve into detailed monitoring plans, the designs of which must adhere to Provincial and Federal regulatory requirements but can be further enhanced by the involvement of the YNLR and other Indigenous communities. Denison provided the summary of monitoring and follow-up programs (Section 16 of the EIS) to the YNLR as an outcome of the February 22, 2024 meeting, with the request to identify those items of further interest to the YNLR to enable the co-development of a path forward.</p> <p>It is Denison’s perspective that, in order to advance a meaningful process to further involve the YNLR in the development of the monitoring plans, it is necessary for Denison to understand the key areas of interest to the YNLR. This was the basis of Denison’s request whereby the YNLR identify a starting point for this exchange, based on the conceptual monitoring programs provided in the EIS. In the absence of specific feedback on the conceptual monitoring plans/programs, Denison re-iterates its commitment to providing the YNLR with the detailed monitoring plans, as developed through the permitting and licensing process, for input and collaboration as the Project advances.</p> |
| 397 | YNLRO (March 4, 2023) | Section 8.0 Aquatic Environment Fish and Fish habitat, p. 8-117, 8-140, 8-141, 8-153, 8-252 and 11-50 | <p>YNLR Comment March 4, 2023 Comment #44, 45, 46, 49, 52 and 84, Appendix A: It is noted that the aquatic survey and fish sampling were carried out in 2016, which is now somewhat dated. It is also noted that work that would affect fish and fish habitat could/should only be carried out between July 16 and September 30th, as both spring and fall spawning species were collected in the fish sample.</p> <p>YNLR acknowledges that the amount of fish habitat directly affected by the Project is small. However, a much bigger concern is the indirect effects of increased human activity in the area over several decades and beyond, particularly with respect to the consequent increase in fish harvest. This will directly affect the ability of Indigenous Peoples to exercise their Aboriginal and Treaty rights.</p> <p>Related comments:</p> <ul style="list-style-type: none"> - YNLR would be eager to see how “a fish salvage plan to relocate fish prior to in-water works” might be carried out? Such an approach may not be practicable or effective. - While the sentiment of the above fish management strategy is laudable, it is not practical in terms of preserving fish numbers given the increased human access to the lakes that the mining activity will create. - The EIS does recognize the value of sucker species to residents, which is a positive step, as these fish species are netted for a variety of purposes. Increased local traffic will also undoubtedly provide more access for both subsistence and recreational fishing. As part of the mitigation measures YNLR proposes working with authorities to regulate recreational fishing prior to the onset of the construction phase of the Project and revisiting these regulations at | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) The response to the review comment are organized by theme, consistent with the comment. Fish salvage: Details of a fish salvage program, if required, will be developed to support Project permitting and licensing. Briefly, for any in-water work, the work area would be isolated from rest of the waterbody. Any fish remaining inside the isolated work area would be captured and relocated outside of the work area. Based on the experience of Denison and its SME team it is noted that such programs are implemented successfully on a routine basis with effective and site-specific planning.</p> <p>Indirect effects related to increased human activity in the area: Please note that the Project will not change public access to the area. The existing gate on Highway 914 near Cameco’s Key Lake Operation will remain in place and no changes to the gate and the process for controlling access to Highway 914 north of the Key Lake Operation are proposed as part of the Wheeler River Project. The proposed operation is fly-in, so Project related traffic to the area would only be related to deliveries of materials to and from the site. On-site staff will not have access to personal (or company) vehicles and will largely be “confined” to the camp and work areas during their shifts. Section 11 of the draft EIS provides the assessment of potential Project effects on Indigenous Land and Resource Use (Section 11.1) and Other Land and Resource Use (Section 11.2). The mitigation measures proposed in the aquatic and terrestrial assessments translated into undetectable changes in resource availability to existing and future users and rightsholders. Recreational fishing: As described in the draft EIS and as noted above, workforce members will be transported to/from site via a fly-in/fly-out rotation and will, therefore, not use ground travel options during shift changes, which will eliminate fishing on local lakes during commutes to/from the site and during time off work. Denison site vehicles will not be available for recreational purposes. While at the Project site and off duty, workers may opt to fish local</p> |

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| | | <p>intervals throughout the mine's operation and decommissioning.</p> <ul style="list-style-type: none"> - YNLR disagrees with the assumptions used (Section 8.3.7.2 to 8.3.7.5), which "assume" specific monitoring and follow-up for Fish and Fish Habitat related to cumulative effects is not warranted. - YNLR would like to be involved in designing and carrying out of a monitoring program, which would test the "no cumulative effect" assumption. - YNLR would like to be involved in a monitoring program for fish health. Further, this monitoring program should continue for the life of the Project or until it is demonstrated that the current filtering programs are effective. <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) YNLR looks forward to the details on how this collaboration will be conducted.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) While encouraging, this still does not address YNLR's concerns as stated in their responses in their letters of 02 February 2024 and 13 March 2024. From the beginning, of their review of Denison's EIS and revised EIS YNLR, has been consistent in their request to be "involved in all monitoring and other plans at a conceptual level when experimental design and methodologies are being developed". Denison has been consistent in their responses "to share further information about plans as they are developed". The Denison response, explicitly, does not address YNLR's concerns stated in YNLR's letters of 02 February 2024 and 13 March 2024. Hence these concerns remain. YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development.</p> | <p>waterbodies. To protect sustainable use of resources, only catch and release of fish will be encouraged, and fish storage or cooking facilities will not be provided. To prevent entry of land users from entering the Project Area, Denison will control access to the property with both a north and south security gate. Overall, given a lack of resources to access fishing locations and store fish harvests, workforce fishing is expected to cause minimal disturbances to local users. Monitoring: In the draft EIS, Denison outlines its plans to conduct fish health monitoring in tandem with surface water quality, sediment quality, benthic invertebrate and fish and fish habitat sampling. Sampling locations will be co-located to facilitate comparison to water quality and sediment quality characteristics. Denison has committed to collaborating with Indigenous Communities of Interest with reserves and residential communities most proximal to the Project on specifics of environmental monitoring regimes, suited to each of their interests and needs. As part of these programs, Denison and the Communities of Interest will be sharing information in an agreed-upon fashion. YNLR will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: programs will meet regulatory requirements, programs will confirm the effectiveness of mitigation measures and predictions made in the assessment, programs will be implemented in an adaptive management framework (if/where applicable) to reduce effects during the lifetime of the Project, and programs will have spatial boundaries are sufficiently extensive to measure EIS predictions. Denison is committed to maintaining positive relations with all local interested parties and will be open to discussions on any issues or concerns that arise.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) Denison is committed to working with YNLR to share information about monitoring plans as they are developed through the permitting and licencing process. In a meeting between YNLR and Denison on February 22, 2024, it was noted by YNLR's consultants that the areas of immediate interest to YNLR are surface and groundwater, aquatics, wildlife, and Woodland Caribou monitoring. As noted in the meeting, the detailed monitoring plans are not yet developed given the stage of the Project in the regulatory process. Given the number of plans and procedures to be developed it would be helpful for Denison and YNLR to work together to establish a process for next steps. Further, as an outcome of a meeting between Denison and YNLR on February 22, 2024, Denison provided YNLR a document from the draft Wheeler River Environmental Impact Statement (EIS) titled Summary of Monitoring. The document outlines the conceptual monitoring program for all stages of the Project and how they tie to each Valued Component assessed in the EIS.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) YNLR expressed the desire to be involved in the program design and development of all monitoring and other plans at a conceptual level when experimental design and methodologies are being deployed, stating that, "YNLR interprets the notion of 'sharing' information after its been developed as being non-collaborative and we prefer being 'involved' in the program/plan design and development." Denison feels it is important to clarify the processes related to the development of various monitoring programs for the Project and the manner in which involvement can occur with interested Indigenous nations, such as those represented by the YNLR. As a starting point, the EIS contains conceptual level information for various monitoring plans associated with the Project, commensurate with the requirements for an environmental assessment, the primary basis of which is informed by regulatory guidance and requirements. The conceptual monitoring plans also take into account any input received through engagement activities, where appropriate. As the Project advances into permitting and licensing, the conceptual monitoring plans evolve into detailed monitoring plans, the designs of which must adhere to Provincial and Federal regulatory requirements but can be further enhanced by the involvement of the YNLR and other Indigenous communities. Denison provided the summary of monitoring and follow-up programs (Section 16 of the EIS) to the YNLR as an outcome of the February 22, 2024 meeting, with the request to identify those items of further interest to the YNLR to enable the co-development of a path forward. It is Denison's perspective that, in order to advance a meaningful process to further involve the YNLR in the development of the monitoring plans, it is necessary for Denison to understand the key areas of interest to the YNLR. This was the basis of Denison's request whereby the YNLR</p> |
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| | | | | identify a starting point for this exchange, based on the conceptual monitoring programs provided in the EIS. In the absence of specific feedback on the conceptual monitoring plans/programs, Denison re-iterates its commitment to providing the YNLR with the detailed monitoring plans, as developed through the permitting and licensing process, for input and collaboration as the Project advances. |
| 398 | YNLRO (March 4, 2023) | Section 8.0 Aquatic Environment, p. 8-151 | <p>YNLR Comment March 4, 2023 Comment #47, Appendix A: The statement on page 8-151 recognizes that the discharge of treated effluent during the Operation and Decommissioning phase may interact with Cameco's current releases contributing to cumulative effects.</p> <p>It is recommended that a study be undertaken to assess the basin effect of water discharges.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) The requested information is presented in draft EIS Section 8.2.7 Cumulative Effects (surface water quality). The summary referenced in the YNLR comment is made in Section 8.3 Fish and Fish Habitat. Specific monitoring and follow-up plans for the Surface Water Quality VC will be prepared to refine and finalize the approach and specific metrics following consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC-specific program.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 398. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 399 | YNLRO (March 4, 2023) | Section 8.0 Aquatic Environment, p. 8-152 | <p>YNLR Comment March 4, 2023 Comment #48, Appendix A: Sediment quality of Whitefish Lake and downstream is not "anticipated" to overlap with the Key Lake Operation.</p> <p>It would be prudent to test this hypothesis to ensure that water quality in the flowage is maintained given the high value placed on these waters by residents.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Any changes in sediment quality would be preceded by changes in surface water quality. Should the surface water quality monitoring program identify changes beyond those predicted in the EIS, adaptive management measures would be implemented and may include monitoring of sediment quality further downstream in the watershed. In addition, the Environmental Effects Monitoring (EEM) program under the Diamond Mining and Effluent Regulations will provide a framework for monitoring changes in the aquatic environment.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 399. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |

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| 400 | YNLRO (March 4, 2023) | Section 8.0 Aquatic Environment, p. 8-232 | <p>YNLR Comment March 4, 2023 Comment #51, Appendix A: Water management during construction indicates that there is to be no planned discharge to Whitefish Lake. If a release of water from the mine site becomes necessary, in addition to monitoring suspended solid levels, there should be a communication plan to inform area residents of the pending release and its duration.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) During Construction, no effluent is expected to be released to the aquatic environment. Contact water stored in the Clean Waste Rock Pond during Construction will be held onsite until the Industrial Wastewater Treatment Plant (IWWTP) is commissioned. At that time the water from the pond would be conveyed to the IWWTP, treated, and released to Whitefish Lake per permit / license requirements. The sequencing of Construction activities will occur in a logical manner based on Project execution plans. For example, construction of the wellfield runoff pond will be prioritized during the early part of Construction, and it will be able to hold 38,200 m3 of water. This will provide contingency and additional water storage capacity if contact water produced exceeds estimates or the volume available in the Clean Waste Rock Pond. Other secondary contingency measures are also available should the volume of water requiring management exceed site infrastructure storage volume. Depending on the situation and volume of water needing management, this could include for example use a hydrovac for offsite disposal. Alternatively, in the instance that there is a planned release of water during construction, this would be permitted by Saskatchewan Ministry of Environment. In accordance with our Indigenous Peoples Policy, Denison is committed to collaborating with Indigenous peoples and communities to build long-term, respectful, trusting, and mutually beneficial relationships. Denison has identified key objectives respecting Indigenous engagement associated with the Project:</p> <ul style="list-style-type: none"> • Build and maintain authentic relationships based on a foundation of trust, good faith, and transparency. • Create a respectful dialogue process that promotes communication and collaboration among Denison and Indigenous communities, in a timely and accurate fashion. • Understand how the proposed development of the Project may affect the interests of Indigenous peoples (including Indigenous and/or Treaty Rights), and work with Indigenous peoples to avoid, mitigate, or otherwise address effects, while also collaborating to maximize potential positive effects. <p>In addition, Denison is required to have a Public Information Disclosure Protocol as set out by the CNSC. This would include any notification to the wider public of unplanned discharges.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 400. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 401 | YNLRO (March 4, 2023) | Section 9.0 Terrestrial Environment Fig 9. 2-6, p. 9-83 | <p>YNLR Comment March 4, 2023 Comment #53, Appendix A: YNLR is concerned about the potential residual and cumulative effects of the extensive seismic network on the soils of the RSA and LSA. Were these and other potential network effects considered in the analyses?</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Through the EA process to date, Denison believes it has identified areas where offset may be required based on Project-Environment interactions. To this end, Denison has made a specific commitment to develop a Caribou Mitigation Plan (a preliminary draft of which has been submitted in response to provincial and federal EIS review comments) that includes provision for potential habitat offset. Details of the habitat offset will be developed in collaboration with Saskatchewan Ministry of Environment.</p> <p>It is also important to consider the site decommissioning plan within this context, though such restoration activities are not typically discussed as "offsets". Denison's decommissioning commitment is to return the land back to the Province of Saskatchewan for unrestricted surface land use post-closure. The Project's Conceptual Decommissioning Plan (CDP) is included in the draft EIS. The details of decommissioning and restoration will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support</p> |

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| | | | | <p>licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP.</p> <p>Denison will continue to engage with YNLR on topics of interest.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 401. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 402 | YNLRO (March 4, 2023) | Section 9.0 Terrestrial Environment Appendix 9B, p. 60 Also, p. 9-68, Fig 9. 2-9, 9-133, 9-139 and 9-149 | <p>YNLR Comment March 4, 2023 Comment #54 and 55, Appendix A: Appendix 9B of the EIS states that 100% of the LSA and 82% of the RSA are already disturbed by buffered anthropogenic disturbances in the form of exploration lines, exploration trails, and seasonal roads. During the consultation process, residents raised the issue of the high degree of human disturbance and highlighted concerns about the broad network of linear disruptions in numerous places across the EIS.</p> <p>As with the Project soils, YNLR is concerned about the potential residual and cumulative effects of the extensive seismic network on the vegetation and wetlands of the RSA and LSA, particularly from edge effects. Were these and other possible effects of the network considered? If so, how were they included?</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Through the EA process to date, Denison believes it has identified areas where offset may be required based on Project-Environment interactions. To this end, Denison has made a specific commitment to develop a Caribou Mitigation Plan (a preliminary draft of which has been submitted in response to provincial and federal EIS review comments) that includes provision for potential habitat offset. Details of the habitat offset will be developed in collaboration with Saskatchewan Ministry of Environment.</p> <p>It is also important to consider the site decommissioning plan within this context, though such restoration activities are not typically discussed as "offsets". Denison's decommissioning commitment is to return the land back to the Province of Saskatchewan for unrestricted surface land use post-closure. The Project's Conceptual Decommissioning Plan (CDP) is included in the draft EIS. The details of decommissioning and restoration will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP.</p> <p>Denison will continue to engage with YNLR on topics of interest.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 402. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |

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| 403 | YNLRO (March 4, 2023) | Section 9.0 Terrestrial Environment, p. 9- 168 | <p>YNLR Comment March 4, 2023 Comment #56, Appendix A: Wilson et al. (2018) recently summarized the home ranges of 25 woodland caribou populations in Canada. The average home range varied 28-fold, from 312 to 8,838 sq. km.</p> <p>The RSA delineated for assessing cumulative effects on caribou (40,174 ha ~ 402 sq.km.) is thus inadequate for this purpose, and the conclusions of project residual and cumulative effects non-significance are highly suspect. The same could be said for other wide-ranging species such as wolverine.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Through the EA process to date, Denison believes it has identified areas where offset may be required based on Project-Environment interactions. To this end, Denison has made a specific commitment to develop a Caribou Mitigation Plan (a preliminary draft of which has been submitted in response to provincial and federal EIS review comments) that includes provision for potential habitat offset. Details of the habitat offset will be developed in collaboration with Saskatchewan Ministry of Environment.</p> <p>It is also important to consider the site decommissioning plan within this context, though such restoration activities are not typically discussed as "offsets". Denison's decommissioning commitment is to return the land back to the Province of Saskatchewan for unrestricted surface land use post-closure. The Project's Conceptual Decommissioning Plan (CDP) is included in the draft EIS. The details of decommissioning and restoration will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP.</p> <p>Denison will continue to engage with YNLR on topics of interest.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 403. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 404 | YNLRO (March 4, 2023) | Section 9.0 Terrestrial Environment Fig9. 2-9 | <p>YNLR Comment March 4, 2023 Comment #57, Appendix A: Was the current RSA anthropogenic disturbance estimate (599 ha) inclusive of the many kilometres of existing seismic cut lines? Did the estimate include consideration of the compounding 'edge effects' from these linear disturbances? If not, why not? See previous comments on the very high level of existing human disturbance in the LSA and RSA highlighted in Appendix 9B.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Through the EA process to date, Denison believes it has identified areas where offset may be required based on Project-Environment interactions. To this end, Denison has made a specific commitment to develop a Caribou Mitigation Plan (a preliminary draft of which has been submitted in response to provincial and federal EIS review comments) that includes provision for potential habitat offset. Details of the habitat offset will be developed in collaboration with Saskatchewan Ministry of Environment.</p> <p>It is also important to consider the site decommissioning plan within this context, though such restoration activities are not typically discussed as "offsets". Denison's decommissioning commitment is to return the land back to the Province of Saskatchewan for unrestricted surface land use post-closure. The Project's Conceptual Decommissioning Plan (CDP) is included in the draft EIS. The details of decommissioning and restoration will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP.</p> <p>Denison will continue to engage with YNLR on topics of interest.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> |

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| | | | | <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024)</p> <p>There have been no further comments from the YNLR on EIS reference no. 404. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 405 | YNLRO (March 4, 2023) | Section 9.0 Terrestrial Environment, p. 9- 239 | <p>YNLR Comment March 4, 2023</p> <p>Comment #58, Appendix A: Again, the direct and indirect effects of the existing seismic disturbance seem not to have been considered in this assessment, particularly because wolverines 'avoid linear infrastructure.' In fact, one can also see that woodland caribou avoid areas of historic seismic disturbance by directly comparing the figures on page 9-139, EIS (vegetation) and 9-202, EIS (caribou sightings). Appendix 9B gives a summary of the impacts of linear disturbances on boreal forest wildlife.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023)</p> <p>No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024)</p> <p>YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023)</p> <p>Through the EA process to date, Denison believes it has identified areas where offset may be required based on Project-Environment interactions. To this end, Denison has made a specific commitment to develop a Caribou Mitigation Plan (a preliminary draft of which has been submitted in response to provincial and federal EIS review comments) that includes provision for potential habitat offset. Details of the habitat offset will be developed in collaboration with Saskatchewan Ministry of Environment.</p> <p>It is also important to consider the site decommissioning plan within this context, though such restoration activities are not typically discussed as "offsets". Denison's decommissioning commitment is to return the land back to the Province of Saskatchewan for unrestricted surface land use post-closure. The Project's Conceptual Decommissioning Plan (CDP) is included in the draft EIS. The details of decommissioning and restoration will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP.</p> <p>Denison will continue to engage with YNLR on topics of interest.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024)</p> <p>No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024)</p> <p>There have been no further comments from the YNLR on EIS reference no. 405. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 406 | YNLRO (March 4, 2023) | Section 9.0 Terrestrial Environment, 9. P- 239 | <p>YNLR Comment March 4, 2023</p> <p>Comment #59, Appendix A: Buffered disturbance is included in Appendix 9B but appears to have been ignored in the effects assessment.</p> <p>Was the 500m buffering of anthropogenic disturbances also applied to the network of seismic cut lines to account for edge effects? If not, why not?</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023)</p> <p>No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024)</p> <p>YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.'</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023)</p> <p>Through the EA process to date, Denison believes it has identified areas where offset may be required based on Project-Environment interactions. To this end, Denison has made a specific commitment to develop a Caribou Mitigation Plan (a preliminary draft of which has been submitted in response to provincial and federal EIS review comments) that includes provision for potential habitat offset. Details of the habitat offset will be developed in collaboration with Saskatchewan Ministry of Environment.</p> <p>It is also important to consider the site decommissioning plan within this context, though such restoration activities are not typically discussed as "offsets". Denison's decommissioning commitment is to return the land back to the Province of Saskatchewan for unrestricted surface land use post-closure. The Project's Conceptual Decommissioning Plan (CDP) is included in the draft EIS. The details of decommissioning and restoration will be refined over time as the Project</p> |

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| | | | <p>YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP.</p> <p>Denison will continue to engage with YNLR on topics of interest.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 406. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 407 | YNLRO (March 4, 2023) | Section 9.0 Terrestrial Environment Table 9.3-23 and p. 9-270 | <p>YNLR Comment March 4, 2023 Comment #60, Appendix A: Is the amount of initial 'available woodland caribou habitat' inclusive of the direct and indirect seismic cutline network effects? If not, why not? Irrespective of this, it appears that the LSA is being written off for woodland caribou for decades to come. See above comments with respect to Appendix 9B.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Through the EA process to date, Denison believes it has identified areas where offset may be required based on Project-Environment interactions. To this end, Denison has made a specific commitment to develop a Caribou Mitigation Plan (a preliminary draft of which has been submitted in response to provincial and federal EIS review comments) that includes provision for potential habitat offset. Details of the habitat offset will be developed in collaboration with Saskatchewan Ministry of Environment.</p> <p>It is also important to consider the site decommissioning plan within this context, though such restoration activities are not typically discussed as "offsets". Denison's decommissioning commitment is to return the land back to the Province of Saskatchewan for unrestricted surface land use post-closure. The Project's Conceptual Decommissioning Plan (CDP) is included in the draft EIS. The details of decommissioning and restoration will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP.</p> <p>Denison will continue to engage with YNLR on topics of interest.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 407. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |

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| 408 | YNLRO (March 4, 2023) | Section 9.0 Terrestrial Environment, p. 9-275, 9-280, 9-300, Section 11.0 Land and Resource Use, p. 11-46 and 11- | <p>YNLRO Comment March 4, 2023</p> <p>Comment #61, 62, 82, 83, Appendix A: The EIS correctly highlights the cultural importance of moose and woodland caribou to Indigenous People, which underscores YNLR's concerns regarding the conclusions of the residual and cumulative effects assessments of these species, particularly for caribou.</p> <p>YNLRO questions the optimistic conclusions drawn by Denison regarding the ongoing availability of woodland caribou for traditional use.</p> <ul style="list-style-type: none"> - The buffered direct habitat loss alone eliminates the LSA and RSA for caribou habitation for decades to come (Appendix 9B), so how can it 'sustain the regional woodland caribou population' in any way? - The reference to 'proven' mitigation measures is rather vague and requires further explanation. - YNLR is unaware of these proven mitigation measures, other than isolation from human disturbance. <p>YNLRO disagrees with this overall residual effects conclusion for these wildlife VCs, especially in regard to woodland caribou (Appendix 9B), for the following reasons:</p> <p>(i) Comment #64, Appendix A: In addition, the reason why SK1 holds one of the very few sustainable caribou populations despite a high level of forest fire, is because of currently very low levels of human intrusion, which suggests that the provincial and federal approval processes, BMPs, and mitigation measures have not been sufficient in the rest of the species' range throughout the entirety of Canada.</p> <p>(ii) Comment #83, Appendix A: Woodland caribou populations have strongly declined across Canada despite all types of project mitigation, so YNLR doubts that similar mitigation efforts will be effective here. A woodland caribou 'management' plan is not sufficient. YNLR believes that, at a minimum, Denison should commit to an aggressive caribou habitat offset plan before work on the Project begins. In addition, it is unclear what constitutes this proposed mitigation. A caribou management plan is proposed (Section 9), however nothing short of a full caribou habitat offset plan will suffice to sustain the region's population. Offset activities should include the ongoing restoration of the existing seismic lines, among other things. This work is best accomplished in consultation and collaboration with Indigenous People, their communities, and organizations.</p> <p>YNLRO Comment March 13, 2024 (Response to Denison Comment November 22, 2023)</p> <p>No further response provided by YNLR.</p> <p>YNLRO Comment June 19, 2024 (Response to Denison Comment on April 05, 2024)</p> <p>YNLRO Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023)</p> <p>Through the EA process to date, Denison believes it has identified areas where offset may be required based on Project-Environment interactions. To this end, Denison has made a specific commitment to develop a Caribou Mitigation Plan (a preliminary draft of which has been submitted in response to provincial and federal EIS review comments) that includes provision for potential habitat offset. Details of the habitat offset will be developed in collaboration with Saskatchewan Ministry of Environment.</p> <p>It is also important to consider the site decommissioning plan within this context, though such restoration activities are not typically discussed as "offsets". 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Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024)</p> <p>There have been no further comments from the YNLR on EIS reference no. 408. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 409 | YNLRO (March 4, 2023) | Section 9.0 Terrestrial Environment, p. 9-280, 9-287 and 9-302 | <p>YNLRO Comment March 4, 2023</p> <p>Comment #62, 63, 64, 66, 67 and 68, Appendix A: Past and future direct and indirect effects of seismic line clearing appear to have been ignored in this assessment (Appendix 9B). The fact that most caribou sightings occurred away from seismically disturbed areas independent of habitat type supports this observation.</p> <p>YNLRO disagrees with this overall residual effects conclusion for these wildlife VCs, especially in regard to woodland caribou (Appendix 9B), for the following reasons:</p> <ul style="list-style-type: none"> - Comment # 63 and 64, Appendix A: The extent of past seismic line cutting is very high for both the LSA and RSA. However, direct and indirect (edge) effects on wildlife, especially woodland caribou, seem to have been overlooked or minimized. Future exploration disturbance should have been estimated and included based on the rate of historic disturbance if nothing else. - Comment #67, Appendix A: Most of these mitigation measures (listed on p. 9-308) are quite superficial and would contribute little to the long-term conservation of wildlife in the RSA and LSA. The proposed caribou management plan needs to be a fully developed Caribou Habitat Offset Plan given the extent of already altered habitat by seismic activities. Also note that this has a high potential for a direct impact on Aboriginal and Treaty rights. More, some Indigenous | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023)</p> <p>Through the EA process to date, Denison believes it has identified areas where offset may be required based on Project-Environment interactions. To this end, Denison has made a specific commitment to develop a Caribou Mitigation Plan (a preliminary draft of which has been submitted in response to provincial and federal EIS review comments) that includes provision for potential habitat offset. Details of the habitat offset will be developed in collaboration with Saskatchewan Ministry of Environment.</p> <p>It is also important to consider the site decommissioning plan within this context, though such restoration activities are not typically discussed as "offsets". Denison's decommissioning commitment is to return the land back to the Province of Saskatchewan for unrestricted surface land use post-closure. The Project's Conceptual Decommissioning Plan (CDP) is included in the draft EIS. The details of decommissioning and restoration will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP.</p> |

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| | | | <p>People will likely take offence at the idea of the company 'facilitating access' to their inherent Treaty Rights. Significant consultation and collaboration with Indigenous People is required.</p> <p>Comment #69, Appendix A: Concern about the extensive network of seismic cut lines were also raised by Indigenous People at several places in the EIS.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison will continue to engage with YNLR on topics of interest.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 409. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 410 | YNLRO (March 4, 2023) | Section 9.0 Terrestrial Environment | <p>YNLR Comment March 4, 2023 Comment #65, Appendix A: Is it not possible to conduct modern mineral exploration without cutting miles and miles of seismic lines across the boreal forest?</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Through the EA process to date, Denison believes it has identified areas where offset may be required based on Project-Environment interactions. To this end, Denison has made a specific commitment to develop a Caribou Mitigation Plan (a preliminary draft of which has been submitted in response to provincial and federal EIS review comments) that includes provision for potential habitat offset. Details of the habitat offset will be developed in collaboration with Saskatchewan Ministry of Environment.</p> <p>It is also important to consider the site decommissioning plan within this context, though such restoration activities are not typically discussed as "offsets". Denison's decommissioning commitment is to return the land back to the Province of Saskatchewan for unrestricted surface land use post-closure. The Project's Conceptual Decommissioning Plan (CDP) is included in the draft EIS. The details of decommissioning and restoration will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP.</p> <p>Denison will continue to engage with YNLR on topics of interest.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 410. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |

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| 411 | YNLRO (March 4, 2023) | Section 9.0 Terrestrial Environment | <p>YNLNR Comment March 4, 2023</p> <p>Comment #68, Appendix A: Section 9.3.9 of the draft EIS indicates that with the implementation of the above (and additional) mitigation measures, the residual effects on the Ungulates, Furbearer, and Woodland Caribou VCs were assessed as follows:</p> <ul style="list-style-type: none"> - Moose. Not significant: the residual effects of alteration and/or loss of available habitat and of change in mortality are not expected to result in a change that will alter habitat integrity to the point where it would not be able to sustain the regional ungulate populations or the integrity of the regional moose population to the point where it could not be sustained. - Furbearers. Not significant: the residual effects of alteration and/or loss of available habitat and of change in mortality are not expected to result in a change that will alter habitat integrity to the point where it would not be able to sustain the regional furbearer populations or the integrity of the regional furbearer populations to the point where they could not be sustained. - Woodland caribou. Not significant: the residual effects of alteration and/or loss of available habitat and of change in mortality are not expected to result in a change that will alter habitat integrity to the point where it would not be able to sustain the regional woodland caribou population or the integrity of the regional woodland caribou population to the point where they could not be sustained. <p>YNLNR believes this summary to be overly optimistic and somewhat inaccurate for the following reasons:</p> <ul style="list-style-type: none"> - The RSA and LSA are too small relative to the home range of woodland caribou to serve as a basis for assessing residual and cumulative effects on the species. - Large portions of the RSA and LSA have been badly degraded by mineral exploration activities (particularly by line-cutting for seismic surveys; Appendix 9B), yet their direct and indirect (edge) impacts seem not to have been considered in the effects assessments. This is puzzling given the known impact that these features have on wildlife, especially caribou, wolverine, other predators, and many avian species. The EIS maps themselves clearly show an avoidance of these seismically-disturbed areas by woodland caribou. <p>YNLNR strongly believes that, at a minimum, an aggressive Caribou Habitat Offset Plan should be co-developed before Project work begins, and regular monitoring of the caribou population be conducted throughout the life of the Project.</p> <p>YNLNR Comment March 13, 2024 (Response to Denison Comment November 22, 2023)</p> <p>No further response provided by YNLNR.</p> <p>YNLNR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024)</p> <p>YNLNR Response: YNLNR does not know what Denison means by the phrase 'deemed complete.' YNLNR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLNR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLNR Comment March 4, 2023)</p> <p>Through the EA process to date, Denison believes it has identified areas where offset may be required based on Project-Environment interactions. To this end, Denison has made a specific commitment to develop a Caribou Mitigation Plan (a preliminary draft of which has been submitted in response to provincial and federal EIS review comments) that includes provision for potential habitat offset. Details of the habitat offset will be developed in collaboration with Saskatchewan Ministry of Environment.</p> <p>It is also important to consider the site decommissioning plan within this context, though such restoration activities are not typically discussed as "offsets". Denison's decommissioning commitment is to return the land back to the Province of Saskatchewan for unrestricted surface land use post-closure. The Project's Conceptual Decommissioning Plan (CDP) is included in the draft EIS. The details of decommissioning and restoration will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP.</p> <p>Denison will continue to engage with YNLNR on topics of interest.</p> <p>Denison Response April 05, 2024 (Response to YNLNR Comment March 13, 2024)</p> <p>No further response from YNLNR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLNR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLNR Comment June 19, 2024)</p> <p>There have been no further comments from the YNLNR on EIS reference no. 411. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLNR responded indicating that the YNLNR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLNR's comments in kind and has sought to address YNLNR's concerns. Denison has stated its commitment to work with the YNLNR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLNR on these concerns. As the YNLNR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLNR.</p> |
| 412 | YNLRO (March 4, 2023) | Section 9.0 Terrestrial Environment, p. 9-320, 9-384, 9-389, 9-408, 9-413, 9-414, 9-454, 9-457, 9-460, 9-465, 9-469 Section 11.0 Land and Resource Use | <p>YNLNR Comment March 4, 2023</p> <p>Comment #69, Appendix A: in Section 9.4 of the EIS lists Raptors, Migratory Breeding Birds and Bird Species at Risk together (p. 9-320).</p> <p>YNLNR questions how and why these three avian VCs were selected and grouped.</p> <p>The three VCs include dozens of breeding bird species with hugely varying habitat requirements, so it is difficult to see how it is possible to accurately predict Project effects for many of these species, especially when so many are lumped together in only one Migratory Breeding Birds VC. In addition, the scarcity of raptors and avian species at risk makes them poor candidates for effects assessments because of low sample sizes.</p> <p>Comment #72 and 73, Appendix A: With only two water-based species selected to represent all forest raptors in the Project area, the results and conclusions of this assessment are extremely limited. For the forest birds in particular, this is compounded by the non-inclusion of the historic network of seismic cut lines across the landscape (Appendix 9B), and the resulting underestimation of direct and edge effects.</p> | <p>Denison Response November 22, 2023 (Response to YNLNR Comment March 4, 2023)</p> <p>An EIS requires scoping in order to determine the appropriate content for the assessment and focus the EIS on key areas of concern and relevance. As per standard, accepted EA practice, the EA was organized by and focused on VCs. The VCs are aspects of the biophysical and human environments that will likely be affected (adversely or positively) by the Project. The VCs reflect identified scientific, local knowledge and Indigenous knowledge, and community interests regarding the Project and its potential effects and are typically identified early in the EA process as a result of questions and concerns raised through engagement with government departments and agencies, Indigenous and community groups, and the general public. Key Indicators are an important component or aspect of the VC that is expected to be affected (changed) as a result of the Project. The KIs may comprise subsets or a guild of the VC, certain aspects of the VC that may be affected by the Project and/or which have a particular importance. The three avian VCs (with Key Indicators in brackets) were: Raptors (bald eagle and osprey), Migratory Breeding Birds (waterbirds and waterfowl, upland game birds, and migratory songbirds), and Bird Species at Risk (common nighthawk, short-eared owl, yellow rail, rusty blackbird, and olive-sided flycatcher). The residual effects evaluation was completed on the Key Indicator species. The rationale for selecting these avian Key Indicators is available in Section 9.4.1.2. For instance, the inclusion of Species At Risk birds is a requirement of the Species at Risk Act and the CNSC's</p> |

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| | | | <p>Comment #74, Appendix A: Species at risk generally make very poor indicators of ecological integrity/biodiversity because of their relative scarcity. In fact, three of the VC bird species at risk selected were not even detected during the Project surveys. This very low quantity and data quality greatly weakens any conclusions regarding the Project residual effects.</p> <p>Comment # 75, Appendix A: YNLR cannot find any mention of the extensive seismic line network impacts (Appendix 9B) included in the effects assessment for birds. This was also the case for the caribou and wildlife assessments.</p> <p>Comment #76 and 77: Appendix A: The selection of weak indicators and the ad hoc grouping of dissimilar species make these predictions quite unreliable. This potential error is likely compounded by the apparent exclusion of the direct and indirect effects of the existing seismic cutline network (Appendix 9B). Concern about these extensive network of seismic cut lines were also raised by Indigenous People at several places in the EIS.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>REGDOC 2.9.1 also notes that applicants should identify all biological species at risk in the area; the avian Species at Risk were not included in the EIS to be indicators of ecological integrity/biodiversity.</p> <p>The avian effects assessment was habitat based. The assessment methods used a conservative approach with the assumption that, following the implementation of site-specific mitigation measures, the proposed Project activities would have a residual effect on these species' guilds regardless of species presence on site. As described in the EIS, pre-construction surveys will be conducted prior to the commencement of any vegetation clearing or soil disturbance. Avian species will also be routinely monitored throughout the life of the Project. Results from the surveys and monitoring activities are expected to inform the adaptive management process to update Project design and identify the need for additional mitigation measures, if required. Denison is of the professional opinion that the data presented, and analysis provided in the avian assessment of the draft EIS is sufficient given 1) the local / regional environment, 2) the level of interaction of the Project with birds that is expected, and 3) because bird densities are not expected to be limited by habitat regionally.</p> <p>The Wheeler River Project Environmental Impact Statement - Denison's Response to Woodland Caribou Habitat Comments discusses how existing cutlines were considered in avian assessments. All past anthropogenic disturbances (which includes cutlines to support mineral exploration) were considered in the terrestrial environment assessments. These human disturbances were mapped and considered/addressed appropriately in Section 9 including the Existing Environment, Residual Effects Characterization, and Cumulative Effects Assessment sections, as they relate to Terrain, Soil and Organic Matter/Peat (Section 9.1); Vegetation and Ecosystems, Listed Plant Species and Wetlands (Section 9.2); Ungulates, Furbearers and Woodland Caribou (Section 9.3); Raptors, Migratory Breeding Birds, and Bird Species at Risk (Section 9.4). The cutlines were classified as previously disturbed and considered as low-quality habitat or no habitat, depending on the species being assessed and their habitat requirements. An anthropogenic layer is included on draft EIS, Figure 9.2-6, which includes geophysical cutlines. Please note that anthropogenic features were mapped at IKONOS 1:5,000. This anthropogenic layer is not listed under available habitat types for any of the wildlife or avian VCs in subsequent assessments (e.g., Figures 9.3-9 to 9.3-14, Figures 9.4-8 to 9.4-11, Figures 9.4-13 to 9.4-15) except for Common Nighthawk (Figure 9.4-12), which is a species that is known to use anthropogenic features.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 412. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 413 | YNLRO (March 4, 2023) | Section 9.0 Terrestrial Environment, p. 9- 356 and 9-357 | <p>YNLR Comment March 4, 2023</p> <p>Comment #71, Appendix A: The EIS states: "<i>In this assessment, alteration of habitat is defined as indirect habitat alteration where suitable habitat for the Raptors, Migratory Breeding Birds, and Bird Species at Risk VCs and their associated KIs remains physically intact but is rendered less suitable or unsuitable for their use. Sources of habitat alteration include Project-related habitat fragmentation (i.e., the breaking apart of continuous habitat into smaller, spatially distinct patches), edge effects (i.e., the influence of recently cleared areas on adjacent habitats), and sensory disturbance.</i>" (Page 9-356, EIS)</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Please refer to the Wheeler River Project Environmental Impact Statement - Denison's Response to Woodland Caribou Habitat Comments for a discussion of how existing cutlines were considered in avian assessments. All past anthropogenic disturbances (which includes cutlines to support mineral exploration) were considered in the terrestrial environment assessments. These human disturbances were mapped and considered/addressed appropriately in Section 9 including the Existing Environment, Residual Effects Characterization, and Cumulative Effects Assessment sections, as they relate to Terrain, Soil and Organic Matter/Peat (Section 9.1); Vegetation and Ecosystems, Listed Plant Species and Wetlands</p> |

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| | | | <p><i>"A minimum patch size is often required to fulfill all required life requisites (Robbins et al. 1989, Askins 1994, Vance et al. 2003, Butcher et al. 2010). When available suitable habitat is below a minimum patch size threshold, individual birds may get displaced despite the continued presence of suitable habitat. As a result, patch size at the individual and population level may have a species-specific effect on habitat use and could affect reproductive success, health, and survival (Askins 1994, Villard et al. 1999, Vance et al. 2003, Suorsa et al. 2004, Butcher et al. 2010)."</i> (Page 9-357, EIS)</p> <p><i>"Edge effects include the influence of recently cleared areas on adjacent intact habitats. Gradients of light intensity, temperature, wind, relative humidity, as well as snow accumulation and melt may occur along the border between cleared areas and intact habitats (Bannerman 1998, Kremsater and Bunnell 1999), which could alter habitat suitability for avian use. Bannerman (1998) suggested that the richness and density of generalist bird species may increase along forest edges based on the variety of vegetation and abundance of food (e.g., American Crow and Blue Jay. However, numbers of habitat specialist species (e.g., Red-breasted Nuthatch and Pileated Woodpecker may decrease near edges because they use edge habitats less frequently or avoid them (George and Dobkin 2002). The potential influx of individuals into edge habitats, or the potential displacement of individuals into other areas, may increase crowding and subsequent inter-and intra-specific competition for breeding habitat, food, and other resources (Hagan et al. 1996, Schmiegelow et al. 1997, Bannerman 1998, George and Dobkin 2002, Calizza et al. 2017)."</i> (Page 9-357, EIS)</p> <p>The above descriptions summarize the potential effects of the Project on breeding bird habitats. When wooded landscapes are subjected to widespread seismic activity, the same effects occur: continuous parcels of forest are divided by miles of cut lines, resulting in smaller habitat patches and greater habitat edge. As a result, bird species that prefer contiguous habitats are declining, while birds that prefer habitat edges are increasing.</p> <p>How will the EIS address already existing direct and indirect impacts of these historic seismic linear disturbances across the LSA and RSA (Appendix 9B) that were ignored.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>(Section 9.2); Ungulates, Furbearers and Woodland Caribou (Section 9.3); Raptors, Migratory Breeding Birds, and Bird Species at Risk (Section 9.4). The cutlines were classified as previously disturbed and considered as low-quality habitat or no habitat, depending on the species being assessed and their habitat requirements. An anthropogenic layer is included on draft EIS, Figure 9.2-6, which includes geophysical cutlines. Please note that anthropogenic features were mapped at IKONOS 1:5,000. This anthropogenic layer is not listed under available habitat types for any of the wildlife or avian VCs in subsequent assessments (e.g., Figures 9.3-9 to 9.3-14, Figures 9.4-8 to 9.4-11, Figures 9.4-13 to 9.4-15) except for Common Nighthawk (Figure 9.4-12), which is a species that is known to use anthropogenic features.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 413. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 414 | YNLRO (March 4, 2023) | Section 9.0 Terrestrial Environment | <p>YNLR Comment March 4, 2023 Comment #78, Appendix A: Why were amphibians excluded as a VC/KI? Bats? Both were surveyed (Appendix 9B).</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Subsequent to filing the draft EIS, Denison has developed a new Species at Risk appendix to Section 9 which will be included in the final EIS and has been included in the response to YNLR (a new SAR appendix (new Appendix 9-D) will be added to Section 9 of the final EIS. It has been included here as Attachment IR-131). This new EIS appendix lists all SAR species potentially occurring in the Project study areas, with links to applicable and appropriate mitigation measures described in the draft EIS. The new appendix also includes a summary of the life history requirements, the expected Project effects, proposed mitigation measures, and anticipated residual effects on bats and amphibians.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 414. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively</p> |

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| | | | | develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR. |
| 415 | YNLRO (March 4, 2023) | Section 9.0 Terrestrial Environment, p. 9-474 | <p>YNLR Comment March 4, 2023 Comment #79, Appendix A: Project monitoring programs specific to Raptors, Migratory Breeding Bird, and Bird Species at Risk VCs are critical, particularly the ongoing repeated surveys throughout the life of the Project, especially given the weak predictive basis for the effects assessments of the Project on breeding bird species.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) The framework for avian-related monitoring programs are available in Section 9.4.8 of the draft EIS. This includes a discussion of the anticipated adaptive management process. As described in the draft EIS, a wildlife monitoring plan will be developed to support permitting and licensing and implemented as the Project proceeds. The wildlife monitoring plan will provide details on the monitoring and follow-up programs outlined in Section 9.4.8 of the draft EIS.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 415. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 416 | YNLRO (March 4, 2023) | Section 11.0 Land and Resource Use | <p>YNLR Comment March 4, 2023 Comment #80, Appendix A: YNLR would like to emphasize that natural resource use by Indigenous Peoples of northern Saskatchewan is of incalculable value, and the Project must not infringe upon the ability of Indigenous Peoples to exercise those constitutionally protected rights.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Denison acknowledges the comment. We believe that the work we have done to date with the YNLR, such as entering into an Exploration Agreement in respect of Denison's exploration activities, demonstrates our strong understanding of this YNLR emphasis.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 416. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |

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| 417 | YNLRO (March 4, 2023) | Section 11.0 Land and Resource Use, p. 11-50, 11-57, 11-58, 11-79, 11-138 and 11-139 | <p>YNLR Comment March 4, 2023</p> <p>Comment #84, 87, 88 and 89, Appendix A: The EIS notes that “The presence of the Project workforce will increase the numbers of people in the ILRU LSA by an estimated 300 during Construction and 180 during Operation and Decommissioning.” (p. 11-57)</p> <p>YNLR notes that:</p> <ul style="list-style-type: none"> - This is a significant increase in the number and persistence of humans in the area, and despite these vague reassurances, YNLR believes that this increase will affect the ability of Indigenous Peoples to exercise their Aboriginal and Treaty rights and increase the pressures on the natural resources of the area. - YNLR believes that Denison provides an overly optimistic conclusion regarding the impacts of the Project on traditional resource use by Indigenous peoples. - One indicator of increased human activity is truck traffic. However, these numbers do not include non-truck traffic. How will Denison address this? <p>As with the impacts on the traditional use of land and natural resources by Aboriginal and Treaty rights holders, the human presence in the region is going to increase, which in turn will put additional pressures on fish and wildlife resources.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023)</p> <p>No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024)</p> <p>YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023)</p> <p>Section 12.3.3.2.1 of the EIS describes how access north of the Key Lake gatehouse for employees of northern mines, Indigenous resource harvesters from select communities, cabin owners, and lease owners provides for controlled access to users. Further, Denison staff will not be allowed to hunt or fish. Denison expects to continue to work with Indigenous COI to share information about the proposed impacts of the Project in relation to the potential to adversely impact the exercise of hunting, fishing, trapping and the carrying out of traditional uses as a result of the Project. Information in this respect will be provided as an update to the EIS. Further mitigations identified in Section 12 include:</p> <ul style="list-style-type: none"> • Air transportation will be used to transport most workers between the Project site and designated pick-up and drop-off points in communities. Pick-up points will be located at two locally central points in communities within the LSA, one additional site in northern Saskatchewan, and potentially other locations to minimize time spent away from families. • Denison's Environment, Health, Safety, and Sustainability Policy will be enforced. • Liaison with LSA communities and relevant authorities (e.g., RCMP, health and service providers) will continue. • Culturally sensitive employment policies that support the Indigenous workforce will be implemented (e.g., having an Elder representative at the Project site to provide cultural programming) <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024)</p> <p>No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024)</p> <p>There have been no further comments from the YNLR on EIS reference no. 417. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 418 | YNLRO (March 4, 2023) | Appendix 16-A Summary of Residual Effects, p. 1 | <p>YNLR Comment March 4, 2023</p> <p>Comment #90, Appendix A: There are about three dozen Valued Component/Key Indicators that are assessed for the significance of residual effects (effects that remain after mitigation) from the Project. They include sediment quality, benthic invertebrates, fish and fish habitat, fish health, terrain, soil, organic matter, vegetation abundance, listed plant species, wetlands, ungulates (moose), furbearers (wolverine, pine marten, mink, muskrat), woodland caribou, raptors (bald eagle, osprey), migratory breeding birds (water birds and waterfowl, upland game birds, migratory songbirds), avian species at risk (5), human health and safety, Indigenous land and resource use, other land and resource use, heritage resources, traditional diet, community well-being (income and cohesion), traffic, infrastructure & services, and economics.</p> <p><u>The residual effects of the Project on all of these VCs/Kis are concluded to be non-significant in the EIS.</u></p> <p>YNLR questions this overly optimistic and statistically unlikely prediction. For example, the sheer number of fish and wildlife species that the few selected VC/Kis represent would suggest that some will be adversely affected, even if by chance alone. The assessment effectively states that the Project is advantageous and/or neutral to all biophysical and human values, which YNLR rejects. If the Project proceeds, YNLR will want to be closely associated with all project monitoring programs.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023)</p> <p>No further response provided by YNLR.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023)</p> <p>The draft EIS carefully evaluated the residual adverse effects remaining on VCs and KIs following implementation of mitigation measures. The EIS conservatively identifies where change from existing conditions are expected for each VC or KI, and assesses this change (i.e., the residual effect) for significance. For instance, the wildlife and avian assessments concluded that the residual effects of the Project are not expected to result in a change to the viability and persistence of the VCs and associated KIs and were, therefore, predicted to be not significant. As the review comment correctly notes residual effects identified in the EIS were deemed to be not significant - that is, the level of effect (change) did not meet the threshold of significance as defined for the VC. The EIS also discusses the certainty (and uncertainty) of the conclusions drawn by the assessment. Each VC or KI is evaluated independently and based on specific Project-environment interactions and VC-specific mitigations. Denison is confident that the conclusions drawn in the EIS with respect to potential effects and their significance are supported by the analysis presented.</p> <p>Details of follow-up and monitoring plans will be prepared in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies. YNLR will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: programs will meet regulatory requirements, programs will confirm the effectiveness of mitigation measures and predictions made in the assessment, programs will be implemented in an adaptive management framework (if/where applicable) to reduce effects during the lifetime of the Project, and programs will have spatial boundaries that are sufficiently extensive to measure EIS predictions.</p> |

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| | | | <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 418. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 419 | YNLRO (March 4, 2023) | Appendix 16-A Summary of Cumulative Effects | <p>YNLR Comment March 4, 2023 Comment #91, Appendix A: There are about three dozen Valued Component/Key Indicators that are assessed for the significance of cumulative effects (effects that remain after mitigation) from the Project. These include air quality, noise, terrain morphology and stability, groundwater quantity and quality, surface water quality and quantity, soil quantity and quality, organic matter, sediment quality, benthic invertebrates, fish and fish habitat, fish health, vegetation abundance, listed plant species, wetlands, moose, furbearers, woodland caribou, raptors, migratory breeding birds, avian species at risk, human health, Indigenous land and resource use, other land and resource use, heritage resources, traditional diet, income of workers, community cohesion, traffic, community infrastructure and services, and economics.</p> <p>As with the summary of the residual effects, <u>the cumulative effects of the Project on all of these VCs/Kis are concluded to be non-significant in the EIS.</u></p> <p>Again, YNLR believes this to be an overly optimistic and statistically unlikely prediction for the same reasons as given above, for example, inadequate spatial boundaries, poorly chosen and grouped VCs and Kis, the apparent omission of the existing linear disturbance network in the effects assessments, and the largely qualitative nature of the assessments and their resultant 'significance.'</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Please refer to the response to YNLR comments #418. Additionally, Denison notes that there are a number of review comments that have a similar theme. Rather than repeating the same narrative in this table Denison has developed an inclusive technical memo to provide a more coherent and complete response, the Wheeler River Project Environmental Impact Statement - Denison's Response to Woodland Caribou Habitat Comments. See attached.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 419. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 420 | YNLRO (March 4, 2023) | Executive Summary Monitoring and Follow- Up Programs | <p>YNLR Comment March 4, 2023 Comment #92, Appendix A: YNLR believes there is a lot of uncertainty remaining from this EIS. This stems from several items, including the relatively novel nature of the ISR methodology with its potential effects on water quality and fish health, to the questionable conclusion that the mine will be neutral with respect to the persistence of woodland caribou in the region.</p> <p>If the mine is to be approved, YNLR wants a transparent, independent, statistically robust monitoring program implemented for the life of the Project and beyond. YNLR expects northern Indigenous Peoples to be involved in the design and implementation of such a program.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.'</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Details of follow-up and monitoring plans will be prepared in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies. YNLR will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: programs will meet regulatory requirements, programs will confirm the effectiveness of mitigation measures and predictions made in the assessment, programs will be implemented in an adaptive management framework (if/where applicable) to reduce effects during the lifetime of the Project, and programs will have spatial boundaries are sufficiently extensive to measure EIS predictions. Additionally, Denison has identified key objectives respecting Indigenous engagement associated with the Project:</p> <ul style="list-style-type: none"> • Build and maintain authentic relationships based on a foundation of trust, good faith, and transparency. • Create a respectful dialogue process that promotes communication and collaboration among Denison and Indigenous communities, in a timely and accurate fashion. • Understand how the proposed development of the Project may affect the interests of Indigenous peoples (including Indigenous and/or Treaty Rights), and work with Indigenous |

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| | | | YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed. | <p>peoples to avoid, mitigate, or otherwise address effects, while also collaborating to maximize potential positive effects.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 420. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 421 | YNLRO (March 4, 2023) | General | <p>YNLR Comment March 4, 2023 Comment #1, Appendix B: There is inconsistent use of YNLRO and YNLR throughout several sections of the EIS. Specifically, YNLRO in section 3, YNLR in sections 4 and 11. As they are used to represent the same thing, only one format should be used.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Editorial issue with inconsistent abbreviations for Ya'thi Néné Land and Resource Office will be corrected in the final EIS and 'YNLR' will be used.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 421. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 422 | YNLRO (March 4, 2023) | Section 1.0 Project Introduction and Overview, p. 1-5 Section 3.0 Value of IK in EA Practice, p. 3-1 and 3-2 | <p>YNLR Comment March 4, 2023 Comment # 2 and 6, Appendix B: EIS Page 1-1, second paragraph, first sentence states: "<i>The Project falls within the boundaries of Treaty 10, the Nuhtsiye-kwi Benéne (Ancestral Lands) of English River First Nation, the traditional territory of the Kineepik Métis Local #9, the homeland of the Métis, and the Nuhenéné.</i>"</p> <p>YNLR notes that this is a misuse of Nuhenéné as the name of the people. This should be "<i>Nuhenéné, the traditional territory of the Athabasca Denesųliné</i>".</p> <p>In reference to section 3.1 of the EIS (p. 3-1 to 3-2), YNLR also notes that the Wheeler River Project falls within Nuhenéné and Athabasca Denesųliné perspectives and knowledge should have been sought throughout all stages of the Environmental Assessment (EA). Early inclusion in this project would have been beneficial to both the Athabasca Denesųline communities and to Denison through increased sharing of knowledge.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) At first instance of 'Nuhenéné' Denison will recognize: 'Nuhenéné, the traditional territory of the Athabasca Denesųliné.'</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 422. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |

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| 423 | YNLRO (March 4, 2023) | Section 1.0 Project Introduction and Overview, p. 1-5 and 4-12 | <p>YNLR Comment March 4, 2023 Comment #3, Appendix B: There YNLR notes that the Hatchet Lake Denesų́łíné First Nation, an Athabasca Denesų́łíné community, is the closest to the Project. The Wheeler River EIS seems to rely on road distance rather than physical proximity.</p> <p>Road distance should not be utilized to determine community importance or impacts since not all travel methods require continuous roads. Travel to this part of our traditional territory is typically achieved cross country rather than by road.</p> <p>Comment #13, Appendix B: YNLR notes that Hatchet Lake First Nation is located 150 km...Black Lake First Nation is located 180 km...and Fond du Lac First Nation is located 230 km away from the Project as recognised on page 4-47 of the draft EIS. Our community members generally access the Project area via overland routes rather than the established Provincial Road network.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Thank you for the information.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 423. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 424 | YNLRO (March 4, 2023) | Section 1.0 Project Introduction and Overview, p. 1-4 and 1-7 | <p>YNLR Comment March 4, 2023 Comment #4 and 5, Appendix B: Athabasca Denesų́łíné land uses include, but are not limited to, large and small game harvesting, gathering activities, and fishing, all of which are of key cultural importance.</p> <p>It is important to note that the Hatchet Lake Denesų́łíné First Nation and the community of Wollaston Post are situated at Wollaston Lake and given their downstream location there is potential for negative impacts.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Potential effects from the Project on surface water quality were comprehensively assessed in Section 8.2 of the draft EIS. The assessment evaluated discharge of treated effluent from the site using predictive modeling. Water treatment will be conducted in the onsite Industrial Waste Water Treatment Plant (IWWTP) and treated effluent will be tested prior to release to Whitefish Lake. Treated effluent that does not meet the effluent discharge criteria in the provincial approval to operate or effluent criteria defined in the Metal and Diamond Mining Effluent Regulations will not be released to Whitefish Lake and will be recirculated to the process water pond for eventual re-treatment in the IWWTP. In the draft EIS, Section 8.2 the predictive modeling showed that constituent concentrations including radionuclides would be below water quality objectives for the protection of aquatic life (i.e., no effects would be expected) at the outlet of Whitefish Lake. The outlet of Whitefish Lake is well upstream of the inflow of Iceland River to Russell Lake. Since no effects on surface water quality are expected to occur in the lake closest to the Project, no effects would accrue in areas further downstream in the watershed, where contributing sub watersheds are many, many-times the size of the sub watersheds near the Project site. As such, there will be no effects on surface water quality in Wollaston Lake from the Project activities.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 424. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |

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| 425 | YNLRO (March 4, 2023) | Section 3.0 Value of IK in EA Practice, p. 3-5 | <p>YNLR Comment March 4, 2023 Comment #7, Appendix B: YNLR notes that while the wording for EIS Page 3-5, first paragraph, is an improvement from the May 2021 draft, it does not make clear that no Wheeler River site specific Athabasca Denesųtine knowledge or land use studies were undertaken and that the information presented is from a variety of other projects with differing objectives and study areas. The issue is better captured/described in the EIS on page 11-39.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Acknowledged, updated language will be included in the EIS.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 425. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 426 | YNLRO (March 4, 2023) | Section 3.0 Value of IK in EA Practice, p. 3-10 | <p>YNLR Comment March 4, 2023 Comment #8, Appendix B: YNLR notes that there appears to be grammatical errors for page 3-10, last paragraph of the EIS.</p> <p>YNLR requests edits to: "Ya'thi Néné Lands and Resources, the point of contact for and representative of the Athabasca Denesųtine communities of Black Lake, Fond du Lac, and Hatchet Lake Denesųtine First Nations, as well as the northern hamlets/settlements of Stony Rapids, Wollaston Lake, Uranium City, and CamsellPortage, provided their report: <u>An Exploration of Recorded Athabasca Denesųtine Traditional Knowledge, Land Use and Occupancy Information in the Vicinity of Denison Mines Wheeler River Project</u>, that summarized traditional knowledge and land use and occupancy information collected for various other projects and initiatives and partially documented Athabasca Denesųtine use in the Project area, although it is not considered as a site-specific study."</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Acknowledged, edit will be made to the EIS.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 426. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 427 | YNLRO (March 4, 2023) | Section 3.0 Value of IK in EA Practice, various pages | <p>YNLR Comment March 4, 2023 Comment #9, 10, 12, 15, 16, 17, 19 and 35, Appendix B: YNLR notes that as the Athabasca Denesųtine were not considered to be an Indigenous COI, the opportunities to contribute to our knowledge to this discussion were diminished or lost.</p> <p>Comment #19, Appendix B: The mis-categorization as the Athabasca Denesųtine am Indigenous Community rather than as an Indigenous COI is a step backwards rather than forwards with regards to reconciliation. A letter to Denison dated July 29, 2022, YNLR critiqued the designations of COI and IC as being artificial and marginalizing. Denison responded October 28, 2022, after the submission of Wheeler River EIS with an alternative view.</p> <p>Other related comments include:</p> <ul style="list-style-type: none"> - Comment #9, Appendix B: Only 4 of 31 aspects influenced (from EIS Table 3.5-1) for Indigenous knowledge and 3 of 37 aspects influenced (from EIS Table 3.5-2) for local knowledge were taken from Athabasca Denesųtine knowledge sources. How will Denison address this? - Comment #10, Appendix B: YNLR notes that the Athabasca Denesųtine communities should be considered an Indigenous COI per Denison's definition (EIS page 4-vii) as they are/have: o signatories of Treaty 10 and Athabasca Denesųtine traditional territory is within the Project | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Denison's approach to identifying Indigenous COIs considered several factors as identified in Section 4.3.1 of the EIS. Being signatories of Treaty 10 was among, but not the sole applicable criteria, and not all Treaty 10 communities are considered as Indigenous COIs for the Project. Through continued and focussed engagement with the YNLR since the YNLR identified its interest in the Project in 2019, Denison has come to better understand the Athabasca Denesųtine communities' relationship to the Project site and current use of the areas for traditional purposes. Denison acknowledges that the Hatchet Lake Denesųtine First Nation has the potential for established Indigenous and Treaty Rights proximal to the Project. The Hatchet Lake Denesųtine First Nation, as represented by the YNLR will be identified as an Indigenous COI in the revised draft EIS.</p> <p>With respect to Denison's consideration of Indigenous Knowledge shared by the Athabasca Denesųtine knowledge sources, Denison notes that Tables 3.5-1 will be updated to better reflect where the YNLR's An Exploration of Recorded Athabasca Denesųtine Traditional Knowledge, Land Use and Occupancy Information in the Vicinity of the Denison Mines Wheeler River Project, which was included as an Appendix to the EIS, was considered and included as Table 3.5-1 does not reflect all instances the report was utilized. With respect to Table 3.5-2, only a limited number of data sources were considered and labelled as Local Knowledge - which</p> |

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| | | | <p>area (Hatchet Lake First Nation is a signatory to Treaty 10 as recognised on page 4-47 of the draft EIS)</p> <ul style="list-style-type: none"> o established Treaty rights in proximity to the Project o more likely to experience impacts, for example, water drainage as indicated on page 1-7 of the EIS ultimately flows into Wollaston Lake where the Athabasca Denesųline community of Hatchet Lake is located <p>- Comment #12 and 16, Appendix B: YNLR notes that the Project is located within Nuhenéné (the Athabasca Denesųliné traditional territory) as recognised on page 4-61 of the draft EIS. Further, Hatchet Lake First Nation is a signatory to Treaty 10, while Black Lake First Nation and Fond du Lac First Nation are signatories to Treaty 8, and as such all have Treaty Rights within the Project area and that ; that our communities are in proximity to the Project and have demonstrated traditional activity</p> <p>- Comment #15, Appendix B: YNLR notes that the Athabasca Denesųline has relationships with other projects such as McArthur River and Key Lake as indicated in ROC-78, page 504, Combined Appendices for the Wheeler River Project Draft EIS.</p> <p>- Comment #17, Appendix B: Given these EIS defined criteria, YNLR has difficulty understanding why the Athabasca Denesųliné have been excluded from Indigenous COI status for this project. Exclusion of COI status means loss of opportunity for the communities to be part of greater engagement throughout all stages of the Project. Lost opportunities are considerable and include loss of participation at all phases of the Project and include influence regarding the boundaries of the study areas, possibilities for increased discussions regarding environmental and health concerns, mitigation procedures, and planned remediation, potential to participate in monitoring and research projects and future opportunities such as employment.</p> <p>- Comment # 35, Appendix B: YNLR notes that the engagement database demonstrates that their opportunities to contribute were limited. For example, of the approximately 101 pages of Engagement Database tables that are dispersed through several sections of the appendices for the EIS (2022), there are 6 entries credited to the Athabasca Denesųliné. Given an average of 3 to 5 entries per page in the tables, this means that only 1-2% of the contributions were made by the Athabasca Denesųliné. These limited opportunities may well be the result of the exclusion of Athabasca Denesųline from the COI category.</p> <p>[Additional questions on this topic directed to regulators or government entities are included in the CNSC table]</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>is representative of information collected outside of a community-led IK process, key person interviews, or engagement events. As such, there may be limited examples in which knowledge shared constituted local knowledge, and may have been considered as either IK or engagement outcomes.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 427. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 428 | YNLRO (March 4, 2023) | Section 4.0 Engagement, p. 4-14, 4-61 | <p>YNLR Comment March 4, 2023 Comment #20 and 22, Appendix B: YNLR note that project is within Nuhenéné. There is no need to state the southern edge. It could be argued that the Project is on the northern edge of other Indigenous groups areas. Such descriptions have been applied inconsistently to the groups. Territories should be described in an unbiased manner.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Noted, EIS will be updated accordingly.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 428. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November</p> |

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| | | | | 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR. |
| 429 | YNLRO (March 4, 2023) | Section 4.0 Engagement, p. 4-61 | <p>YNLR Comment March 4, 2023 Comment #23, Appendix B: YNLR notes that the EIS text on page 4-61 should recognise that this report was a compilation of existing YNLR data from a variety of projects with differing objectives and study areas, and that no research was commissioned.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Noted, EIS will be updated accordingly.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 429. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 430 | YNLRO (March 4, 2023) | Section 4 Engagement, p. 4-65 | <p>YNLR Comment March 4, 2023 Comment #24, Appendix B: YNLR believes that the EIS section on page 4-65 referring to the letter sent by Denison dated October 28, 2022 rather than in early October as stated in the draft EIS. Given the draft EIS was submitted to the CNSC on October 24, 2022, four days before Denison responded to YNLR concerns, further opportunity to provide clarifications or specific details for inclusion in the EIS were lost.</p> <p>YNLR does not agree that all our concerns have been addressed in the EIS.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Denison understands the EIS involves an iterative process and Denison will continue to engage with YNLR at their direction.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 430. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 431 | YNLRO (March 4, 2023) | Section 11 Land and Resource Use, p. 11-8 | <p>YNLR Comment March 4, 2023 Comment #26, Appendix B: YNLR notes that the Athabasca Denesytine had limited opportunity to contribute to VCs. One community virtual meeting was presented to the Athabasca Denesytine, while there appears to have been approximately 12 events for other First Nation communities (combined) including workshops, school presentations, meetings (in person and virtual) and open houses (draft EIS pp 4-16 to 4-86). While YNLR appreciate the opportunity to participate and recognize the impacts of Covid-19, the difference between Athabasca Denesytine participation and other groups is stark.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) In March 2019, Denison was notified by the YNLR that the Indigenous communities within the local Athabasca communities identified were interested in the Project and that YNLR held the Duty to Consult from these communities. Since receiving correspondence from the YNLR office in 2019 Denison has been collaboratively working with the YNLR office in a mutually agreed upon manner and will continue to do so. Denison understands the EIS involves an iterative process and Denison will continue to engage with YNLR at their direction.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> |

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| | | | <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 431. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 432 | YNLRO (March 4, 2023) | Section 11 Land and Resource Use, p. 11-14 | <p>YNLR Comment March 4, 2023 Comment #27, Appendix B: YNLR notes that the Athabasca Denesųtlné have demonstrated land use in both the local and regional land use as per our report (YNLR 2022). YNLR has reported 371 Athabasca Denesųtline Traditional Land Use and Occupancy data entries within the Denison regional study area. These include 18 points for harvesting of big game, such as barren ground caribou, moose, and woodland caribou, 29 overnight sites, 21 points where birds or eggs such as duck and spruce grouse were harvested. Other activities include furbearer harvesting, fishing, including commercial and tourism related activities such as guiding. A map of these activities is reiterated here.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Thank you, noted.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 432. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 433 | YNLRO (March 4, 2023) | Section 11 Land and Resource Use, p. 11-18, 11-40, 11-41, 11-94 and 11-95 | <p>YNLR Comment March 4, 2023 Comment #28, 31 and 32, and 34 Appendix B: YNLR notes that Denison's understanding of the nature of the 2022 YNLR Report is incomplete. As YNLR noted many times, this report is an amalgamation of known information contained within YNLR's database. It comes from a variety of projects each with differing objectives and geographic scope. It is not a Wheeler River-specific Athabasca Denesųtlné Knowledge, Land Use, and Occupancy (ADKLUO) Study. This, in our opinion, leads to misunderstandings and misrepresentations within the draft EIS.</p> <p>Additional clarifications are that our report is not a Wheeler River-specific TLU study, nor were any such specific works undertaken or commissioned. This is important because it sets the tone for comparisons with other Indigenous groups who have met with Denison far more frequently and conducted far more intensive and focused works. Additionally, the limited engagement with did not allow for a shared Athabasca Denesųtline – Denison in- depth exploration of Athabasca Denesųtlné experiences.</p> <p>Using the YNLR Report requires an understanding that the amalgamated information comes from a variety of projects and was collected for a variety of purposes. For example, the report mentions woodland caribou values, tracks, and sightings within the EIS study area. This information comes from various caribou studies and our database records project information. This information clearly demonstrates that Athabasca Denesųtline members were in the EIS area, that harvesting or other values were not recorded is a function of the purpose of the woodland caribou study rather than an indication that Athabasca Denesųtline do not utilize the area for other traditional purposes. Other such interpretations or misrepresentations exist within the report. Additional engagement with the Athabasca Denesųtlné communities and YNLR could have ensured further clarification.</p> <p>Information from the 2022 YNLR Report Section 3.3 appears to have been disregarded in the draft EIS. This information includes references to activities mentioned during duty-to- consult works for other projects with the LSA. This includes hunting, fishing (including commercial) and the gathering of berries and medicines. The responses also indicate that the land is used for</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Section 11.1.2.4 of the EIS will be updated to reflect the fact that the YNLR's report is an amalgamation of known information from YNLR's database and was not collected explicitly for the purposes of the Project, and as such, should be interpreted by the reader with caution. Section 3.3 of the YNLR's report notes that the comments shared are not geo-located. Without having the locations disclosed, information may have been excluded from Section 11.0 as there was no way to confirm whether those activities overlapped with the spatial boundaries under consideration for potential effects to Indigenous Land and Resources Use.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 433. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |

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| | | | <p>therapeutic purposes, youth gatherings, fish camps and general camping. Further the responses note that areas were utilized year-round for hunting, trapping, and fishing, with activities such as berry picking occurring in summer. Impact concerns raised by the interviewees in included damage to the lands and water, how wildlife will be affected, disruption to traditional activities and accessibility to the areas while projects are ongoing. Surely, this information is relevant to the Wheeler River project and should be included with the EIS?</p> <p>YNLR also indicated to Denison in July 2022 that some of the publicly available information is the draft EIS was misleading and of limited relevance to this project.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | |
| 434 | YNLRO (March 4, 2023) | Section 11 Land and Resource Use, p. 11-37 | <p>YNLR Comment March 4, 2023 Comment #29, Appendix B: YNLR notes that the Map of BQ Caribou Range in draft EIS Section 11.1.3.3.26 is misdated, it should be BQCMB 2012. The original source map is dated 2000, but includes telemetry data from 2012 so is more appropriately dated as 2012.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Noted, the map included in Section 11.1.3.2.6 (Figure 11.1-5) will be updated to reflect the appropriate date.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 434. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 435 | YNLRO (March 4, 2023) | Section 11 Land and Resource Use, p. 11-40 | <p>YNLR Comment March 4, 2023 Comment #30, Appendix B: YNLR notes, as they did previously, that they are unclear what the relevance of including these sources is, since neither the CBEMP nor the Tazi Twé project investigated land use in the Wheeler River area. The March 2022 YNLR compilation report provides clear indications that the Athabasca Denesųline communities 150tilize the areas in the vicinity of the Project.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Noted, Denison provided publicly available information on the Community Based Environmental Monitoring Program and the socio-economic baseline assessment for the Tazi Twé Hydroelectric Project EIS to provide context on recorded harvests in locations close to communities and distant from the Project. Section 11.1.3 further provides context from the YNLR 2022 report and their recorded land use in the vicinity of the Project.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 435. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |

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| 436 | YNLRO (March 4, 2023) | Section 11 Land and Resource Use, p. 11-40 | <p>YNLR Comment March 4, 2023 Comment #31, Appendix B: YNLR notes that the citations on the EIS page 11-40 are listed as YNLR 2020 and should likely be 2022.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Noted, the EIS will be updated.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 436. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 437 | YNLRO (March 4, 2023) | Section 11 Land and Resource Use | <p>YNLR Comment March 4, 2023 Comment # 33, Appendix B: Pages 11-94 and 11-95 of the EIS uses the term <i>historic</i>. YNLR notes that the use of the term historic is prejudicial and incorrect.</p> <p>YNLR were assured by Denison that they had removed the term historic during earlier discussions.</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Denison has verified that the term 'historic' is not included or referenced on pages 11-94 or 11-95 of the EIS.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 437. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |
| 438 | YNLRO (March 4, 2023) | Section 11 Land and Resource Use | <p>YNLR Comment March 4, 2023 Comment #36, Appendix B, EIS Page 11-100 third- and fourth-lines states "The YNLR described trapping activity by one of its Athabasca Denesųtiné member at Keefe Lake to the east of the RSA but did not report any trapping in N-14 (YNLR 2022)." YNLR notes that the reference to trapping in N-14 is perplexing as the Saskatchewan Trappers Association map shows that N-14 is south of the Project area. Further there is a typo: "not" instead of "nor"</p> <p>YNLR Comment March 13, 2024 (Response to Denison Comment November 22, 2023) No further response provided by YNLR.</p> <p>YNLR Comment June 19, 2024 (Response to Denison Comment on April 05, 2024) YNLR Response: YNLR does not know what Denison means by the phrase 'deemed complete.' YNLR's responses in their letters of 02 February 2024 and 13 March 2024 remain unchanged and YNLR's concerns in those responses remains unaddressed.</p> | <p>Denison Response November 22, 2023 (Response to YNLR Comment March 4, 2023) Denison will revise the EIS to correct the typo.</p> <p>Denison Response April 05, 2024 (Response to YNLR Comment March 13, 2024) No further response from YNLR. Denison will proceed on the basis that the comment is deemed acceptable and complete by YNLR, unless otherwise advised.</p> <p>Denison Response June 28, 2024 (Response to YNLR Comment June 19, 2024) There have been no further comments from the YNLR on EIS reference no. 438. As such, Denison assumes that its responses provided November 2023 are satisfactory and are therefore deemed complete. YNLR responded indicating that the YNLR's comments in letter dated February 02, 2024 and March 13, 2024 remain unchanged and unaddressed. Denison has provided a comprehensive response to each of YNLR's comments in kind and has sought to address YNLR's concerns. Denison has stated its commitment to work with the YNLR and to collaboratively develop monitoring plans. Denison remains committed to engaging with the YNLR on these concerns. As the YNLR has provided no further comments to Denison's responses November 2023, Denison is unclear on how to address the comments in a way that is satisfactory for the YNLR.</p> |

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| 439 | Métis Nation of Saskatchewan (MN-S) (March 4, 2023) | Executive Summary, Section 2 Project Overview EIS, Section 4.3.4.1 Engagement with Indigenous Organizations | <p>Issue #ES-001: To date, Denison's engagement approach has not been collaborative. Denison has not engaged all potentially impacted Métis communities. Denison has focused engagement efforts on Métis communities in NR3.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to engage all potentially impacted Métis communities. Specifically, to see Denison equally engage NR1 Locals and NR3 Locals in addition to Kineepik Metis Local #9 throughout the life of the Project. Denison needs to include MN-S, NR1 Locals, and NR3 Locals under Indigenous Communities of Interest - Denison needs to engage MN-S, NR1 Locals, and NR3 Locals on Project information, Project-related employment, procurement, and cultural opportunities, engagement expectations (e.g., involvement of youth and Elders), and approach for gathering and incorporating Métis Knowledge into Project reports, plans, and processes. | <p>Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. For the purposes of the organization of the EIS, such organizations as the MN-S and YNLR are understood as organizations.</p> <p>Denison has updated the revised draft EIS executive summary to acknowledge that the Project falls within the MN-S Homeland, including the unique situation that the MN-S have in the area.</p> <p>A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study.</p> |
| 440 | MN-S (March 4, 2023) | Executive Summary, Section 3 Project Setting Executive Summary, Section 3.4.3 Proposed Schedule and Activities Executive Summary, Section 4 General EIS, Glossary | <p>Issue #ES-002: Denison does not acknowledge that the Project falls within the MN-S Homeland.</p> <p>Issue #ES-013: MN-S is listed under Indigenous Organizations instead of Indigenous Communities of Interest.</p> <p>Issue #ES-012, ES-005 and 4-001: Per Denison's definition, MN-S, NR1 Locals, and NR3 Locals should be considered an Indigenous Community of Interest. Denison notes site visits as the only engagement-associated activities in each Project Phase. Additional involvement opportunities should be provided to MN-S throughout the life of the Project</p> <p>Further, MNS refers to CNSC correspondence (Appendix A) indicating that consultation and engagement was expected to be with NR1 Locals, NR2 Locals, NR3 Locals, and MN-S. Given NR2's involvement in NexGen and Fission, MN-S limited its engagement and consultation expectations to NR1 Locals, NR3 Locals, and itself.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to engage all potentially impacted Métis, including: MN-S, NR1 Locals, and NR3 Locals, in addition to Kineepik Metis Local #9, as an Indigenous Community of Interest throughout the life of the Project. - Denison needs to revise their Indigenous Community of Interest definition in the Final EIS to reflect the uniqueness of Métis governance structures. Specifically, a definition that recognizes Métis Locals proximate to the Project, MN-S, and MN-S regional leadership. - Denison needs to engage MN-S, NR1 Locals, and NR3 Locals, to understand their preferred level of involvement throughout the life of the Project. - Denison needs to acknowledge MN-S, NR1 Locals, and NR3 Locals as an Indigenous Community of Interest in the Final EIS. - Denison needs to revise the Final EIS Executive Summary to note that the Project falls within the Homeland of MN-S, NR1 Locals, and NR3 Locals. Denison needs to apply this change throughout the EIS, where applicable. - Denison to acknowledge that lease review data is not an appropriate way to determine Métis traditional resource use in and around the Project in the Final EIS. <p>[Additional questions on this topic directed to regulators or government entities are included in the CNSC table]</p> | <p>Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. For the purposes of the organization of the EIS, such organizations as the MN-S and YNLR are understood as organizations.</p> <p>Denison has updated the revised draft EIS executive summary to acknowledge that the Project falls within the MN-S Homeland, including the unique situation that the MN-S have in the area.</p> <p>A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study.</p> |
| 441 | MN-S (March 4, 2023) | Executive Summary, Section 3.4.2.4 Waste Management | <p>Issue #ES-004: Denison's EIS does not outline where hazardous waste will be taken for proper recycling or disposal.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to share where hazardous waste will be taken for proper recycling and disposal with MN-S, NR1 Locals, and NR3 Locals | <p>Waste management is described in Section 2.2.4 of the Draft EIS and includes discussion of all waste types that will be generated by Project-related activities. The following is noted in Section 2.2.4 for reference, "Conventional waste, radiologically contaminated waste, and hazardous waste will be managed at the Project. Denison is committed to conducting stringent waste characterization throughout the life of the Project. This includes physical, radiological, and chemical characterization to maintain accurate waste inventories and determine how wastes will be dispositioned through either re-use, recycling, temporary storage, or permanent disposal (on or off site). This includes clearance of material that meets unconditional release requirements and can be safely removed from site.</p> <p>A waste management program will be developed for the Project to support licensing and permitting. The waste management program and associated plans developed to support licensing will be based on the 4 R's: Reduce, Reuse, Recycle, and Recover, and will detail how each type of waste generated on site will be managed. Resources used to develop the waste management program will include, but are not limited to, the CNSC's REGDOC-2.11 series, related Canadian Standards Association (CSA) standards, and the Hazardous Substances and</p> |

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| | | | | <p>Waste Dangerous Goods Regulations (Government of Saskatchewan 2000)."</p> <p>Hazardous waste management in particular discussed in Section 2.2.4.4. of the Draft EIS where the following is noted, "Denison identified a need to have a small (250 m2) pad designated for temporary storage of hazardous waste such as paints, solvents, hydrocarbons, and used oil. The temporary storage pad will have a composite liner system (Figure 2.2 24). Hazardous wastes will be taken off site by waste management service providers for proper recycling as soon as practical."</p> <p>As referenced in the Draft EIS, the specific details related to hazardous waste management will be documented as part of the overall, waste management program that will be developed as the Project advances from the environmental assessment process into licensing and permitting. Hazardous wastes will be managed consistent with regulatory requirements, using licensed third-party waste management/haulage providers and licensed waste management facilities. Denison will inform the MN-S and relevant locals when such documentation has been prepared through engagement mechanisms in place at that time.</p> |
| 442 | MN-S (March 4, 2023) | Executive Summary, Section 3.4.8 Indigenous Knowledge | <p>Issue #ES-003 and ES-007: Denison did not engage MN-S on potential Project-related effects to Métis traditional use activities (such as but not limited to: hunting, trapping, and fishing) and therefore may not be aware of potential traditional use activities conducted by Métis peoples in and around the Project. Denison's reliance on reviewing traditional resource user leases is not an appropriate way to determine Métis traditional resource use in and around the Project.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to incorporate Métis Knowledge from the Métis Knowledge Study (MKS) into their discipline-specific effects assessment, the Final EIS, and all monitoring plans for the Project, where applicable. - Denison needs to engage MN-S, NR1 Locals, and NR3 Locals to determine the appropriate funding, process, and timeline to conduct the MKS. | <p>Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. For the purposes of the organization of the EIS, such organizations as the MN-S and YNLR are understood as organizations.</p> <p>Denison has updated the revised draft EIS executive summary to acknowledge that the Project falls within the MN-S Homeland, including the unique situation that the MN-S have in the area.</p> <p>A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study.</p> |
| 443 | MN-S (March 4, 2023) | Executive Summary, Section 4.1 Introduction | <p>Issue #ES-009: MN-S has not had an opportunity to review Denison's engagement plan.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to share all engagement plans and reports of interest to MN-S, NR1 Locals, and NR3 Locals for review and comment. | <p>Since being advised by the MN-S in October 2019 that a number of Métis Locals had delegated to the MN-S the Duty to Consult for the Project, Denison has been engaged in extensive ongoing discussions with the MN-S with the goal of reaching agreement regarding the EA process and MN-S' participation in it. Denison continues to engage with the MN-S, inclusive of engagement in NR1 and NR3, at their direction and there is no formal engagement plan, as such Denison does not feel there is a need for MN-S review as continued engagement is informed by and at the direction of the MN-S in an ongoing manner.</p> <p>For example, In recognition of the MN-S potential interests in the Project, Denison and MN-S have negotiated a capacity funding agreement. This agreement outlines a mutually agreeable framework and applicable funding arrangements to facilitate the MN-S' participation and engagement in the EA process for the Project.</p> <p>The parties have specifically agreed to a process between each other that will be funded by Denison and undertaken on behalf of the MN-S in connection with the EA of the Project: a Métis Knowledge Study, meetings to focus on VCs and preliminary effects, and regular meetings and associated costs for hosting such meetings.</p> |
| 444 | MN-S (March 4, 2023) | Executive Summary, Section 4.1 Introduction Executive Summary, Section 4.2 Engagement Approach EIS, Section 2.2.1 Mining EIS, Section 4.3.1 Engagement with Identified Indigenous Communities and | <p>Issue #ES-008 and ES-010: Denison has not engaged all potentially impacted Métis communities.</p> <p>Issue #4-006: Métis communities in NR1 and NR3 meet multiple evaluation criteria identified by Denison. Denison's engagement to date has not included Métis communities in NR1. Denison's explanation related to the selection of Indigenous groups to be engaged on the Project is unsatisfactory.</p> <p>Issue #4-007: The Project is located within Métis NR1 in Saskatchewan. However, several key Métis communities with whom Denison is engaging are located in Métis NR3. Denison's explanation related to the selection of Indigenous groups to be engaged on the Project is unsatisfactory. The MN-S website states that "consultations must be with the Métis government structures that are elected and supported by the Métis people." (MN-S n.d.c.). Denison has not engaged with Métis communities outside of NR3.</p> | <p>Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. For the purposes of the organization of the EIS, such organizations as the MN-S and YNLR are understood as organizations.</p> <p>Denison has updated the revised draft EIS executive summary to acknowledge that the Project falls within the MN-S Homeland, including the unique situation that the MN-S have in the area.</p> <p>A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October</p> |

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| | | Organizations, and Supporting Criteria EIS, Section 4.3.2.1.3 Key Engagement Activities EIS, Section 4.3.4 Engagement with Indigenous Organizations | <p>Issue #ES-011: Denison's engagement to date has largely been with Métis communities in NR3. Particularly, the Kineepik Metis Local #9 community. There are only two entries related to engagement with Métis communities (with exclusion to Kineepik Metis Local #9) in Appendix 2A: Section 2 – Engagement Database Summary Table – Project Description.</p> <p>Kineepik Metis Local #9. This record demonstrates little engagement was conducted with Métis communities in NR1 and NR3.</p> <p>Issue #2-001 and 4-008: Denison has not had meetings to introduce the Project, share information on Project alternatives and options, VCs, the ISR ming method and proposed freezing method, or any other topics of interest to the MN-S and Métis communities in NR1. These communities also did not receive a VC survey to identify VCs of importance to Citizens and/or other interests and concerns related to the Project.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to engage all potentially impacted Métis communities. Specifically, to equally engage all NR1 and NR3 communities, in addition to Kineepik Metis Local #9 throughout the life of the Project. Denison needs to include MN-S, NR1 Locals, and NR3 Locals under Indigenous Communities of Interest. - To facilitate a collaborative approach to engagement, Denison needs to engage MN-S, NR1 Locals, and NR3 Locals on Project information, Project-related employment/procurement/cultural opportunities, engagement expectations (e.g., involvement of youth and Elders), and approach for gathering and incorporating Métis Knowledge into Project reports, plans, and processes. | 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study. |
| 445 | MN-S (March 4, 2023) | Executive Summary, Section 5 General | <p>Issue #ES-014: Denison did not engage MN-S on potential Project-related effects to Métis traditional use activities such as (but not limited to): hunting, trapping, and fishing. No Métis Knowledge was used to inform the Project's spatial boundaries.</p> <p>Issues #ES-015 to ES-24: Denison has not engaged MN-S to understand Métis knowledge to inform the development of the Project's environmental monitoring and management plans (e.g., Caribou Management Plan). This applies to monitoring air emissions, noise monitoring, geology, groundwater quantity and quality, surface water quality, sediment quality, fish and fish habitat and human health. Information to be gathered during the Métis Knowledge Study will contribute to the development of these plans.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to incorporate Métis Knowledge from the MKS into their discipline- specific effects assessment, the Final EIS, and all monitoring and management plans for the Project, where applicable. - Denison needs to engage MN-S to determine the appropriate funding, process, and timeline to conduct the MKS. - MN-S would like the opportunity to review applicable Project management documents that provide information that is relative to the potential impacts of the Project on traditional land use activities, these include, but are not limited to the following: Preliminary Decommissioning Plan, Status of the Environment reports, Environmental Effects Monitoring reports, annual reports, updated environmental risk assessments and the Final Decommissioning. - Denison needs to provide plain language summaries, posters/handouts, and presentations on monitoring and effects management plans and programs to MN-S, NR1 Locals, and NR3 Locals. Denison needs to share all engagement plans and reports of interest to MN-S, NR1 Locals, and NR3 Locals for review and comment. - Denison needs to engage MN-S, NR1 Locals, and NR3 Locals to better understand how they would like to be informed of monitoring results (e.g., 1-page plain language summaries, annual monitoring report, community meetings etc.). | <p>Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. For the purposes of the organization of the EIS, such organizations as the MN-S and YNLR are understood as organizations.</p> <p>A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study.</p> <p>Section 12.2.4.2.1 describes that multiple pick-up points for workers will be determined as part of Project design, including additional locations to be determined relative to eligible labour force supply.</p> <p>As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> |
| 446 | MN-S (March 4, 2023) | Executive Summary, Section 5.4.2 Surface Water Quality | <p>Issue #ES-20: The draft EIS does not clarify the influence of groundwater temperature on Whitefish Lake.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to confirm the influence of groundwater temperature on Whitefish Lake in the Final EIS. | There is no expectation of influence of groundwater temperature on Whitefish Lake during any phase of the Project. Groundwater would be expected to enter (discharge) to Whitefish Lake at its typical ambient temperature. |

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| 447 | MN-S (March 4, 2023) | Section 2.2.1.3.2 Freeze Wall Timeline | Issue #2-002: The removal of the freeze wall may cause increased migration of constituents that could cause environmental release to the receiving environment unintentionally. Recommendations: Denison needs to clarify the following with MN-S, NR1 Locals, and NR3 Locals: a) the freezing effects on the Upper and Lower barrier zones post mining, and b) if the freeze thaw process could cause increased fracturing potential within these zones. | A separate technical memo including information related to freeze wall integrity and the basis for design of the freeze wall, which relies on site field data and lived experience from several exiting Saskatchewan mining operations, is provided as Attachment IR-10 . |
| 448 | MN-S (March 4, 2023) | Section 2.3.4 Post-decommissioning | Issue #2-002: Denison does not acknowledge MN-S, NR1, or NR3 involvement in the design and implementation of the post-decommissioning monitoring program. Recommendations: Denison needs to engage MN-S, NR1 Locals, and NR3 Locals in the design and implementation of decommissioning planning and all subsequent monitoring programs for the Project. This will allow Métis to share their interests in the long-term state of the land and incorporate Métis knowledge. It will also create opportunities for Métis youth and Elders to participate in monitoring programs. | Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. For the purposes of the organization of the EIS, such organizations as the MN-S and YNLR are understood as organizations. A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study. Section 12.2.4.2.1 describes that multiple pick-up points for workers will be determined as part of Project design, including additional locations to be determined relative to eligible labour force supply. As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions. |
| 449 | MN-S (March 4, 2023) | Section 2.3.5 Ancillary Projects | Issue #2-004: Denison's EIS suggests SaskPower's work related to the extension of an existing 138 kV line will be independent from work led by Denison. Recommendations: - Denison needs to clarify whether the additional 138 kV line was factored into the cumulative effects evaluation. - Denison needs to clarify whether the proposed Project can proceed without the 138 kV line construction. - Denison needs to clarify the timing of the construction of the line and Wheeler River Project construction. - Denison needs to confirm that SaskPower will engage with MN-S, NR1 Locals, and NR3 Locals on line routing and design. - Denison needs to confirm if/when the 138 kV line will be decommissioned. | The Wheeler River Project includes a power line as an ancillary component. Denison evaluated the impact of the electrical infrastructure as part of the overall mine project. In the cumulative assessment, both the mine and its ancillary components were considered together, and cumulatively with other reasonably foreseeable projects. SaskPower will build, own, and operate the transmission line, and is responsible for separate permitting and engagement for their part of the project. SaskPower is also responsible for scheduling construction and decommissioning of the line and related communication. |
| 450 | MN-S (March 4, 2023) | Section 2.7 Project Benefits | Issue #2-005: Denison notes some jobs will require a Grade 12 education in addition to in-house training programs, but does not offer to support Métis peoples obtain Grade 12 education to access available positions. Recommendations: - MN-S would like confirmation on what kind of education and training support Denison will make available to maximize employment from Communities of Interest. - Denison needs to support Métis training opportunities through Northlands College. - MN-S would like additional details on which roles will need Grade 12, and how many roles are available for people without Grade 12. | Denison, through a Human Resource Development Plan, will initially prioritize Indigenous and non-Indigenous communities in the LSA in terms of employment and training opportunities (anticipated to be in institutions in northern Saskatchewan) and will work with the leadership of these communities to assist in determining hiring and training practices during all phases of the Project, which could include such items as on-the-job training and career counselling to help with advancement from foundational positions, advance sharing of job qualification requirements, clearly identifying training requirements and working with various training institutions (such as Northlands College) to make sure such appropriate training is available, and creation of scholarship and support programs. Priority for employment and training will then focus on Indigenous and non-Indigenous residents of the RSA and then beyond the RSA. All positions at the Project will require a Grade 12 education or equivalent. Section 13.3.2.1 |

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| | | | | <p>describes how foundational positions (i.e. entry level) require Grade 12 education and in-house training programs, although a combination of skills and experience may be considered. These positions would include process plant operators, site services, drillers, and catering/janitorial staff.</p> <p>Denison will update the Economics Section to reflect the latest census and the effects that Covid has had on employment in the LSA and RSA.</p> <p>Further, Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS.</p> |
| 451 | MN-S (March 4, 2023) | Section 2.7 Project Benefits | <p>Issue #2-006 and 2-007: Denison does not specify the goods and services during Construction, Operation, and Decommissioning. MN-S is interested in sharing potential goods and services opportunities for Métis peoples (e.g., chefs and artisans). Denison has not specified how it is transmitting knowledge nor provided an explanation of the procurement approach.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide specific information on the goods and services opportunity available to Métis as per labour force and business analysis. - Denison needs to clarify how it has made MN-S, NR1, and NR3 Locals aware of the procurement approach and opportunities, and how it will keep them informed through the life of the Project. | <p>Denison will establish a procurement approach throughout all phases of the Project, prioritizing the procurement of goods and services for the Project toward businesses based within the LSA communities prior to looking elsewhere in northern Saskatchewan, southern Saskatchewan, and/or outside of Saskatchewan. This procurement approach may consider advance sharing of purchasing requirements of goods and services throughout all phases of the Project, efforts to increase the capacity and capabilities of businesses to increase successful bidding outcomes, and the development of a business registry.</p> |
| 452 | MN-S (March 4, 2023) | Section 2.9.1.3.1 Environmental Protection Program | <p>Issue #2-008 and 2-009: The Draft EIS does not include a draft Environmental Protection Plan (EPP) or a summary of how the EPP will be developed. The Métis Knowledge Study is yet to be completed and these plans should not be completed without considering the Métis Knowledge Study. Draft monitoring plans were not available for review to confirm how Denison plans to inform plans with existing local and traditional knowledge.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide an Environmental Protection Plan with the Final EIS. - Denison needs to involve MN-S, NR1 Locals, and NR3 Locals in the development and implementation of the Environmental Protection Program so that Métis can ensure their interests and Métis Knowledge are included. Additionally involvement in the development of monitoring plans and review of MN-S knowledge usage and how it informed the plan should also be undertaken. - Denison needs to share all engagement plans and reports of interest to MN-S, NR1 Locals, and NR3 Locals for input, review and comment. - Denison needs to include an implementation and reporting plan with the monitoring plans. | <p>With respect to Part i) of the comment the following is noted. The MN-S review comments accurately indicates that a draft Environmental Protection Plan was not included in the EIS submission; rather, Section 2.9.1.3.1 of the draft EIS provides the commitment to develop an Environmental Protection Program (EPP) and associated plans. The EPP would be established to provide an overarching framework for key environmental monitoring and management plans and to ensure a means to demonstrate compliance with applicable environmental regulatory requirements and other performance targets. The EPP would be developed in a manner that aligns with the ISO 14001 EMS Standard. As noted on the draft EIS, Denison has opted to execute the overall Project approvals process - that is, the environmental assessment and licensing / permitting processes - in series and not simultaneously. As such, the documentation referenced in the MN-S review comment will be developed during the licensing / permitting phase and will be available for review at that time rather than as part of the final EIS. The level of information provided in the draft EIS is appropriate for the stage at which the overall Project approvals process currently sits, and as noted, MN-S, and others, will have an opportunity to review documentation that is developed at later stages of the overall approvals process as appropriate.</p> <p>With respect to Parts ii), iii) and iv) of the comment the following is noted. Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. For the purposes of the organization of the EIS, such organizations as the MN-S and YNLRO are understood as organizations. A study agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. The Métis Knowledge Study was received by Denison on October 24, 2023, and Denison has integrated relevant information from the Study into the EIS accordingly.. It is important to note that Denison has incorporated Métis land use information and perspectives into the draft EIS, through the funding of the Kineepik Métis Land and Occupancy information along with the KML VEC statement, of which relevant information has been incorporated directly into the draft EIS to determine effects to the human environment. Additionally, and as noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other stakeholders, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: programs will meet regulatory requirements, programs will confirm the effectiveness of mitigation measures and predictions made in the assessment, programs will be implemented in an adaptive</p> |

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| | | | | management framework (if/where applicable) to reduce effects during the lifetime of the Project, and programs will have spatial boundaries that are sufficiently extensive to measure EIS predictions. |
| 453 | MN-S (March 4, 2023) | Section 2.9.1.3.5 Emergency Preparedness and Response Program | Issue #2-010: No Emergency Preparedness and Response Program was available for review. Recommendations: - Denison needs to include an Emergency Preparedness and Response Program in the Final EIS for review. - Denison to include information on transportation accidents within the Emergency Preparedness and Response Program. | <p>With respect to Part i) of the comment the following is noted. The MN-S review comments accurately indicates that a draft Emergency Preparedness and Response Program was not included in the EIS submission; rather, Section 2.9.1.3.5 of the draft EIS provides the commitment to develop an Emergency Preparedness and Response Program (EPRP). The EPRP would be established to identify how the Project will prepare for and addresses emergencies that may affect the health and safety of persons, the environment, and the protection of property. The EPRP would be developed in a manner that aligns with guidance provided by CNSC in REGDOC-2.10.1. As noted on the draft EIS, Denison has opted to execute the overall Project approvals process - that is, the environmental assessment and licensing / permitting processes - in series and not simultaneously. As such, the documentation referenced in the MN-S review comment will be developed during the licensing / permitting phase and will be available for review at that time rather than as part of the final EIS. The level of information provided in the draft EIS is appropriate for the stage at which the overall Project approvals process currently sits, and as noted, MN-S, and others, will have an opportunity to review documentation that is developed at later stages of the overall approvals process as appropriate.</p> <p>With respect to Part ii) of the comment the following is noted. The EPRP will include information relevant to transportation accidents and responses thereof. Further, information regarding aspects of emergency response with respect to transportation accidents was provided in the draft EIS and direction to that information is highlighted as follows for reference. Postulated traffic accident scenarios were considered in the Accidents and Malfunctions Technical Supporting Document (TSD; Appendix 14-A) as summarized in Section 14 of the draft EIS. As mitigation for such scenarios the accidents and malfunctions assessment highlighted commitments to develop the EPRP and several plan and procedure level documents (e.g., spill response plan; an emergency response plan; a traffic and transportation plan; a travel management plan; personnel training procedures). Additionally, Section 12.3 of the draft EIS discusses mitigation measures that will be implemented to reduce adverse traffic effects, as well as mitigation measures to be implemented to reduce adverse effects on emergency services capacity such as:</p> <ul style="list-style-type: none"> • All drivers serving the Project will receive appropriate training related to the nature of materials being transported, including driver training to the highest standards based on the transportation of nuclear substances. • Vehicles transporting dangerous goods and/or hazardous products will display required placards and labels in accordance with provincial legislation and will follow designated highway corridors. • All materials transported by truck will be compliant with any weight restrictions or permits, spring road restrictions, or geometric constraints set out by the Saskatchewan MOHI. • Denison will maintain Project roads and the main access road to the site. First aid facilities will be supplied during construction. • A primary care paramedic will be contracted to provide care on site through all phases of the Project. Denison will provide the appropriate amount of First Aid and CPR training to make sure employees have adequate coverage. • Mandatory safety orientations will be held for contractors and workers. • First aid personnel will provide transport to a hospital by air when required or by Saskatchewan's air ambulances; • Health and safety management programs will be developed for Construction, Operation, and Decommissioning. • Workers will be trained in fuel handling, equipment maintenance, and fire prevention and response measures. • Denison's Environment, Health, Safety, and Sustainability Policy will be enforced. |

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| | | | | <ul style="list-style-type: none"> • Continued liaison with LSA communities and relevant authorities (e.g., RCMP, health and service providers) will be undertaken to provide updates, discuss any Project-related concerns, and make sure that the required resources are in place. • Project-specific contingency, emergency response, and spill prevention plans will be developed to reduce the likelihood and severity of accidents and potential fires. • Based on the outcomes of discussions with COI, Denison may provide support and/or training to local emergency services to make sure that staff are adequately prepared in the unlikely event of an accident, malfunction, or spill on Highways 914 or 165. This may include the provision of specialty materials or equipment to deal with an emergency response. |
| 454 | MN-S (March 4, 2023) | Section 3.4.2.3 Métis Nation – Saskatchewan Section 3.4.8 Lands Taken Up from an Indigenous Perspective | <p>Issue #3-001 and 3-002: The Draft EIS does not yet include Métis Knowledge from NR1 and NR 3 other than Kineepik. The Draft EIS does not include information on how Denison intends to include the outcome of the Métis Knowledge Study.</p> <p>Perspectives on cumulative impacts have only been considered for English River First Nation and Kineepik Metis. This has resulted in an absence of MN-S perspective regarding cumulative impacts within the Project and surrounding areas.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide a clear indication of how the MKS findings were included in the Final EIS (e.g., effects analysis, cumulative effects analysis, mitigation measures, etc.) including confirming use with MN-S. - The Assessment should not be considered complete until the Métis Knowledge Study is finished and factored in. | Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. For the purposes of the organization of the EIS, such organizations as the MN-S and YNLRO are understood as organizations. A study agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. The Métis Knowledge Study was received by Denison on October 24, 2023, and Denison has integrated relevant information from the Study into the EIS accordingly. It is important to note that Denison has incorporated Métis land use information and perspectives into the draft EIS, through the funding of the Kineepik Métis Land and Occupancy information along with the KML VEC statement, of which relevant information has been incorporated directly into the draft EIS to determine effects to the human environment. |
| 455 | MN-S (March 4, 2023) | Section 3.4.6 Addressing Divergence Between Indigenous Knowledge and Western Scientific Knowledge Systems | <p>Issue #3-003: Details are not provided regarding how these programs and plans will be developed and implemented, or how they will integrate the needs of all the Indigenous and Métis communities.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to clarify whether discrepancies will only be addressed by follow-up and monitoring. - Denison needs to involve MN-S, NR1 and NR3 in determining other means for examining divergences and informing follow-up and monitoring (e.g., collaborative field studies). | <p>As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> <p>As the Project site will be self-sufficient in terms of meeting the needs of the Project and its workforce, the effects related to local communities are associated with the effects of participation in employment and the associated commuter rotation system. With the application of mitigation measures described in Section 12.3.5, and given the distance between communities in the LSA and the Project site, the residual adverse effects are expected to be low in magnitude. The overall conclusion relative to changes to Infrastructure and Services is not significant.</p> |
| 456 | MN-S (March 4, 2023) | Section 4.1.2 Denison's Indigenous Peoples Policy and Investment and Sustainability Philosophy | <p>Issue #4-002: The EIS notes that "In 2021, Denison announced the adoption of an Indigenous Peoples Policy (IPP). The IPP reflects Denison's recognition of the important role of Canadian business in the process of reconciliation with Indigenous peoples in Canada and outlines Denison's commitment to take action towards advancing reconciliation. The IPP was developed based on Denison's experiences with, as well as feedback and guidance received from, Indigenous communities with whom Denison is actively engaged. This approach was designed to make sure the IPP appropriately captures a mutual vision for reconciliation. The IPP identifies five key areas of action that will support the ongoing development of a continuously evolving Reconciliation Action Plan (RAP): Engagement; Empowerment; Environment; Employment; and Education. Through the RAP, Denison is striving to interweave the principles of reconciliation throughout all areas of the company's operations (Denison 2021a)."</p> <p>Denison does not explain how it will accomplish free, prior, and informed consent (FPIC) as per the IPP and RAP [2].</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to clarify how it intends to consider free, prior, and informed consent (FPIC). <p>[2] Engagement – We are committed to building long-term and mutually respectful relationships through proactive engagement and consultation with Indigenous people. Our aim is to work to achieve the free, prior, and informed consent, where the potential for impacts to rights may occur, before proceeding with economic development projects and during ongoing activities and operations</p> | Denison's IPP is a principles based policy and addresses its vision for reconcile-action in all of Denison's activities. How the policy will be executed will vary on a project to project and community to community basis. The process includes a continually evolving Reconciliation Action Plan, that Denison will seek periodic input on from its Indigenous partners to ensure that it remains relevant to in the ongoing evolving landscape of reconciliation. |

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| 457 | MN-S (March 4, 2023) | Section 4.2 Engagement Approach Section 4.3.1 Engagement with Identified Indigenous Communities and Organizations, and Supporting Criteria | Issue #4-003 and 4-005: MN-S is listed under Indigenous Organizations instead of Indigenous Communities of Interest. Not all potentially impacted Métis communities are listed in this figure. Métis communities listed under Indigenous Communities of Interest include Kineepik Metis Local #9, Sipishik Metis Local #37, Patuanak Metis Local #82. Métis communities listed under Other Indigenous Communities include Dore/Sled Lake Métis Local #67 and A La Baie Métis Local #21. These Métis communities are all within NR3. Only NR3 communities are listed in Figure 4.3-2: Unidentified Indigenous Communities and Organizations in Relation to the Project. Recommendations: - Denison needs to revise its understanding of Métis, Métis governance and the differences between MN-S and Métis Locals. - Denison needs to include MN-S, NR1 Locals, and NR3 Locals as Communities of Interest, or explain why they limited their selection of Métis communities in their listing. | Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. For the purposes of the organization of the EIS, such organizations as the MN-S and YNLR are understood as organizations. A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study. Section 12.2.4.2.1 describes that multiple pick-up points for workers will be determined as part of Project design, including additional locations to be determined relative to eligible labour force supply. As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions. |
| 458 | MN-S (March 4, 2023) | Section 4.2 Engagement Approach | Issue #4-003: MN-S appreciates Denison's willingness to evolve engagement activities in response to feedback from MN-S over time. Recommendations: - Denison to continue engaging and involving MN-S, NR1 Locals, and NR3 Locals during the revisions of the Draft EIS and completion of outstanding plans. | Noted, throughout the engagement, Denison has consistently affirmed its interest in MN-S participation and the incorporation of Métis knowledge into the EIS, in addition to the information and input that has already been gathered with KML. |
| 459 | MN-S (March 4, 2023) | Section 4.3.2.3 Engagement with Sipishik Métis Local #37 | Issue #4-009: Denison is taking engagement direction from MN-S to not lump public engagement efforts with Métis engagement is appreciated. Recommendations: - Denison needs to engage Beauval/Sipishik Métis Local #37 throughout the life of the Project. | Noted, Denison will continue to engage with MN-S, including Beauval/Sipishik Métis Local #37, at their direction for the life for relevant stages of the Project. |
| 460 | MN-S (March 4, 2023) | Section 4.3.2.3.4 Key Issues and Concerns | Issue #4-010: The safety of all Métis peoples that will be engaged or employed by the Project is of utmost importance. Racism towards Métis peoples will not be tolerated. Denison's policies need to support a safe work culture for all. Recommendations: - Denison needs to share all policies related to creating a safe workplace with MN-S, NR1 Locals, and NR3 Locals for review and comment (e.g., health and safety policies and the Workplace Violence & Harassment Policy). - Denison needs to create a culturally safe workplace for Métis peoples. - Denison needs to clarify its policies to prevent incidents of workplace violence and harassment and identify clear actions to address potential incidents of workplace violence and harassment. - Denison needs to mandate cultural awareness training for all employees to help with one the Project's established principles: "approaching sustainability and engagement activities with the utmost respect for Indigenous communities, Indigenous Rights, and Indigenous Knowledge". | Denison has an established Workplace Violence and Harassment Policy and an Indigenous Peoples Policy, both of which are publicly available on Denison's website. These two policies create the conditions for an inclusive and diverse work environment and a safe work culture for all. Policies will be adapted to the conditions of the Project and Denison welcomes specific feedback on Métis interests and concerns. Further, Section 12.2.5 Mitigation Measures for Community Well-being describes the establishment of health and wellness programming on-site, an Employee and Family Assistance Program (EFAP), a no alcohol and drug policy on Project site, the enforcement of Denison's Environment, Health, Safety, and Sustainability Policy, the implementation of culturally sensitive employment policies to support the Indigenous workforce (for example, having an Elder representative at the Project site to provide cultural programming), among others. |

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| 461 | MN-S (March 4, 2023) | Section 4.3.2.4.3 Key Issues and Concerns | <p>Issue #4-011: Denison created “Key Issues and Concerns” tables in their EIS to document responses to issues and concerns identified by Indigenous Groups.</p> <p>Denison marked issues and concerns that they believe have been addressed as “Complete” in “Key Issues and Concerns” tables throughout the Draft EIS. Directing MN-S and Métis Locals to chapters within the EIS is not a sufficient response to an issue or concern identified by MN-S and Métis peoples. One- way information sharing is not an effective means for addressing or mitigating issues and concerns identified by MN-S and Métis people. Responses to issues regarding effects should discuss the presence or absence of effects, rather than responding that effects were studied.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to respond to issues and concerns identified through engagement during meetings with and communications to MN-S, MN-S, NR1 Locals, and NR3 Locals. - Denison needs to implement a collaborative engagement approach that allows MN-S, NR1 Locals, and NR3 Locals to provide feedback and inform Project decision-making, plans, and outcomes versus one-way information sharing engagement approach. | <p>Since being advised by the MN-S in October 2019 that a number of Métis Locals had delegated to the MN-S the Duty to Consult for the Project, Denison has been engaged in extensive ongoing discussions with the MN-S with the goal of reaching agreement regarding the EA process and MN-S’ participation in it. Denison continues to engage with the MN-S, inclusive of engagement in NR1 and NR3, at their direction and there is no formal engagement plan, as such Denison does not feel there is a need for MN-S review as continued engagement is informed by and at the direction of the MN-S in an ongoing manner.</p> <p>For example, in recognition of the MN-S potential interests in the Project, Denison and MN-S have negotiated a capacity funding agreement. This agreement outlines a mutually agreeable framework and applicable funding arrangements to facilitate the MN-S’ participation and engagement in the EA process for the Project.</p> <p>The parties have specifically agreed to a process between each other that will be funded by Denison and undertaken on behalf of the MN-S in connection with the EA of the Project: a Métis Knowledge Study, meetings to focus on VCs and preliminary effects, and regular meetings and associated costs for hosting such meetings.</p> |
| 462 | MN-S (March 4, 2023) | Section 4.3.4.1.2 Agreements Relative to the Environmental Assessment Process | <p>Issue #4-014: Denison’s Draft EIS notes that Denison and MN-S were in the process of developing a capacity funding agreement. Since the Draft EIS was published, Denison and MN-S reached an agreement.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to revise the Final EIS to note that a capacity funding agreement was reached with MN-S. | The EIS will be updated to reflect the capacity funding agreement reached with the MN-S. |
| 463 | MN-S (March 4, 2023) | Section 5.3.1 Valued Components Selection | <p>Issue #5-001: Métis input to VC selection was limited to NR3 communities.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to confirm the selected valued components with Métis Locals in NR1 and NR3 and revise the Final EIS as required to reflect their input. | <p>At the direction of the MN-S, Denison participated in meetings on February 12, 2023 with NR1 and on February 13, 2023 with NR3. The participants at these sessions were identified and invited by the MN-S. During these meetings, Denison shared information about the Project and the associated VCs assessed as part of the environmental assessment. No new VCs were identified as part of that discussion, and should new ones emerge through process, we would consider them at that time.</p> <p>A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study.</p> |
| 464 | MN-S (March 4, 2023) | Section 5.4 Influence of Indigenous Knowledge, Local Knowledge, and Engagement | <p>Issue #5-002: The use of “complimentary and influential” does not reflect current best practices that acknowledge Indigenous Knowledge as an equal but different way of knowing (than western science). This terminology implies that Indigenous Knowledge can be absorbed into a scientific approach.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to confirm use of the wording “complimentary and influential” and how the use of Indigenous Knowledge is treated as equal to western science in the Final EIS. - Denison needs to confirm if it intends the use of “complimentary” or “complementary”. Best practices will differ depending on intention. | <p>Section 5.1 of the EIS explains that the project is assessment under the Canadian Environmental Assessment Act, 2012, along with the Saskatchewan Environmental Assessment Act. As such, the Canadian Environmental Assessment Agency’s reference guidance (CEAA 2015) on considering Aboriginal traditional knowledge for EAs under the Canadian Environmental Assessment Act 2012 is considered as relevant guidance. Further to this (see Section 3.3.1 of the EIS) Denison has committed to working with Indigenous communities in a spirit of mutual respect and cooperation. Denison’s Indigenous Peoples Policy reflects the company’s belief that reconciliation is advanced through collaboration with Indigenous peoples and communities to build long-lasting, respectful, trusting, and mutually beneficial relationships. Section 3.2.2 of the EIS notes that access to Indigenous Knowledge is a privilege and must be respected. Prior to sharing and collecting IK, local protocols and procedures developed by the Indigenous COIs for the management of IK were requested and applied. For some communities, this meant Indigenous Knowledge was shared with Denison and its consultants for use in the EIS with measures in place to protect the privacy of the IK, and in others communities consented to reports being shared and appended to the EIS itself. Denison will continue to work with the Indigenous COIs to ensure this information is shared and protected in manner consistent with community protocols.</p> <p>Noted, the use of ‘complimentary’ and ‘complementary’ will be revisited throughout the EIS.</p> |

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| 465 | MN-S (March 4, 2023) | Section 5.6.1 Potential Interactions Between the Project and Valued Components/Key Indicators | <p>Issue #5-003: Interactions with the Human Environment Valued Components should be consistent with interaction table in related technical VC assessment sections. Comments have been made for revision to some of the interaction table in related VCs.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to update Table 5.6-2 be to be consistent with revised interaction tables for related VCs. | Acknowledged. Table 5.6-2, Summary Interaction Matrix for Valued Components in the Human Environment, will be cross-checked against the VC interactions tables related to the biophysical environment and updated for consistency in the final EIS, and in consideration of the comments provided by the reviewer on the individual biophysical environment VC interaction tables as noted. |
| 466 | MN-S (March 4, 2023) | Section 5.3 Scope of the Assessment | <p>Issue #5-004: It's best practice in environmental assessments to acknowledge limitations on data and analysis used for the assessment. This identifies constraints imposed on the assessment due to limitations in data or analysis that can influence or limit the ability to predict potential effects of the Project. This may be provided as a "technical boundary" or in some other transparent way as a part of the assessment reporting.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide details in the Final EIS on data and analysis limitations. | Data and analysis limitations are described within the relevant VCs existing environment, where applicable. As an example, See Section 12.2.3 Existing Environment for Community Well-Being which describes the limitations of Statistics Canada Census of Population Data, the limitations of Statistics Canada incident-based crime statistics, limitations associated to key person interviews, and others. |
| 467 | MN-S (March 4, 2023) | Section 5.8 Residual Effects Evaluation | <p>Issue #5-005: Details should be provided on what level of residual effects are carried forward for residual effects evaluation. This would help provide a consistent method for bringing measurable effects for a full residual effect assessment. This ensures that measurable (even minor) are not overlooked in residual effects characterization and consideration of significance. From review of the Draft EIS, there are instances where effects that remain after the implementation of all mitigation measures and management plans are characterized as minor and not carried forward for evaluation.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide details on the development and choice of thresholds used to describe residual effects including how LK and IK were considered in threshold development. - Denison needs to provide further explanation as to why minor effects will have no or negligible effects and should not be considered further. | <p>Section 5 of the draft EIS provides an overview of the assessment methodology, including how residual effects were characterized (i.e., those effects that were measurable after consideration of proposed mitigation. Each technical section of the draft EIS where effects are considered (draft EIS Sections 6 through 13) uses this assessment framework in consideration of the specific VCs / KIs that have been defined to represent that environmental component. Effects thresholds that define the presence / or absence of a residual effect have been described for each VC / KI. In some cases the thresholds are narrative in nature and in some cases, where available, numeric thresholds are used. The former tended to be based on SME knowledge and experience in like assessments and situations and in the latter the thresholds tended to be derived from published environmental quality objectives and guidelines. As an example, the manner by which residual effects were characterized for the Fish and Fish Habitat VC is given. Section 8.3.6.1 of the draft EIS provides the definition for a residual effect as follows, "A residual adverse effect on the Fish and Fish Habitat VC is defined as a measurable change in the concentrations of a surface water quality parameter(s) that exceed relevant water quality assessment benchmarks that represent concentrations that are protective of aquatic biota and water uses in watercourse and waterbodies that receive mine-affected drainage." In this example a numeric threshold is used (i.e., a relevant water quality assessment benchmark) and rationale is provided for its use (i.e., represent concentrations that are protective of aquatic biota and water uses in watercourse and waterbodies that receive mine-affected drainage). The threshold is both transparent and reasonable with the context of the assessment, though it is acknowledged that some level of change in the VC (or more precisely its measurable parameter) is deemed acceptable on condition that the change is not of a magnitude from which negative effects could accrue.</p> <p>Each technical section of the draft EIS where effects are considered (draft EIS Sections 6 through 13) notes how Indigenous Knowledge (IK), Local Knowledge (LK) and Engagement influenced the assessment. Whether generic or specific in nature the information was considered and woven into the assessment where possible. For example, water and the protection of water was generally noted as a key consideration to Indigenous peoples and LK holders. Accordingly, informs the framework of the assessment to ensure that water quality related VCs are included to provide a comprehensive evaluation related to water quality and affirms the need to assess water quality and sediment quality as they inform assessments for benthic invertebrates, fish and fish habitat, human health, and Indigenous land and resource use components.</p> |

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| 468 | MN-S (March 4, 2023) | Section 5.9.1 Cumulative Effects Assessment Process Section 12.1.7 Cumulative Effects | <p>Issue #5-006 and 12-005: Denison acknowledges that cumulative effects are important to Indigenous communities in section 5.9.3 (p. 5-42).</p> <p>For many Indigenous communities and governments, cumulative effects analysis requires an assessment this includes pre-development conditions to understand the impacts of past and existing activities that continue to affect the context for environmental and social systems. Considering the fuller context of historic change during an EA is an evolving best practice and is recognized through numerous Canadian cumulative effects assessment initiatives and management frameworks (e.g., Indigenous Centre for Cumulative Effects) and recent Indigenous led environmental assessment (e.g., Squamish Nation Assessment Process).</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide further detail on what projects and activities were considered in the cumulative effects i.e., table listing projects. - Denison needs to provide further detail on how it considers cumulative effects important to Indigenous communities and whether it includes an evaluation of changes to pre- development conditions as is being done as practice in other environmental assessments. This would allow Indigenous communities to better understand the ongoing impacts of past and existing activities that continue to affect Indigenous cultural use of lands and resources. | <p>With respect to review comment i) the following is noted. Section 5.9.2 of the draft EIS provides an overview of other Projects and activities that were considered present and reasonably foreseeable and could be a source of residual effects that could interact with the Project-specific residual effects. A preliminary list of projects and activities for potential consideration in the VC-specific cumulative effects assessment for the Project was provided in Table 5.9-1 of the draft EIS and their locations were shown relative to the Project site in Figure 5.9-1. Per Section 5.9.2.1 of the draft EIS, the original (or "preliminary") list of Projects and activities was scrutinized relative to various screening criteria to identify those present and reasonably foreseeable Projects and activities that were likely to interact with the Project VC in cumulative manner. It was this subset of Projects and activities that was carried forward into the cumulative effects assessment as described in Section 5.9.2.1.1 of the draft EIS.</p> <p>With respect to comment ii) the following is noted. The Wheeler River Project EIS is subject the Canadian Environmental Assessment Act, 2012. In this assessment framework, the Project-specific cumulative effects assessment (CEA) considers whether residual adverse effects of the Project on a given VC will overlap spatially and/or temporally with residual adverse effects on the VC resulting from other past, present, and reasonably foreseeable projects or activities. The CEA follows standard methodology as per provincial (e.g., Guidelines for an Environmental Assessment [Government of Saskatchewan 2022]) and federal guidance (e.g., Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012 [Government of Canada 2019]). As noted in the IR, Section 5.9.3 of the draft EIS describes how Denison considers the cumulative effects assessment to be important to Indigenous peoples. As noted, the cumulative effects assessment is important to Indigenous communities because incremental effects to the environment can weaken resource economies, affect important resources such as plants, fish, and wildlife, affect rights-based and cultural activities, and affect both the health of wildlife and humans. Denison also noted and acknowledged the important relationship of the Indigenous Communities of Interest to the lands and waters in the Project study areas and sought out information from Indigenous Communities of Interest (ERFN and the Kineepik Métis Local #9 at Pinehouse (KML)) with respect to their Indigenous Knowledge on past, present, and predicted cumulative effects. Denison believes that the cumulative effects assessment does appropriately consider changes to pre- development conditions.</p> <p>References Government of Canada. 2019. Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012. https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/assessing-cumulative-environmental-effects-ceaa2012.html. Government of Saskatchewan. 2022. Guidelines for an Environmental Assessment. https://www.saskatchewan.ca/business/environmental-protection-and-sustainability/environmental-assessment/does-my-project-need-an-environmental-assessment.</p> |
| 469 | MN-S (March 4, 2023) | Section 5.9.2 Identification of Present or Reasonably Foreseeable Projects and Activities | <p>Issue #5-007: Clarity is required that this includes existing ongoing activities that may not be certain but are highly likely to occur such as forestry and mine exploration activity. Denison did not include the new powerline that SaskPower is building in Table 5.9-1: Projects and Activities for Consideration in the Cumulative Effects Assessment for the Valued Components. See Section 2.3.1.9 for more details on the powerline to be constructed by SaskPower.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide further detail on the projects and activities that were considered for cumulative effects and why certain projects and activities were not included. For example, Denison needs to explain how reasonably foreseeable projects and activities that may not be certain but are highly likely in the RSA, such as mining exploration or infrastructure use and maintenance, are not included in Table 5.9-1. | <p>Section 5.9.2 of the draft EIS provides an overview of other Projects and activities that were considered present and reasonably foreseeable and could be a source of residual effects that could interact with the Project-specific residual effects. A preliminary list of projects and activities for potential consideration in the VC-specific cumulative effects assessment for the Project was provided in Table 5.9-1 of the draft EIS and their locations were shown relative to the Project site in Figure 5.9-1. Per Section 5.9.2.1 of the draft EIS, the original (or "preliminary") list of Projects and activities was scrutinized relative to various screening criteria to identify those present and reasonably foreseeable Projects and activities that were likely to interact with the Project VC in cumulative manner. Also show in Section 5.9.2.1 are the criteria by which the Present or Reasonably Foreseeable Projects and Activities were assessed. These criteria are consistent with CEAA's interim technical guidance on a future project (or physical activity) and how it could be considered reasonably foreseeable and areas as follows:</p> <ul style="list-style-type: none"> • The intent to proceed is officially announced by a proponent. • The project or activity is under regulatory review (i.e., the application is in process). • The submission for regulatory review is imminent. • The project or activity is identified in a publicly available development plan that is approved or for which approval is anticipated (e.g., a wastewater treatment plant in a city's long term development plan). • The physical activity supports—or is consistent with—the long-term economic or financial |

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| | | | | <p>assumptions and engineering assumptions made for the project's planning purposes.</p> <ul style="list-style-type: none"> • A physical activity is required in order for the project to proceed (e.g., rail or port transportation facilities, or a transmission line). • The economic feasibility of the project is contingent upon the future development. • The completion of the project would facilitate or enable the future development. <p>Further information with respect to present and reasonably foreseeable projects and activities pertaining to exploration and mining activities, infrastructure use and maintenance, lodges/outfitters and tourist/ recreational activities and Indigenous and other land use activities are described in draft EIS Sections 5.9.2.1.1 through 5.9.2.1.4, respectively. Rationale for not carrying forward projects / activities that were part of initial screening is described in Section 5.9.2.2.</p> <p>The review comments has specifically references the power line development associated with the implementation of the Project. In response the following is offered. While it is true the power line to service the Project will be constructed by Sask Power the power line has been considered a Project activity for the purpose of the effects assessment and has been assessed in that context. With that there is no rationale nor need for assessing it as a separate project / activity within the CEA.</p> |
| 470 | MN-S (March 4, 2023) | Section 7.4.1 Potential Project- Valued Components Interactions | <p>Issue #7-001: There is lack of geotechnical information in the Draft EIS that would expand explanation of Project interactions with geology and groundwater.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - The Final EIS needs to demonstrate Denison's commitment to developing appropriate mitigations to avoid or limit identified adverse effects resulting from the Project, whether direct or indirect. | <p>Denison recognizes that geology and groundwater are of particular importance within the context of the EIS given the proposed mining method and believes that the assessment presented in the EIS and its supporting documentation is comprehensive. Denison is committed to developing / implementing appropriate mitigations to avoid or limit identified adverse effects resulting from the Project, whether direct or indirect. Proposed mitigation measures specific to geology and groundwater and presented in the draft EIS, Section 7.5, Mitigation Measures, and Table 7.5-1 therein provides a summary of mitigation measures based on Project phases for the geology and groundwater VC.</p> |
| 471 | MN-S (March 4, 2023) | Section 7.5 Mitigation Measures | <p>Issue #7-002: There is lack of information, details and modelling related to potential subsidence.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide additional detail in the Final EIS about mitigation measures related to operations affecting subsidence at ground surface including managing for different subsidence areas, different subsidence sizes, and whether subsidence will propagate further ground surface disturbances that will require further and continuous action. - Denison needs to prepare a management and monitoring plan for subsidence. | <p>To clarify with respect to the potential for subsidence, it is noted that the portion of the deposit being mined is never truly a void and what remains after mining will be a honeycomb texture with water-filled interstices. The mined area is filled with a fluid at all times, whether it be a mining solution, groundwater, or the neutralizing solution. This is different from a more traditional underground operation such as Cigar Lake, where there is physical excavation of the orebody, leaving a temporary air-filled space. Although the uranium ore is high-grade by global standards it is not entirely massive in nature. As such, the uranium will be leached in a 'honeycomb' texture leaving behind a structure of partial intact rock mass with the remaining area being filled by fluid. This retains the pressure balance of the mining zone with the adjacent water-saturated rock masses.</p> <p>Although the above provides context on the absence of true, air-filled voids remaining post-mining, the risk of subsidence has been assessed appropriately in the draft EIS and its supporting documents (see draft EIS as Appendix K to Appendix 7-C; see also draft EIS Section 7 Geology Valued Component - Terrain Morphology and Stability Key Indicator and draft EIS Section 9 Terrain Valued Component - Terrain Morphology Key Indicator and Terrain Stability Key Indicator). The analysis presented in the draft EIS shows there is negligible risk of subsidence and the magnitude of subsidence, if it were to occur, is the range of 7.5 cm at surface.</p> <p>Subsequent to the filing of the draft EIS, Denison has undertaken additional modelling with refined, more granular inputs including consideration of subunits within the altered zone. With this more refined analysis, the potential surface subsidence has been reduced from 7.5 cm to 2.4 to 2.8 mm. Further, this potential subsidence, if it were to occur, would be limited to the footprint directly above the deposit. Given the low levels of risk that has been determined, Denison believes the monitoring and contingency plans as envisioned in the draft EIS are commensurate with this low level of risk and appropriate.</p> |

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| 472 | MN-S (March 4, 2023) | Section 8.0 Aquatic Environment | <p>Issue #8-001: Key waterbodies are inconsistently named on the maps/figures throughout section Section 8.0 Aquatic Environment. Key waterbodies include those considered as reference or exposure waterbodies, and any others of importance to NR2 and NR3 Locals.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to revise maps/figures to include labels for key waterbodies referenced in the EIS, particularly for figures included in section 8. - Denison needs to ensure waterbodies are named consistently throughout section 8.0 Aquatic Environment. | Acknowledged. Denison will update all maps/figures throughout Section 8 in the final EIS to more consistently include lake names. |
| 473 | MN-S (March 4, 2023) | Section 8.3.6.1 Residual Effects Characterization | <p>Issue #8-002: Not all fishing and hunting activities are documented. Currently, the MKS has not been completed and therefore this assumption may be incorrect.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to revise the fish and fish habitat section as part of the inclusion and consideration of the MKS in the Final EIS. - Denison needs to include additional information in the Final EIS that describes data limitations. A conservative approach would consider all waterbodies in the area to be potential fishing waterbodies for current and future use purposes. | <p>The draft EIS was prepared in consideration of the information available to Denison at that time. Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. For the purposes of the organization of the EIS, such organizations as the MN-S and YNLR are understood as organizations. A study agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. The Métis Knowledge Study was received by Denison on October 24, 2023, and Denison has integrated relevant information from the Study into the EIS accordingly. It is important to note that Denison has incorporated Métis land use information and perspectives into the draft EIS, through the funding of the Kineepik Métis Land and Occupancy information along with the KML VEC statement, of which relevant information has been incorporated directly into the draft EIS to determine effects to the human environment.</p> <p>While Denison acknowledges the comment regarding what it perceives as a desire to include more regional data regarding fishing waterbodies of interest to MN-S within the context of cumulative effects, it believes the draft EIS and supporting documentation (including the aquatic environment baseline report, Appendix 8-D) provide a spatially extensive and appropriate description of fish habitat and fish resources in water bodies and water courses to assess potential cumulative effects given the spatial extent of Project interactions with the environment. For the purpose of a Project-specific CEA a cumulative effect can only exist when a residual Project effect overlaps in time and space with other current or reasonably foreseeable projects / activities. Where no such overlap exists, it is beyond the scope of a Project-specific CEA.</p> |
| 474 | MN-S (March 4, 2023) | Section 8.3.8 Monitoring and Follow-up | <p>Issue #8-003: Russell Lake is not identified as a location to monitor fish health.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to include Russell Lake in the aquatic monitoring program as cumulative effects from the Key Lake operation will be detected in this waterbody and this is an important local fisheries resource waterbody. - Denison should commit to involving MN-S, NR1 and NR3 in the development of management and monitoring plans for the aquatic environment in the Final EIS. | <p>As indicated in the review comment, Russell Lake was not specifically referenced as a location to monitor fish health. This would be based on the draft EIS conclusion that environmental change that might affect fish health (e.g., water quality) would not extend beyond the LSA and into Russell Lake. This however does not preclude incorporating Russell Lake into follow up monitoring based on alternative rationale. Specific details for follow up monitoring program design have yet to be developed and the appropriateness / suitability of sampling areas (including Russell Lake) will be evaluated through that process. Such determinations as to the appropriateness of sampling areas to be utilized for follow up monitoring for the aquatic environment will be made when that monitoring program / plan documentation is developed and would be subject to discussion with Interested Parties. As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other stakeholders, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: programs will meet regulatory requirements, programs will confirm the effectiveness of mitigation measures and predictions made in the assessment, programs will be implemented in an adaptive management framework (if/where applicable) to reduce effects during the lifetime of the Project, and programs will have spatial boundaries that are sufficiently extensive to measure EIS predictions.</p> <p>For further reference the following provides an overview of the information presented in the draft EIS and its supporting documentation regarding Russel Lake. Aquatic baseline surveys were conducted at two stations (LAB-1 and LAB-2) in Russell Lake and were considered 'far-field' stations in relation to the proposed mining plan for the Wheeler River Project. Data collection</p> |

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| | | | | <p>methods and results are presented in the draft EIS throughout the applicable subsections of Section 8.</p> <ul style="list-style-type: none"> • Section 8.2 details the Surface Water Quality methods and results, • Sections 8.3 and 8.5 detail fish habitat, community, and health methods and results; and • Section 8.4 details sediment quality and benthic invertebrate community and chemistry methods and results. <p>A breakdown of where specific processes and results are located for each of these components is presented below:</p> <p>Surface Water Quality/Chemistry: Surface Water Quality was sampled in Russell Lake. Methods and metrics are presented in Section 8.2.3.1. Water was sampled in Russell Lake and presented in Table 8.2-2 (Pages 8-60 to 8-62) of Section 8.2.3.3 of the EIS report, and summarized in Table 8.2-4. Surface Water predicted maximum Constituents of Potential Concern for the Russell Lake Inlet (LAB-1) are presented in Table 8.2-13 of Section 8.2.4.2.4. Cumulative effects are also assessed in Section 8.2.7. Detailed baseline summary data is presented in Appendix 8-D of the report in Table 3-3.</p> <p>Sediment Quality/Chemistry: Sediment was sampled in Russell Lake, and the sample methodology is presented in Section 8.4.3.1. Sediment grain size results are summarized in Table 8.4-2 in Section 8.4.3.2.1, and full data is presented in Appendix 8-D, Table 3-4. Sediment chemistry was summarized in Table 8.4-3, and full data is in Appendix 8-D, Table 3-5.</p> <p>Fish Habitat, Tissue Chemistry, and Community: Russell lake is not clearly indicated in the initial list of sample areas presented in Section 8.3.3 or Section 8.5.3; however, habitat information is presented in the Fish Habitat table (Table 8.3-4) of Section 8.3.3.2, and both Russell Lake sample locations (LAB-1 and LAB-2) and their associated fish community data are presented in the fish community map (Figure 8.3-6). Fish community and information is also presented in Table 8.3-4. Baseline fish community information is presented in Appendix 8-D of the report in Table 3-9. Fish chemistry summary data (Mean, Max, Min) for Northern Pike and White Sucker bone and tissue samples is presented in Table 8.5-2 of Section 8.5.3 of the Draft EIS. Detailed fish tissue data summary is presented in Appendix 8-D of the report in Table 3-10.</p> <p>Benthic Invertebrate Chemistry and Community: Benthic invertebrates were sampled in Russell Lake, and the sample methodology is presented in Section 8.4.3.1. Benthic invertebrate endpoints are summarized in Table 8.4-4 of Section 8.4.3.2.4, and benthic invertebrate chemistry is summarized in Table 8.4-5. Detailed baseline benthic invertebrate community and chemistry data is presented in Appendix 8-D of the report in Table 3-8, and community data in Tables 3-7A to 3-7D.</p> <p>Also, refer to Cumulative Effects sections within each part of the Aquatic Environment assessment in the draft EIS for a discussion of potential cumulative effects in Russell Lake. (i.e., Section 8.2.7 for surface water quality; Section 8.3.7 for fish and fish habitat, 8.4.7 for sediment quality and benthic invertebrates, and 8.5.7 for fish health).</p> |
| 475 | MN-S (March 4, 2023) | Section 8.5.7.1 Potential Cumulative Effects | <p>Issue #8-004: "Fish Health VC are primarily related to c the controlled" – there is a typo in the report.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to address the typo and replace "c" with the complete word. | <p>Acknowledged. The typo will be corrected in the final version of the EIS as follows, "Potential Project residual effects on the Fish Health VC are primarily related to controlled discharge of site water into local receiving environments during all Project phases."</p> |

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| 476 | MN-S (March 4, 2023) | Section 8.5.8 Monitoring and Follow-up | <p>Issue #8-005: It is unclear whether there is a physical barrier between Whitefish Lake North and Whitefish Lake South that would allow Whitefish Lake North to be considered as an appropriate reference area for monitoring fish health.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to clarify in the Final EIS on an appropriate reference area for monitoring fish health. - Denison needs to confirm fish movements between Whitefish Lake North and Whitefish Lake South and that Whitefish Lake North will be an appropriate reference lake. If it is not appropriate, then another reference lake such as Kochichowsky Lake may need to be considered for monitoring fish health. | <p>To clarify, there is no physical barrier between the north and south portions of Whitefish Lake.</p> <p>As indicated in the review comment the north basin of Whitefish Lake was suggested in the EIS as a potential upstream or reference monitoring for aquatic environment endpoints, including those related to fish health. Specific details for follow up monitoring program design have yet to be developed and the appropriateness / suitability of sampling areas will be evaluated through that process. The north basin of Whitefish Lake is the most proximal aquatic feature upstream of where treated effluent would be discharged and in that regard is a good candidate as a reference or non-influenced area. It is understood that proximity is not the only consideration as to the suitability of an area to be utilized as a reference area - as indicated in the review comment fish movement and mobility between sampling areas is also an important consideration since it is necessary to make comparisons, in the case of fish health, between / among independent fish populations. Such determinations as to the appropriateness of sampling areas to be utilized for follow up monitoring for the aquatic environment will be made when that monitoring program / plan documentation is developed and would be subject to discussion with Interested Parties.</p> |
| 477 | MN-S (March 4, 2023) | Section 9.1.1.3 Spatial Boundaries | <p>Issue #9-001: The terrestrial RSA seems small in consideration of woodland caribou and determining the impacts of the Project in association with the SK1 caribou population.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to evaluate the terrestrial RSA as it relates to the SK1 caribou population and Environment Canada's woodland caribou management plan. Provide a detailed explanation in the Final EIS as to how the terrestrial RSA was determined. | <p>The Project Area was delineated to capture all direct, and most indirect, likely adverse effects on caribou; as this is the zone of influence most likely to affect caribou in the vicinity of the Project (i.e., in the vicinity of human activity, equipment use and vehicle use). The Project Area (169.6 ha) is the direct footprint of proposed Project infrastructure (74.8 ha) with a buffer applied, thereby representing the area of maximum physical disturbance. The Project Area is not VC-specific, but consistent throughout the EIS.</p> <p>The Wildlife LSA was designed to capture the majority of the Project effects. The LSA extends beyond Project Area of the site to include a reasonable estimation of where sensory disturbance from Project-related activities would extend and where effects on wildlife including caribou are most likely to occur. That is the primary rationale for selection of the spatial extent of the LSA – Denison believes this is an appropriate spatial scale that applies broadly to the wildlife VCs as a whole given the perceived mechanism of VC-Project interaction.</p> <p>Importantly, as noted in draft EIS Section 9.3.6.4, in the caribou assessment, the Project Area had a 500 m buffer applied to account for indirect effects/habitat alteration; this area is within the wildlife LSA (refer to Figure 9.3-14 for a map showing the spatial areas). The 500 m buffer for habitat alteration for caribou was selected in accordance with ECCO's (2020) assessment of disturbed areas, which buffered (500 m) anthropogenic disturbances to evaluate woodland caribou habitat. The alteration of available woodland caribou habitat is quantified in this EIS by applying a buffer of 500 m around the Project Area in which Project effects in the form of sensory disturbance are likely to affect available woodland caribou habitat and make it functionally unavailable for use.</p> <p>Boreal caribou occur as one continuous population across the SK1 range, including within the Terrestrial RSA. It was decided to not use the entire SK1 range as an assessment area (e.g., due to the dilution factor) and instead use the Terrestrial RSA to appropriately and adequately assess residual and cumulative effects in proportion to the Project. It was deemed to be not feasible to use a large area like the SK1 range to assess residual Project effects because this would provide inappropriate context or "dilute" the adverse effects of the Project on the caribou that have a home range that overlaps with the RSA.</p> <p>The reviewer is also referred to the response provided to Information Requirement (IR) No. 137 from the Federal Indigenous Review Team (FIRT).</p> |

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| 478 | MN-S (March 4, 2023) | Section 9.2.3.3 Wetlands Valued Components | <p>Issue #9-002: Figure 9.2-8 identifies lakes and waterbodies separately. There is a lack of clarity between a lake and a waterbody and its treatment in the EIS.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to clarify and distinguish in the Final EIS if and why lakes and waterbodies are treated differently. | <p>Footnote 4 of Table 9.2-5 of the draft EIS describes "lakes" and "waterbodies" the difference within the context of the assessment as follows: "Lakes have been defined as either named lakes or waterbodies observed to exhibit an average depth of ≥ 2 m (Ecometrix Incorporated 2020). Waterbodies are defined as areas of open water observed to exhibit an average depth of < 2 m (Ecometrix Incorporated 2020), or unnamed areas of open water without any existing bathymetric information."</p> <p>For further reference it is noted that lakes were not considered wetlands and not carried forward in our assessment, but waterbodies (identified as either < 2m deep or without bathymetric information) were conservatively considered to be shallow open water wetlands and assessed in the wetland assessment.</p> |
| 479 | MN-S (March 4, 2023) | Section 9.2.7.3 Cumulative Effects Characterization and Determination of Significance | <p>Issue #9-003: There is inadequate evaluation of the combined impact of all of these changes in vegetation on the terrestrial ecosystem. It is unclear whether there will be any short-term or long-term impacts on the overall health of the terrestrial ecosystem due to the individual changes to the terrestrial components.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide in the Final EIS an assessment of the cumulative impacts of all of the individual changes to the vegetation (e.g., change in vegetation types, a change in the COPC levels in vegetation and a change in wetland composition) on the entire terrestrial ecosystem. | <p>The assessment of potential Project related effects on the vegetation VCs followed standard assessment methodology using specific KIs and associated MPs. There is no practical, reliable way to combine all of the various KIs and associated MPs into a single, combined expression of potential effects as suggested by the review comment. The standard approach and practice is that each VC is evaluated independently using the KIs and associated MPs, setting appropriately conservative effects thresholds.</p> <p>As outlined in draft EIS Section 9.2.7.4, the residual effects of the Project, in conjunction with the comparable residual effects from past, present, and reasonably foreseeable future projects on the vegetation abundance and constituent concentrations in vegetation KIs were predicted to be not significant. Thus, the cumulative effects are not expected to alter the integrity of the Vegetation and Ecosystems VC (i.e., it remains sustainable and available to contribute to ecological functions) and is predicted to be not significant. Similarly, the residual effects of the Project, in conjunction with the comparable residual effects from past, present, and reasonably foreseeable future projects on the listed plant species and wetlands KIs were predicted to be not significant. Thus, the cumulative effects are not expected to alter the integrity of the Listed Plant Species VC and Wetlands VC (i.e., they remain sustainable and available to contribute to ecological functions) and are predicted to be not significant.</p> |
| 480 | MN-S (March 4, 2023) | Section 9.3.3.1.1 Scientific Literature Review | <p>Issue #9-004: The EA assumptions for moose harvest numbers and success are based on the SK database information which includes information for hunters in the southern portion of the province and for non-Indigenous peoples. Reliance on draw licences to support Project models does not capture Métis harvesting and traditional use activities in the Northern Administrative District of Saskatchewan. Métis do not participate in the draw system as they are recognized rights holders.</p> <p>Indigenous and non-Indigenous hunters have different hunting patterns. Although the data used in the EA is accurate for non- Indigenous hunters, this data should be used cautiously when assessing a project that is in an area where there is mostly (if not all) Indigenous hunters for moose and other ungulates.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide confirmation that the assumption that moose harvest information used in the Draft EIS is based on the SK database which includes information for hunters in the southern portion of the province and for non- Indigenous peoples. If yes: <ul style="list-style-type: none"> o Denison to acknowledge in the Final EIS that the Terrestrial Ecosystem Effects Assessment relied on draw licences to support assessment conclusions and these conclusions do not capture Métis harvesting and traditional use activities in the Northern Administrative District of Saskatchewan. In addition, Denison to note Métis do not participate in the draw system as they are recognized rights holders in the Final EIS. - Denison needs to incorporate Métis Knowledge from the MKS to the Project's Terrestrial Ecosystems Effects Assessment. - Denison to co-develop and implement a moose-specific monitoring and management plan with the Métis. - Denison needs to include Métis harvesting patterns in the Final EIS (e.g., rabbit, moose, caribou, fox etc.). | <p>With respect to bullet #1 the following is noted. Denison can confirm that the information provided in Section 9.3 (as well as 11.1) of the Draft EIS related to moose harvest data is based on the information that was publicly available from the Saskatchewan Ministry of Environment to contextualize moose harvest in the province and did not include specific harvest information from Indigenous sources as this was not available at the time. The final version of the EIS will provide further clarification as to the source of the moose harvest data, and that specifically it was obtained via the publicly available data regarding draw licenses.</p> <p>With respect to bullet #2 the following is noted. The draft EIS was prepared in consideration of the information available to Denison at that time. Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. For the purposes of the organization of the EIS, such organizations as the MN-S and YNLR are understood as organizations. A study agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. The Métis Knowledge Study was received by Denison on October 24, 2023, and Denison has integrated relevant information from the Study into the EIS accordingly. It is important to note that Denison has incorporated Métis land use information and perspectives into the draft EIS, through the funding of the Kineepik Métis Land and Occupancy information along with the KML VEC statement, of which relevant information has been incorporated directly into the draft EIS to determine effects to the human environment.</p> <p>With respect to bullet #3 the following is noted. Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3, is committed to such engagement with respect to monitoring. As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other stakeholders, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: programs will meet</p> |

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| | | | | <p>regulatory requirements, programs will confirm the effectiveness of mitigation measures and predictions made in the assessment, programs will be implemented in an adaptive management framework (if/where applicable) to reduce effects during the lifetime of the Project, and programs will have spatial boundaries that are sufficiently extensive to measure EIS predictions.</p> <p>With respect to bullet #4 the following is noted. The draft EIS was prepared in consideration of the information available to Denison at that time. Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. For the purposes of the organization of the EIS, such organizations as the MN-S and YNLR are understood as organizations. A study agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023 The Métis Knowledge Study was received by Denison on October 24, 2023, and Denison has integrated relevant information from the Study into the EIS accordingly.. It is important to note that Denison has incorporated Métis land use information and perspectives (including harvesting) into the draft EIS, through the funding of the Kineepik Métis Land and Occupancy information along with the KML VEC statement, of which relevant information has been incorporated directly into the draft EIS to determine effects to the human environment.</p> |
| 481 | MN-S (March 4, 2023) | Section 9.3.4.2.1 Alteration and/or Loss of Habitat | <p>Issue #9-005: The nature of vegetation regeneration on an altered landscape can have continuing effects on woodland caribou. This conclusion is sufficiently vague and assume regeneration will be suitable for woodland caribou.</p> <p>Denison does not provide information on the removal and decommissioning of the roads built for the Project or the extension of the transmission line in the Draft EIS. Linear disturbances like these are incredibly impactful to Métis traditional land use in and around the Project.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to identify how it will be determined that post-decommissioning revegetated habitat will be suitable for woodland caribou including any risk assessments completed to confirm the predictions. - Denison needs to involve MN-S as well as NR1 and NR3 Locals in decommissioning planning, mitigation, and monitoring. - Denison to provide further information on the removal and decommissioning of roads built for the Project and the extension of the transmission line built by SaskPower in the Final EIS. | <p>With respect to bullet #1 the following is noted. The Project's Conceptual Decommissioning Plan (CDP) is included in the draft EIS, and are presented at a relatively high level commensurate with the stage of Project development, including consideration of site restoration. The details of decommissioning and restoration will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP. As the decommissioning plan becomes more specific and granular it is expected that the design basis will become more detailed. Consistent with this approach / process, the expectation is that restoration goals will be defined, the activities to be implemented to meet these goals will be defined and performance criteria to confirm that the goals are being / have been reached will also be defined. It is also noted that Denison has developed a Conceptual Caribou Mitigation Plan (the Plan) during discussions between Denison and Saskatchewan Ministry of Environment (ENV) in May and June 2023. As noted at this time the Plan is conceptual in nature but will go hand in hand with, and evolve with the decommissioning plan over time. Since the boreal caribou range plan for SK-1 is under development, it is understood that this Plan will be updated as more information becomes available. The conceptual nature of the Plan at this time is in part due to the absence of range plan priorities and reflects Denison's commitment to continue to work with ENV to meet the management objectives and management strategies for the SK1 range.</p> <p>With respect to bullet #2 the following is noted. Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3 and is committed to such engagement with respect to decommissioning planning, mitigation, and monitoring.</p> <p>With respect to bullet #3 the following is noted. The Project's Conceptual Decommissioning Plan (CDP) is included in the draft EIS, and are presented at a relatively high level commensurate with the stage of Project development, including consideration of site restoration. The details of decommissioning and restoration will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP. As the decommissioning plan becomes more specific and granular it is expected that the design basis will become more detailed. With the context of the evolution of the decommissioning plan for the site, the plans for removal and decommissioning of roads built for the Project and the transmission line will be developed as part of that process.</p> |

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| 482 | MN-S (March 4, 2023) | Section 9.3.4.2.2 Change in Mortality | <p>Issue #9-006: Changes in the numbers of prey and/or predators during the post-decommissioning period could impact what animals are available for harvesting by the MN-S in the long-term.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to clarify and confirm the duration of the habitat changes that may interfere with predator/prey densities including any risk assessments completed to confirm the predictions. - Denison needs to involve MN-S, as well as NR1 and NR3 Locals in decommissioning planning, mitigation, and monitoring. | <p>With respect to bullet #1 the following is noted. Denison's decommissioning commitment is to return the land back to the Province of Saskatchewan for unrestricted surface land use post-closure. Plans for the post-decommissioning phase, including land restoration are at the conceptual stage and will evolve over time. The Project's Conceptual Decommissioning Plan (CDP) is included in the draft EIS, and are presented at a relatively high level commensurate with the stage of Project development, including consideration of site restoration. The details of decommissioning and restoration will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP. As the decommissioning plan becomes more specific and granular it is expected that the design basis will become more detailed and specifics as to what the post-decommissioning landscape will entail and the wildlife it would support as referenced in the review question will be developed. It is also noted that Denison has developed a Conceptual Caribou Mitigation Plan (the Plan) based on discussions between Denison and Saskatchewan Ministry of Environment (ENV) in May and June 2023. The Plan is conceptual in nature but will go hand in hand with, and evolve with the decommissioning plan over time. Since the boreal caribou range plan for SK-1 is under development, it is understood that this Plan will be updated as more information becomes available. The conceptual nature of the Plan at this time is in part due to the absence of range plan priorities and reflects Denison's commitment to continue to work with ENV to meet the management objectives and management strategies for the SK1 range.</p> <p>With respect to bullet #2 the following is noted. Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3 and is committed to such engagement with respect to decommissioning planning, mitigation, and monitoring.</p> |
| 483 | MN-S (March 4, 2023) | Section 9.3.5.2 Additional wildlife specific mitigation measures | <p>Issue #9-007: A wildlife monitoring plan and a Woodland Caribou Management Plan are important tools for managing caribou in the short and long-term.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to involve MN-S as well as NR1 and NR3 Locals in the creation of the Woodland Caribou Management Plan, and include the plan in the Final EIS | <p>Denison has developed a Conceptual Caribou Mitigation Plan (the Plan) based on discussions between Denison and Saskatchewan Ministry of Environment (ENV) in May and June 2023. As noted the Plan is conceptual in nature at this time, largely because of the absence of range plan priorities. Denison is committed to continue to work with ENV to meet the management objectives and management strategies for the SK1 range as the boreal caribou range plan for SK-1 is developed. The Plan is a living document and will evolve over time as more information becomes available. In this regard, Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3 and is committed to such engagement with respect to decommissioning planning, mitigation, and monitoring.</p> |
| 484 | MN-S (March 4, 2023) | Section 9.3.6.4.1 Alteration and/or Loss of Habitat | <p>Issue #9-008: The woodland caribou may not return to the Project area for up to 20 years following post-decommissioning due to available food resources. This may have an impact on long-term harvesting of woodland caribou by the MN-S.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to clarify and confirm the duration of the habitat changes that may interfere with predator/prey densities including any risk assessments completed to confirm the predictions. - Denison needs to clarify and confirm the duration of the habitat changes that may interfere with predator/prey densities including any risk assessments completed to confirm the predictions. | <p>Denison acknowledges the comment and notes the following. Following submission of the draft EIS in October 2022, Denison has met with Saskatchewan Ministry of Environment (SK ENV) staff to develop a framework for future woodland caribou offset. This information has been presented to the provincial and federal review teams as part of the response to federal information requirements in August 2023 as the Conceptual Caribou Mitigation Plan.</p> <p>The Conceptual Caribou Mitigation Plan (the Plan), developed proactively by Denison, has a different objective than the draft EIS. The Plan builds on the assessment of potential Project effects and commitments to consider additional mitigation (offset) to account for non-significant residual effects highlighted in the draft EIS. The Plan is expected to be advanced with ongoing consultation with the SK ENV, as SK ENV finalize the caribou range plan for SK1. The EIS is a conservative planning tool, whereas the Plan is a practical, living document designed to define management works associated with caribou. The Plan is not a requirement for EA determination per se, but is provided as a guidance document to help Denison proactively describe and inform the development and implementation of appropriate mitigation measures related to caribou and their habitat.</p> <p>The Plan is an evergreen document. It will be consistent with the management goals of SK ENV for the SK-1 caribou conservation unit and will be developed/refined in consultation with local communities including English River First Nation and Kineepik Métis Local in Pinehouse and regulators. As noted above, the boreal caribou range plan for SK-1 is under development and it is understood that this Plan will be updated as more information becomes available. The conceptual nature of the Plan is in part due to the absence of range plan priorities and reflects</p> |

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| | | | | <p>Denison's commitment to continue to work with the province to meet the management objectives and management strategies for the SK1 range.</p> <p>Denison is continuing to work with SK ENV to estimate habitat offset scenarios based on the current Project design which will be refined as the Project advances. A boreal caribou habitat offset calculator is under development by SK ENV and Denison is collaborating with SK ENV to define key scenario attributes. SK ENV will engage with Indigenous communities and nations as the province develops and refines the range management plan for SK1.</p> |
| 485 | MN-S (March 4, 2023) | Section 9.3.7.3.3 Woodland Caribou | <p>Issue #9-009: The 5% threshold disturbance is for a viable population which is the SK1 population.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide confirmation that the Final EIS appropriately used the Environment Canada threshold values on the woodland caribou population as they relate to the SK1 population. - Denison needs to confirm that the RSA and threshold is suitable in areal extent. See comment 9-001. - Denison needs to commit to re-evaluating their woodland caribou information in the Final EIS. Specifically, to ensure the woodland caribou information used by Denison is in alignment with the SK1 Range Plan being developed by the Province. | <p>In terms of the woodland caribou population in SK1, the likelihood of self-sustainability for the Boreal Shield range (SK1) has been updated from "unknown" (EC 2012) to "likely" in the amended recovery strategy (ECCC 2020). The SK1 range comprises more than 18,000,000 ha and is characterized by high fire disturbance and low anthropogenic disturbance (ECCC 2020). For SK1, the amended recovery strategy (ECCC 2020) identifies 40% undisturbed habitat in the range as the disturbance management threshold, which provides a measurable probability (71%) for the local population to be self-sustaining. This threshold is considered a minimum threshold because at 40% undisturbed habitat there remains a risk (29%) that the SK1 local population cannot be self-sustaining. According to ECCC (2020) disturbed habitat is habitat showing: i) anthropogenic disturbance visible on Landsat at a scale of 1:50,000, including habitat within a 500 m buffer of the anthropogenic disturbance; and/or ii) fire disturbance in the last 40 years, as identified in data from each provincial and territorial jurisdiction (without buffer). In contrast, according to ECCC (2020) undisturbed habitat is habitat not showing any: i) anthropogenic disturbance visible on Landsat at a scale of 1:50,000, including habitat within a 500 m buffer of the anthropogenic disturbance; and/or ii) fire disturbance in the last 40 years, as identified in data from each provincial and territorial jurisdiction (without buffer). The cumulative effects assessment in the draft EIS showed that the Project is expected to add 0.001% of anthropogenic disturbance at the scale of the SK1 Boreal Shield Woodland Caribou Management Unit (Section 9.3.7.3.3 of the EIS).</p> <p>Specific to woodland caribou, the draft EIS evaluated and assessed potential Project-related effects on the boreal population of woodland caribou following standard environmental assessment (EA) methodology. The assessment of potential effects considered both direct (i.e., habitat loss) and indirect effects (i.e., habitat alteration) on caribou and their habitat, while assuming that caribou were present year-round and during all of their life stages (i.e., calving, rearing, mating, over wintering). The rationale for the definition of study areas for the purpose of the assessment of the Terrestrial Environment valued components (VCs) is described in Section 9.1.1 of the draft EIS. The Project Area (169 ha or 1.69 km²) and LSA were delineated based on the expected extent of potential direct (footprint) and indirect (sensory disturbance) Project effects; whereas, the RSA considered an 8 km buffer around the Project Area to provide an appropriate spatial scale upon which potential Project effects could be evaluated at the landscape scale where key Terrestrial Environment VCs reside and move within and upon which cumulative effects could be assessed. Boreal caribou occur as one continuous population across the SK1 range (18,034,870 ha), including within the Terrestrial RSA. After consideration, it was decided by Denison and its Subject Matter Experts at EDI Environmental Dynamics Inc. to use the Terrestrial RSA for the cumulative effects assessment for caribou rather than the entire SK1 range. This decision was made largely on the basis that it would not be feasible / appropriate to use a such large area like the SK1 range to assess cumulative effects since consideration of such a large spatial extent would likely "dilute" the contribution of the Project to potential effects at that scale. In support of this decision, comparison of the Project-specific habitat effects (i.e., the Project Area plus a 500 m buffer to account for sensory disturbance) relative to the scale of the SK1 range (as the applicable management unit for portion of the woodland caribou population that uses the Terrestrial RSA) was made. The comparison indicated that the Project is expected to add 0.001% of anthropogenic disturbance at the scale of the SK1 Boreal Shield Woodland Caribou Management Unit (Section 9.3.7.3.3 of the EIS). As can be seen, the default conclusion at the range scale could only be that the Project does not contribute to cumulative effects at a practical measurable level.</p> <p>Denison and its SMEs believe the EIS took a precautionary or conservative approach to understanding/addressing the likely residual effects (i.e., effects remaining after mitigation</p> |

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| | | | | <p>measures were considered) of the Project on caribou and their habitat. This approach provides is appropriate as a planning tool to inform/support future Project-related regulatory approvals processes and to guide the scope and nature of follow-up monitoring. After consideration of measures to avoid and mitigate the potential for effects on caribou and their habitat it was concluded that the likely residual effects of the Project on caribou and their habitat were not significant.</p> <p>While the EIS did not consider specific additional opportunities to offset the non-significant effects, Denison has been working to develop a Conceptual Caribou Mitigation Plan. The plan was submitted to the provincial and federal review teams as part of the response to federal information requirements in August 2023 as the Conceptual Caribou Mitigation Plan and Denison has been in close contact with the Saskatchewan Ministry of Environment (SK ENV), as stewards of woodland caribou from a regulatory perspective.</p> <p>References: Environment and Climate Change Canada (ECCC). 2020. Amended Recovery Strategy for the Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada. Species at Risk Act Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. xiii + 143pp.</p> |
| 486 | MN-S (March 4, 2023) | Section 9.3.8 Monitoring and Follow-up | <p>Issue #9-010: Previous sections of the Draft EIS identified the development of the Woodland Caribou Management Plan.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to confirm the preparation and inclusion of a Woodland Caribou Management Plan within this section of the Final EIS. | <p>Denison acknowledges the comment and notes the following. Following submission of the draft EIS in October 2022, Denison has met with Saskatchewan Ministry of Environment (SK ENV) staff to develop a framework for future woodland caribou offset. This information has been presented to the provincial and federal review teams as part of the response to federal information requirements in August 2023 as the Conceptual Caribou Mitigation Plan. The Conceptual Caribou Mitigation Plan (the Plan), developed proactively by Denison, has a different objective than the draft EIS. The Plan builds on the assessment of potential Project effects and commitments to consider additional mitigation (offset) to account for non-significant residual effects highlighted in the draft EIS. The Plan is expected to be advanced with ongoing consultation with the SK ENV, as SK ENV finalize the caribou range plan for SK1. The EIS is a conservative planning tool, whereas the Plan is a practical, living document designed to define management works associated with caribou. The Plan is not a requirement for EA determination per se, but is provided as a guidance document to help Denison proactively describe and inform the development and implementation of appropriate mitigation measures related to caribou and their habitat. The Plan is an evergreen document. It will be consistent with the management goals of SK ENV for the SK-1 caribou conservation unit and will be developed/refined in consultation with local communities including English River First Nation and Kineepik Métis Local in Pinehouse and regulators. As noted above, the boreal caribou range plan for SK-1 is under development and it is understood that this Plan will be updated as more information becomes available. The conceptual nature of the Plan is in part due to the absence of range plan priorities and reflects Denison's commitment to continue to work with the province to meet the management objectives and management strategies for the SK1 range. Denison is continuing to work with SK ENV to estimate habitat offset scenarios based on the current Project design which will be refined as the Project advances. A boreal caribou habitat offset calculator is under development by SK ENV and Denison is collaborating with SK ENV to define key scenario attributes. SK ENV will engage with Indigenous communities and nations as the province develops and refines the range management plan for SK1.</p> |
| 487 | MN-S (March 4, 2023) | Section 11.1.1.1 Values Component Selection | <p>Issue #11-001: Arrangements and applicable funding to facilitate MN-S' participation and engagement in the EA process are underway. It is expected that MN-S will be given the opportunity to validate VC selection and have this information reflected in the Final EIS.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison, in the Final EIS, needs to demonstrate that it confirmed the selected valued components with Métis Locals in NR1 and NR3. - Denison needs to include in the Final EIS input from the Métis Knowledge Study and any changes in the selection of VCs and their characterization. | <p>At the direction of the MN-S, Denison participated in meetings on February 12, 2023 with NR1 and on February 13, 2023 with NR3. The participants at these sessions were identified and invited by the MN-S. During these meetings, Denison shared information about the Project and the associated VCs assessed as part of the environmental assessment. No new VCs were identified as part of that discussion, and should new ones emerge through process, we would consider them at that time.</p> <p>A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study.</p> |

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| 488 | MN-S (March 4, 2023) | Section 11.1.2.3 The Métis Nation of Saskatchewan | <p>Issue #11-002: The EIS states: "The parties have specifically agreed to a process between each other that will be funded by Denison and undertaken on behalf of the MN-S in connection with the EA of the Project: a Métis Knowledge Study, meetings to focus on VCs and preliminary effects, and regular meetings and associated costs for hosting such meetings."</p> <p>The correct name is "Métis Nation-Saskatchewan" (no "of").</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to correctly reference Métis Nation- Saskatchewan throughout the Final EIS. - Denison needs to include in the Final EIS input from the Métis Knowledge Study and any changes in the selection of VCs and their characterization. | <p>The EIS will be updated throughout to the correct name "Métis Nation-Saskatchewan" (no "of").</p> <p>At the direction of the MN-S, Denison participated in meetings on February 12, 2023 with NR1 and on February 13, 2023 with NR3. The participants at these sessions were identified and invited by the MN-S. During these meetings, Denison shared information about the Project and the associated VCs assessed as part of the environmental assessment. No new VCs were identified as part of that discussion, and should new ones emerge through process, we would consider them at that time.</p> <p>A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study.</p> |
| 489 | MN-S (March 4, 2023) | Section 11.1.4.1 Potential Interactions Between the Project and Valued Component/Key Indicators | <p>Issue #11-003: Many of the Project Phase/Activities listed would contribute to a change in the environmental setting for Indigenous land and resource users within the LSA. Interactions should be considered for temporary or longer-lasting aesthetics impact related to Project-related dust, lighting, noise, and visual disturbance.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to revise Table 11.1-7 in the Final EIS to include the addition of interactions and effects analysis for "Perceived suitability of lands and resources therein" that considers Project-related construction and decommission impacts to Indigenous Land and Resource Use. For example, the development of access roads and site preparation during construction, and demolition and disposal of surface infrastructure during decommission, would likely result in some interaction with ILRU related to noise, dust, or traffic. | <p>Table 11.1-7 will be revisited to include to the development of access roads and site preparation during construction, and demolition and disposal of surface infrastructure during decommission.</p> |
| 490 | MN-S (March 4, 2023) | Section 11.1.4.3.1 Terrestrial Resource Availability | <p>Issue #11-004: Missing information to support the claim that other large terrestrial mammals, such as elk and white-tailed deer species, are not found in sufficient abundance in the LSA to be assessed as part the Project.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to include additional information in the Final EIS on why large terrestrial mammals that are harvested in the LSA (such as elk and white-tailed deer) are not found in sufficient abundance in the LSA to support this conclusion. | <p>The Saskatchewan Ministry of Environment (SK MOE) manages the conservation and allocation of wildlife resources on behalf of all Saskatchewan residents. Many resource management tools are used to manage species abundance and to reduce conflict between resource users. Tools include hunting seasons, management areas, considering other land use activities, limiting firearm types, and harvest limits. In addition to these tools, the SK MOE has developed a wildlife allocation policy to determine how harvestable game is allocated to hunters and manage resource management conflicts (SK MOE 2017a).</p> <p>Section 11.2.3.1 describes that the Wildlife Management Zones and Special Areas Boundaries Regulations, 1990 (Government of Saskatchewan 2014) define Wildlife Management Zones (WMZs) as areas for managing, harvesting, controlling, or regulating wildlife. Wildlife Management Zones are defined based on several factors including ecosystem classification and by land tenure or ownership. Wildlife Management Zones are primarily used to help with species conservation, as the goal is to have hunters harvest the surplus of a species. For the management of big game, the LSA is within WMZ 75. The RSA extends into WMZs 74, 75, and 76. Section 11.2.3.1.2 describes how other big game species, such as white-tailed deer or elk, are not hunted in WMZ 75 due to the absence or low abundance of these species.</p> <p>Section 9.3.3.1 of the EIS describes the existing environment in terms ungulates. The ungulates VC is represented by one KI: moose. A potential reason for low moose density could be the poorly productive shield ecosystem and successional dynamics both of favour conifers at all seral stages with limited production of deciduous browse post-disturbance.</p> <p>Appendix 9-A describes baseline data collection for the terrestrial environment, including winter track and pellet count surveys for wildlife within the study area.</p> |

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| 491 | MN-S (March 4, 2023) | Section 11.1.5 Mitigation Measures | <p>Issue #11-005: In the Draft EIS, Denison has proposed to develop mitigation measures and management planning, but has not begun engaging with Métis Community of Interest and MN-S on contents of mitigation measures or management plans.</p> <p>It is good practice for Communities of Interest, including Métis, to have the opportunity to contribute to the scoping, development, and implementation of mitigation measures and management plans (and monitoring programs), including effectiveness reviews and the application of an adaptive management approach.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to include in the Final EIS, effects mitigation, and management and monitoring plans that were prepared with MN-S and NR1 and NR3 Locals involvement and agreement. | <p>A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study.</p> <p>As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> |
| 492 | MN-S (March 4, 2023) | Section 11.1.8 Monitoring and Follow-up | <p>Issue #11-06: In the Draft EIS, Denison has proposed to develop monitoring programs, but as not begun engaging with MN-S or NR1 and NR3 Locals on contents of these programs.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to include in the Final EIS, management and monitoring plans that were prepared with MN-S and NR1 and NR3 Locals involvement and agreement. | <p>As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> <p>As the Project site will be self-sufficient in terms of meeting the needs of the Project and its workforce, the effects related to local communities are associated with the effects of participation in employment and the associated commuter rotation system. With the application of mitigation measures described in Section 12.3.5, and given the distance between communities in the LSA and the Project site, the residual adverse effects are expected to be low in magnitude. The overall conclusion relative to changes to Infrastructure and Services is not significant.</p> |
| 493 | MN-S (March 4, 2023) | Section 11.1.7 Cumulative Effects Section 11.2.7 Cumulative Effects | <p>Issue #11-07 and 11-12: For many Indigenous communities and governments, cumulative effects analysis requires an assessment that includes pre-development conditions to understand the impacts of past and existing activities that continue to affect the context for environmental and social systems.</p> <p>An evolving best practice during an EA is to consider the fuller context of historic change. This practice is recognized through numerous Canadian cumulative effects assessment initiatives and management frameworks (e.g., Indigenous Centre for Cumulative Effects) and recent Indigenous led environmental assessment (e.g., Squamish Nation Assessment Process).</p> | Noted. |
| 494 | MN-S (March 4, 2023) | Section 11.2.3.1.2 Big Game Hunting | <p>Issue #11-08: The EA assumptions for big game numbers and success are based on the SK database information which includes information for hunters in the southern portion of the province and for non-Indigenous peoples. Reliance on draw licences to support Project models does not capture Métis harvesting and traditional use activities in the Northern Administrative District of Saskatchewan. Métis do not participate in the draw system as they are recognized rights holders.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison to acknowledge in the Final EIS that the Terrestrial Ecosystem Effects Assessment relied on draw licences to support assessment conclusions and these conclusions do not capture Métis harvesting and traditional use activities in the Northern Administrative District of Saskatchewan. In addition, Denison to note Métis do not participate in the draw system as they are recognized rights holders in the Final EIS. - Denison needs to incorporate Métis Knowledge from the MKS to the Project's Terrestrial Ecosystems Effects Assessment. | <p>Section 9.3.3.1.1 describes how the Project is located in WMZ 75, while WMZ 73, 74, and 76 are adjoining WMZ 75 (Figure 9.3.6). Between 2014 and 2020 (the years for which data are available), no draw licences were sold for any of these WMZ and, therefore, no associated harvest was reported to have occurred in the area based on draw licenses. While this breakdown to WMZ harvest numbers is not available for resident regular licences, it is assumed that most of the annual harvest through resident regular licences occurred in the southern part of the province.</p> <p>A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study.</p> |

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| 495 | MN-S (March 4, 2023) | Section 11.2.3.1.4 Upland Game Bird Hunting | Issue #11-09: To characterize trends in wildlife harvesting it would be more appropriate to show a period longer than 1 year; at least 5 years where available. Recommendations: - Following best practices, Denison should include at least 5 years of data in the Final EIS for upland game bird harvest and harvest effort in Game Bird Management. | Temporal boundaries for characterizing components of the OLRU existing environment varied by topic. Commercial trapping and fishing data were presented based on the data available from the Province of Saskatchewan, and with multiple years of data presented where available. Other topics such as recreational fishing and hunting considered data where available, but in some instances is based on licensing quotas which do not always vary from year to year, or are based on self-reported outcomes. Specific to game bird harvesting, over 5 years of data is provided on annual grouse harvest (2014 to 2020) in Section 9.4.3, Table 9.4-3. |
| 496 | MN-S (March 4, 2023) | Section 11.2.3.9 Indigenous Perspectives on Other Land and Resource Use | Issue #11-10: The characterization of Indigenous perspectives on other land and resource use does not yet reflect MN-S and NR1 and NR3 Locals values or interests as this has not yet been provided. It is expected that when made available, this information will be reflected in the Final EIS. Recommendations: - Denison needs to include in the Final EIS, information provided by Métis Locals in NR1 and NR3 on their perspectives on other land and resource use. | A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study. As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions. |
| 497 | MN-S (March 4, 2023) | Section 11.2.4.5.1 Aesthetic Experience | Issue #11-011: This conclusion is not consistent with the methods detailed on page 5-30 in section 5.8 as the Draft EIS identifies noticeable residual effects related to traffic (increased traffic volume) and noise (low to moderate impact). These effects should be taken to residual effects assessment. Recommendations: - To be consistent with the methods detailed in section 5.8, Denison should include all noticeable Project-related effects for residual effects assessment. For example, effects were identified related to traffic (increased traffic volume) and noise (low to moderate impact) but were not taken to residual effects assessment for Other Land and Resource Use in the Final EIS. | Potential Project disturbances considered under this pathway included increases in traffic, noise, air quality, modification of the wilderness experience, and increases in competition for resources. These disturbances will be most detectable in locations proximal to the Project site. Effects have the most potential to affect cabin leaseholders due to their use of ground travel, hunting and fishing activities, and general proximity to the Project. With the exception of dust which has proven mitigation strategies, the overall disturbances are negligible and there are a limited number of resource users who will experience them to any detectable degree. Therefore, this pathway is not carried forward for residual effects assessment. Section 11.2.5 describes the mitigation measures to reduce the impacts of traffic, noise, and others. Further mitigations for traffic are described in Section 12.3.5 in Section 12 and for noise are described in Section 6.2.5 in Section 6. |
| 498 | MN-S (March 4, 2023) | Section 12.1.2.3 Other Sources of Information and Local Knowledge | Issue #12-001: Arrangements and applicable funding to facilitate the MN-S' participation and engagement in the EA process are underway. It's expected that MN-S will be given the opportunity to provide information related to cultural expression and this information will be reflected in the Final EIS. Recommendations: - Denison needs to include in the Final EIS, information provided by Métis Locals in NR1 and NR3 on their input related to cultural expression. | Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. For the purposes of the organization of the EIS, such organizations as the MN-S and YNLR are understood as organizations. A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study. Section 12.2.4.2.1 describes that multiple pick-up points for workers will be determined as part of Project design, including additional locations to be determined relative to eligible labour force supply. As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing |

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| | | | | adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions. |
| 499 | MN-S (March 4, 2023) | Section 12.1.4.2.1 Potential Effect 1: Change in Knowledge Transmission | <p>Issue #12-002: Need some clarification on this statement as it's reasonable to assume that both parents (mother and father), aunts' and uncles, and other relatives who are members of the community/family would potentially be employed and be away from home. Transmission of knowledge has the potential to be disturbed if multiple family and community members are away on working rotation.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide clarity in the Final EIS on the statement that "knowledge transmission is likely to continue because the entire family and community are involved" considering the potential that with local hiring practices in place, multiple family and community members may be away on working rotation and not able to adequately facilitate knowledge transfer. | <p>Denison acknowledges that both parents (mother and father), aunts' and uncles, and other relatives who are members of the community/family could potentially be employed by the Project. Mitigation measures associated with potential effects to cultural continuity and the commuter-rotation system are described in Section 12.1.5 and include:</p> <ul style="list-style-type: none"> - Working with Indigenous COIs to understand culturally important periods relative to harvest times and cultural camps to facilitate Indigenous employees taking time off to participate in such activities, where practicable; - Implementation of Denison's Indigenous Peoples Policy and advancement of reconciliation - Using a commuter rotation system has also shown to be effective in allowing Indigenous employees continued opportunities to spend time on the land, and important factor in the transmission of knowledge and language (see Section 11 for a description of potential effects to land use). <p>Denison remains committed to maintain positive working relationships with all Indigenous COIs and will be open to discussion on any issues or concerns that arise.</p> <p>As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> |
| 500 | MN-S (March 4, 2023) | Section 12.1.4.2.1 Potential Effect 1: Change in Knowledge Transmission | <p>Issue #12-003: The Draft EIS points to follow-up programs as a way to address any uncertainties identified during the EA process. Insufficient detail is provided to reflect how avoidance of areas near the Project may occur; monitoring (and adaptive management) is needed. More clarity on how monitoring will be developed (in section 12.1.8, p. 12-34) to address this uncertainty.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide more detail in the Final EIS on monitoring (and adaptive management) for areas of uncertainty such as displacement of cultural activities. This includes management and monitoring plans that were prepared with MN-S involvement and agreement. | <p>Changes to knowledge transmission as described in Section 12.1.4.2.1 stem from two factors: changes to Indigenous Land and Resource Use, and individual participation in the commuter rotation system - both of which have the potential to affect the ways in which individuals spend time participating in cultural activities. Although there is some uncertainty as to the extent to which individuals will continue to participate in activities that support knowledge transmission, experience from other uranium operations in northern Saskatchewan, the shared and communal nature of cultural expression (i.e., occurs within entire extended families and communities) combined with the Project's minimal effects to land and resource use are not expected to alter the ways in which cultural expression currently occurs (or might vary under regular circumstances). As such, no specific monitoring related to changes to cultural expression are planned.</p> <p>Denison acknowledges the concern raised regarding cultural activities related to working at an industrial operation. Mitigation measures associated with potential effects to cultural continuity (including knowledge transfer and language) are described in Section 12.1.5 and include:</p> <ul style="list-style-type: none"> - working with Indigenous COIs to understand culturally important periods relative to harvest times and cultural camps to facilitate Indigenous employees taking time off to participate in such activities; and - implementation of Denison's Indigenous Peoples Policy and advancement of reconciliation; <p>Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3 and is committed to such engagement with respect to decommissioning planning, mitigation, and monitoring. Denison remains committed to maintaining positive relationships</p> |

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| | | | | with Indigenous communities and will be open to discussion on any issues or concerns that arise over the course of the Project. |
| 501 | MN-S (March 4, 2023) | Section 12.1.4.2.2 Potential Effect 2: Change in Traditional Diet | <p>Issue #12-004: The EIS states: "Experience from other uranium operations in northern Saskatchewan suggests that resource use will continue despite the potential selenium exceedance. . . members had developed their own culturally appropriate practice of risk assessment and management based on their relationship with the land. . . .The ERFN Trapper had a positive relationship with other uranium operations in the ILRU LSA." The claims made in this section sound like the potential Project effects being identified are to be mitigated by ILRU users' behavior, based on past behavior patterns, rather than Project mitigation.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to include in the Final EIS, health risk assessment management and monitoring plans that are prepared with MN-S involvement and agreement to address suitability of land and resources for Indigenous land users. - Denison should confirm this assertion through a monitoring program that will focus on providing data to verify the predictions and include communication planning to convey health risk assessment results. This may also address assumptions about perceived suitability of lands and resources. | <p>As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> <p>As the Project site will be self-sufficient in terms of meeting the needs of the Project and its workforce, the effects related to local communities are associated with the effects of participation in employment and the associated commuter rotation system. With the application of mitigation measures described in Section 12.3.5, and given the distance between communities in the LSA and the Project site, the residual adverse effects are expected to be low in magnitude. The overall conclusion relative to changes to Infrastructure and Services is not significant.</p> |
| 502 | MN-S (March 4, 2023) | Section 12.1.8 Monitoring and Follow-up | <p>Issue #12-006: Areas of uncertainty were identified in the analysis of Cultural Expression (e.g., displacement of cultural activities). Adaptive management is an appropriate strategy for helping to reduce uncertainty about environmental effects and the effectiveness of mitigation. It provides flexibility to identify new mitigation measures or to modify existing ones during the life of the Project.</p> <p>In the Draft EIS, Denison has proposed to develop monitoring programs, but has not begun engaging with MN-S on contents of these programs. As a rights holder, MN-S should have the opportunity to contribute to the scoping, development, and implementation of monitoring programs, including effectiveness reviews and the application of an adaptive management approach.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Considering areas of uncertainty were identified in the analysis of Cultural Expression (e.g., displacement of cultural activities) in the Draft EIS, MN-S request more details in the Final EIS on monitoring (and adaptive management) for areas of uncertainty related to Indigenous cultural expression. This includes a monitoring program that will focus on providing data to verify the predictions and include communication planning to convey health risk assessment results. This may also address assumptions about perceived suitability of lands and resources. | <p>Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. For the purposes of the organization of the EIS, such organizations as the MN-S and YNLR are understood as organizations.</p> <p>A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study.</p> <p>Section 12.2.4.2.1 describes that multiple pick-up points for workers will be determined as part of Project design, including additional locations to be determined relative to eligible labour force supply.</p> <p>As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> |

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| 503 | MN-S (March 4, 2023) | Section 12.2.2 Influence of Indigenous Knowledge, Local Knowledge, and Engagement on the Assessment | Issue #12-007: Arrangements and applicable funding for a Métis Knowledge study is underway but not yet incorporated in the assessment. Recommendations: - Denison, in the Final EIS, needs to incorporate the outcome of the Métis Knowledge Study. | A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study. As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions. |
| 504 | MN-S (March 4, 2023) | Section 12.2.4.1 Potential Interactions Between the Project and Valued Component / Key Indicators | Issue #12-08: The interaction table (12.2-5) identifies "Employment and Expenditures" as the only project component that would influence community well-being. This is inconsistent with previous interactions tables and information in the Draft EIS that identified potential interactions with the physical components and activities of the project that could affect aspects of community identity and cohesion (e.g., section 12.1 Cultural Expression). Comments were raised in the Draft EIS that community health and well-being is related to the relationship with the environment including issues such as changes in water quality or quantity, and mental health being affected by industrial development. Furthermore, section 12.2.3.3 (p. 12-66 to 12-73) identifies the natural environment as a component of community cohesion. This should be better reflected in the analysis of Community Well-being. Recommendations: - In the Final EIS, Table 12.2-5: Potential Project Interactions for Community Well-being (p. 12-74 to 12-77) should include the addition of interactions and effects analysis for "Change in Community Cohesion" that considers Project-related construction, operations, and decommission impacts to mental, physical, and cultural health that stem from a relationship with the environment. | Denison acknowledges that there is an interrelationship between the two and for the purposes of the EIS has been organized into separate sections. Section 11.1 provides an assessment on perceived suitability of lands and resources therein, along with human health. See Section 11.1.4, 11.1.5, and 11.1.6 for further information. |
| 505 | MN-S (March 4, 2023) | Section 12.2.4.2.1 Potential Effect 1 – Change in Population and Demographics | Issue #12-009: In the Draft EIS, Denison has proposed to develop mitigation measures and management planning, but as not begun engaging with MN-S on contents of mitigation measures or management plans. As a rights holder, MN-S should have the opportunity to contribute to the scoping, development, and implementation of mitigations, such as input into the location of pick-up points and commuter transportation options. Recommendations: - The Final EIS should include detail on how the input provided by Métis Locals in NR1 and NR3 and MN-S will influence the development of the location of pick-up points and commuter transportation options and address concerns related to in-migration and out-migration pressures. | Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. For the purposes of the organization of the EIS, such organizations as the MN-S and YNLR are understood as organizations. A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study. Section 12.2.4.2.1 describes that multiple pick-up points for workers will be determined as part of Project design, including additional locations to be determined relative to eligible labour force supply. As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions. |

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| 506 | MN-S (March 4, 2023) | Section 12.2.4.2.2 Potential Effect 2 – Change in Income | <p>Issue #12-010: The EIS states: “Best efforts will be made to make sure employment is maximized, including within the LSA communities and to encourage business participation within the LSA.” (p. 12-80)</p> <p>“Best efforts will be made . . .” is a vague statement about project-related plans to maximize local training, employment, and procurement opportunities that would beneficially impact income levels for residents. More detail is needed to understand Denison's approach and commitment to increased personal income for residents of the LSA.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide more certainty and detail within the Final EIS related to local employment and procurement mitigation as well as supports for employee retention. More information is needed to understand Denison's approach and commitment to increased personal income for residents of the LSA - Denison to expand the LSA communities to include all potentially impacted NR1 and NR3 Locals. | <p>Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS.</p> <p>Spatial boundaries for the Economy VC were selected to reflect the geographic areas where economic impacts from the Project are likely to be detectable and measurable. These impacts are expected to be driven primarily by the relationship and interactions between the Project and the COI. The LSA for the assessment of the economy includes ERFN (including Indian Reserve Wapachewunak 192D and Indian Reserve La Plonge 192) and Patuanak, Pinehouse Lake, and Beauval. The RSA for the Economy VC is the Northern Saskatchewan Administrative District (Census Division 18), which is defined in The Northern Municipalities Act, 2010 (Government of Saskatchewan 2010). This area shares many economic and demographic characteristics with the LSA and is a relevant reference point.</p> <p>Denison, through a Human Resource Development Plan, will initially prioritize Indigenous and non-Indigenous communities in the LSA in terms of employment and training opportunities (anticipated to be in institutions in northern Saskatchewan) and will work with the leadership of these communities to assist in determining hiring and training practices during all phases of the Project, which could include such items as on-the-job training and career counselling to help with advancement from foundational positions, advance sharing of job qualification requirements, clearly identifying training requirements and working with various training institutions (such as Northlands College) to make sure such appropriate training is available, and creation of scholarship and support programs. Priority for employment and training will then focus on Indigenous and non-Indigenous residents of the RSA and then beyond the RSA.</p> <p>Denison will establish a procurement approach throughout all phases of the Project, prioritizing the procurement of goods and services for the Project toward businesses based within the LSA communities prior to looking elsewhere in northern Saskatchewan, southern Saskatchewan, and/or outside of Saskatchewan. This procurement approach may consider advance sharing of purchasing requirements of goods and services throughout all phases of the Project, efforts to increase the capacity and capabilities of businesses to increase successful bidding outcomes, and the development of a business registry.</p> |
| 507 | MN-S (March 4, 2023) | Section 12.2.4.2.2 Potential Effect 2 – Change in Income | <p>Issue #12-011: “Community concerns” are identified related to broader spatial (having to move away to work) and temporal (“crash” after project) uncertainty for increased income. More detail is needed to understand Denison's approach and commitment to addressing community concerns related to income for residents of the LSA.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide more certainty and detail within the Final EIS related to local employment and procurement mitigation as well as supports for employee retention. More information is needed to understand Denison's approach and commitment to addressing community concerns related to increased personal income for residents of the LSA. - Decommissioning planning needs to consider employment transition in addition to site clean-up to avoid boom and bust scenarios. | <p>Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS.</p> <p>Spatial boundaries for the Economy VC were selected to reflect the geographic areas where economic impacts from the Project are likely to be detectable and measurable. These impacts are expected to be driven primarily by the relationship and interactions between the Project and the COI. The LSA for the assessment of the economy includes ERFN (including Indian Reserve Wapachewunak 192D and Indian Reserve La Plonge 192) and Patuanak, Pinehouse Lake, and Beauval. The RSA for the Economy VC is the Northern Saskatchewan Administrative District (Census Division 18), which is defined in The Northern Municipalities Act, 2010 (Government of Saskatchewan 2010). This area shares many economic and demographic characteristics with the LSA and is a relevant reference point.</p> <p>Denison, through a Human Resource Development Plan, will initially prioritize Indigenous and non-Indigenous communities in the LSA in terms of employment and training opportunities (anticipated to be in institutions in northern Saskatchewan) and will work with the leadership of these communities to assist in determining hiring and training practices during all phases of the Project, which could include such items as on-the-job training and career counselling to help with advancement from foundational positions, advance sharing of job qualification requirements, clearly identifying training requirements and working with various training institutions (such as Northlands College) to make sure such appropriate training is available, and creation of scholarship and support programs. Priority for employment and training will then focus on Indigenous and non-Indigenous residents of the RSA and then beyond the RSA.</p> |

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| | | | | Denison will establish a procurement approach throughout all phases of the Project, prioritizing the procurement of goods and services for the Project toward businesses based within the LSA communities prior to looking elsewhere in northern Saskatchewan, southern Saskatchewan, and/or outside of Saskatchewan. This procurement approach may consider advance sharing of purchasing requirements of goods and services throughout all phases of the Project, efforts to increase the capacity and capabilities of businesses to increase successful bidding outcomes, and the development of a business registry. |
| 508 | MN-S (March 4, 2023) | Section 12.2.4.2.3 Potential Effect 3 – Change in Community Cohesion | Issue #12-012: “Community concerns” are identified related to impact to family and community cohesion due to working away from home for long periods. More detail is needed to understand Denison's approach and commitment to addressing community concerns related to community and family cohesion effects for residents of the LSA. Recommendations: - Denison needs to provide more detail within the Final EIS related to worker rotation system mitigation. Particularly considering the identification of reported difficulty in balancing the demands of a worker rotation system with domestic commitments, and many local community members concern of being unable to achieve a work-life balance. | Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. Denison recognizes that both parents and members of the community/family could potentially be employed by the Project. Mitigation measures associated with potential effects to community cohesion and the commuter-rotation system are described in Section 12.1.5 and include: - Working with Indigenous COIs to understand culturally important periods relative to harvest times and cultural camps to facilitate Indigenous employees taking time off to participate in such activities, where practicable; - Implementation of Denison's Indigenous Peoples Policy and advancement of reconciliation - Using a commuter rotation system has also shown to be effective in allowing Indigenous employees continued opportunities to spend time on the land, and important factor in the transmission of knowledge and language (see Section 11 for a description of potential effects to land use). As noted in the draft EIS, Section 8.2.9 “Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program.” MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions. |
| 509 | MN-S (March 4, 2023) | Section 12.2.4.2.3 Potential Effect 3 – Change in Community Cohesion | Issue #12-013: Terminology like “could” is a vague indicator of commitment to developing strategies to address training and support systems for workers. More detail is needed to understand Denison's approach and commitment to addressing community concerns related to providing appropriate local resources for training and support as access to education and supports systems effects for residents of the LSA. Recommendations: - Denison needs to provide more detail within the Final EIS related to their role in developing and providing culturally appropriate resources for training, education and supports systems as access has already been identified as a barrier to local communities. - Denison needs to support Métis training opportunities through Northlands College. | Denison, through a Human Resource Development Plan, will initially prioritize Indigenous and non-Indigenous communities in the LSA in terms of employment and training opportunities (anticipated to be in institutions in northern Saskatchewan) and will work with the leadership of these communities to assist in determining hiring and training practices during all phases of the Project, which could include such items as on-the-job training and career counselling to help with advancement from foundational positions, advance sharing of job qualification requirements, clearly identifying training requirements and working with various training institutions (such as Northlands College) to make sure such appropriate training is available, and creation of scholarship and support programs. Priority for employment and training will then focus on Indigenous and non-Indigenous residents of the RSA and then beyond the RSA. All positions at the Project will require a Grade 12 education or equivalent. Section 13.3.2.1 describes how foundational positions (i.e. entry level) require Grade 12 education and in-house training programs, although a combination of skills and experience may be considered. These positions would include process plant operators, site services, drillers, and catering/janitorial staff. Denison will update the Economics Section to reflect the latest census and the effects that Covid has had on employment in the LSA and RSA. Further, Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in |

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| | | | | Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. |
| 510 | MN-S (March 4, 2023) | Section 12.2.5 Mitigation Measures | <p>Issue #12-014: More detail is needed to understand the types and scope of health and wellness programs. Many of the services listed below this statement are standard health and safety measures for industrial sites and only accessible to on-site staff. They do not address community issues of health and well-being.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide more detail within the Final EIS related to the health and wellness programs and their role in developing and providing resources of this type. This should include the provision of services more broadly within communities, not just to individuals on-site. - Denison to confirm how Métis input is considered in mitigation development. | <p>As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> <p>As the Project site will be self-sufficient in terms of meeting the needs of the Project and its workforce, the effects related to local communities are associated with the effects of participation in employment and the associated commuter rotation system. With the application of mitigation measures described in Section 12.3.5, and given the distance between communities in the LSA and the Project site, the residual adverse effects are expected to be low in magnitude. The overall conclusion relative to changes to Infrastructure and Services is not significant.</p> |
| 511 | MN-S (March 4, 2023) | Section 12.2.5 Mitigation Measures | <p>Issue #12-015: Terminology like "may" is a vague indicator of commitment to development of life skills programming. More detail is needed to understand Denison's approach and commitment to addressing community concerns related to providing appropriate local resources for supporting the well-being of residents of the LSA.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide more detail within the Final EIS related to a commitment to developing and key components of life skills programs. It is appropriate to address the issues as they are identified as an effect of the project in the proceeding section regardless of the certainty of these effects. - Denison to confirm how Métis input is considered in mitigation development. | <p>As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> <p>As the Project site will be self-sufficient in terms of meeting the needs of the Project and its workforce, the effects related to local communities are associated with the effects of participation in employment and the associated commuter rotation system. With the application of mitigation measures described in Section 12.3.5, and given the distance between communities in the LSA and the Project site, the residual adverse effects are expected to be low in magnitude. The overall conclusion relative to changes to Infrastructure and Services is not significant.</p> |
| 512 | MN-S (March 4, 2023) | Section 12.2.5 Mitigation Measures | <p>Issue #12-016: In the Draft EIS, Denison has proposed to develop mitigation measures and management planning, but has not begun engaging with MN-S on contents of mitigation measures or management plans. As a rights holder, MN-S should have the opportunity to contribute to the scoping, development, and implementation of mitigations, such as input into the location of pick-up points and commuter transportation options.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide additional detail within the Final EIS, on how the input provided by MN-S, NR1 Locals, and NR3 Locals will influence the development of the location of pick-up points and commuter transportation options <p>See also MN-S Issue #12-010</p> | <p>Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. For the purposes of the organization of the EIS, such organizations as the MN-S and YNLR are understood as organizations.</p> <p>A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study.</p> <p>Section 12.2.4.2.1 describes that multiple pick-up points for workers will be determined as part of Project design, including additional locations to be determined relative to eligible labour force supply.</p> |

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| | | | | As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions. |
| 513 | MN-S (March 4, 2023) | Section 12.2.5 Mitigation Measures | <p>Issue #12-017: More clarity and commitment are required from Denison on social management mitigations and programming.</p> <p>For example, Denison could implement established mitigations to address effects that are identified in the Draft EIS related to community well-being, such as:</p> <ul style="list-style-type: none"> a) maintain a Community Liaison Coordinator position to work with communities throughout the Project and provide a grievance mechanism through which individuals can confidentially and independently raise issues should they arise. b) develop a Community Readiness program to support communities and businesses in assessing local capacity, identify critical gaps that would prevent community members from successfully gaining employment, and capture business and economic opportunities related to the Project. c) involving local communities in the development and implementation of monitoring programs could provide opportunities for employment during Construction to beyond the Decommissioning stage. <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide additional detail within the Final EIS related to Denison's commitment to developing mitigations that address potential effects to community well-being such as support for community accessible health and wellness programs, community liaisons, community readiness programs, and long-term monitoring opportunities. This includes mitigations that are prepared with MN-S, and NR1 and NR3 Locals involvement and agreement. | <p>Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS.</p> <p>Denison recognizes that both parents and members of the community/family could potentially be employed by the Project. Mitigation measures associated with potential effects to community cohesion and the commuter-rotation system are described in Section 12.1.5 and include:</p> <ul style="list-style-type: none"> - Working with Indigenous COIs to understand culturally important periods relative to harvest times and cultural camps to facilitate Indigenous employees taking time off to participate in such activities, where practicable; - Implementation of Denison's Indigenous Peoples Policy and advancement of reconciliation - Using a commuter rotation system has also shown to be effective in allowing Indigenous employees continued opportunities to spend time on the land, and important factor in the transmission of knowledge and language (see Section 11 for a description of potential effects to land use). <p>As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> |
| 514 | MN-S (March 4, 2023) | Section 12.2.6.2.2 Community Cohesion | <p>Issue #12-018: This analysis does not address the concerns expressed in the existing conditions reporting (section 12.2.3, p. 12-47 to 12-50) related to mental and physical health being affected by quality of water and land is being affected by industrial developments. This should be better reflected in the analysis of Community Cohesion.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide additional effects analysis of "Change in Community Cohesion" that considers Project- related construction, operations, and decommission impacts to mental, physical, and cultural health that stem from a relationship with the environment. For example, concerns were expressed in the Draft EIS reporting (section 12.2.3) related to mental and physical health being affected by quality of water and land is being affected by industrial developments. | Denison acknowledges that there is an interrelationship between the two and for the purposes of the EIS has been organized into separate sections. Section 11.1 provides an assessment on perceived suitability of lands and resources therein, along with human health. See Section 11.1.4, 11.1.5, and 11.1.6 for further information. |
| 515 | MN-S (March 4, 2023) | Section 12.2.6.2.2 Community Cohesion | <p>Issue #12-019: This statement, and the existing conditions reporting, presents evidence that stress and related responses are a potential indirect effect of changes to employment and income that could be related to the Project.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Considering the uncertainty identified in the Draft EIS about social effects of the Project on community cohesion, Denison needs to provide additional detail within the Final EIS related to Denison's commitment to developing monitoring and management programs to understand and respond adaptively to potential effects of the Project on community cohesion. This includes monitoring and management programs prepared with MN-S, and NR1 and NR3 Locals involvement and agreement that could support community members dealing with use of alcohol/substances and/or related violence and crime. | <p>Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. For the purposes of the organization of the EIS, such organizations as the MN-S and YNLR are understood as organizations.</p> <p>A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study.</p> |

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| | | | | <p>Section 12.2.4.2.1 describes that multiple pick-up points for workers will be determined as part of Project design, including additional locations to be determined relative to eligible labour force supply.</p> <p>As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> |
| 516 | MN-S (March 4, 2023) | Section 12.2.8 Monitoring and Follow-up | <p>Issue #12-020: This statement is vague about who will monitor community cohesion and whether Government departments and private- sector companies are committed to provide those services for the life of the Project. It also ignores previous statements in the Draft EIS that identify direct and indirect effects of uncertainty related to changes to community well-being that would be related to the Project.</p> <p>Denison's earlier statements indicate that monitoring and follow-up will be an aspect of mitigation. The statements seem contradictory.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison, in the Final EIS, needs to demonstrate that whether Government departments and private-sector companies are committed to provide community cohesion- related services for the life of the Project. - Denison needs to distinguish and clarify earlier statements of monitoring and follow- up with the assertion here. | <p>Denison is committed to implementing measures within its control and responsibilities (for example the EFAP and other measures). As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> <p>Monitoring of community cohesion at the community level is something Denison understands is for the Government to consider.</p> |
| 517, | MN-S (March 4, 2023) | Section 12.3.1.3.1 Spatial Boundaries | <p>Issue #12-021: Contrary to the text describing the Traffic Study Area, Highway 914 and Highway 165 are not labelled on Figure 12.3-3.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - MN-S request the revision of Figure 12.3-3 to include labelling of Highway 914 and Highway 165 in the Final EIS. | <p>Please refer to Figure 12.3-4 which describes the location of the Project in relation to Highway 914 and 165.</p> |
| 518 | MN-S (March 4, 2023) | Section 12.3.4.2.1 Potential Effect 1 – Change in Traffic | <p>Issue #12-022: The 31% or 51% increase in truck traffic on Highway 914 seems to represent a more than slight increase in traffic volume. It is acknowledged that this is related to 18 additional trucks per day. Clarification is required to determine if there would be a similar % increase in potential collisions.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to clarify and provide analysis of the impact of traffic volume and what is a suitable threshold. | <p>Denison believes it has fulfilled its information requirements for the EIS and supporting documentation as outlined in the EA guidance provided by the province and federal government. Notwithstanding that, Denison recognizes that further information will be required as the project moves through the EA and licensing / permitting processes. Denison will work with the province to identify and scope additional information requirements.</p> |
| 519 | MN-S (March 4, 2023) | Section 12.3.4.2.1 Potential Effect 1 – Change in Traffic | <p>Issue #12-023: Clarity is required to explain why collisions can not be predicted with accuracy given the availability of existing predictive modelling for traffic management planning.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison should provide further clarification in the Final EIS of why collisions can not be predicted with accuracy given the availability of existing predictive modelling for traffic management planning. | <p>To clarify, the text in Section 12.3.4.2.1. could have more specifically referenced accident rates as part the discussion of an increase in the number of collisions due to the Project. Overall, it is expected that accident rates will not be affected by the incremental increase in traffic associated with the Project. Traffic volume is a poor predictor of accident rates on relatively well traveled roads - that is, the accident rate does not show a direct relationship with traffic volume and is relatively consistent in this case. Extrapolating existing accident rates and specifically applying them to the Projects related traffic would provide some insight but it is understood that such extrapolation would be very conservative and overestimate the actual level of risk. Accident statistics are inclusive of all manner of accidents, the majority if which are single vehicle accidents that do not result in significant harm to people or property. Moreover, it would be expected that the likelihood of Project-related traffic accidents would occur at lower rates than those attributed to the general public based on the mitigations described in the draft EIS</p> |

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| | | | | <p>(Section 12.3.5) including: all drivers serving the Project will receive appropriate training related to the nature of materials being transported, including driver training to the highest standards based on the transportation of nuclear substances; vehicles transporting dangerous goods and/or hazardous products will display required placards and labels in accordance with provincial legislation and will follow designated highway corridors; an Emergency Response Plan will be developed in case there is a spill during the transportation of dangerous goods and/or hazardous products; and all, materials transported by truck will be compliant with any weight restrictions or permits, spring road restrictions, or geometric constraints set out by the Saskatchewan MOHI.</p> <p>The above notwithstanding, Denison recognizes the level of concern regarding Project related transportation it has received through engagement activities to date and will continue to solicit input on transportation concerns as the Project moves forward and as the Program / Plan / Procedure documentation is developed during licensing since elements of this documentation directly align with management of the aforementioned concerns (e.g., emergency response planning, transportation management planning).</p> |
| 520 | MN-S (March 4, 2023) | Section 12.3.4.2.2 Potential Effect 2 – Change in Community Infrastructure and Services | <p>Issue #12-024: Clarification is required to explain how Denison intends to provide employee maintenance support services that address the indirect effect to the community members (e.g., childcare, etc.) identified in this statement.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison to provide in the Final EIS additional detail on commitments to support employee families while on rotation. | <p>Section 12.3.5 describes the mitigation measures applicable to community infrastructure and services within the LSA communities, the following mitigation measures will be implemented to reduce adverse effects:</p> <p>(1) Services and programs will be provided on-site and will be accessible to workers. These services and programs may alleviate pressures on social and health services within LSA communities.</p> <p>(2) An EFAP will be part of each worker's benefits package and will provide supports to individuals and their families that may not be readily available in the communities. Employee and family assistance programs typically provide free assessments, short-term counselling, referrals, and follow-ups to employees and their family members who are having personal or work-related problems. Generally, EFAPs can be accessed remotely by workers and their immediate family. Denison will aim to educate their staff on the offerings of their EFAPs, as well as making that information shareable with individuals' families.</p> |
| 521 | MN-S (March 4, 2023) | Section 12.3.4.2.2 Potential Effect 2 – Change in Community Infrastructure and Services | <p>Issue #12-025: The services listed in Table 12.3-14 are predominately crisis management services and general health care services which are provided by existing organizations in the community/region. Clarification is required to identify the community services that Denison will make available to the families of local employees to address shift rotation issues (e.g., childcare services) and how Denison will help families with access these services.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison should clarify their commitment to providing provide community social services to the families of local employees to address issue identified in relation to the shift rotation (e.g., childcare services) | <p>As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> <p>As the Project site will be self-sufficient in terms of meeting the needs of the Project and its workforce, the effects related to local communities are associated with the effects of participation in employment and the associated commuter rotation system. With the application of mitigation measures described in Section 12.3.5, and given the distance between communities in the LSA and the Project site, the residual adverse effects are expected to be low in magnitude The overall conclusion relative to changes to Infrastructure and Services is not significant.</p> |
| 522 | MN-S (March 4, 2023) | Section 12.3.2 Influence of Indigenous Knowledge, Local Knowledge, and Engagement on the Assessment (p. 12- 108) | <p>Issue #12-026: Arrangements and applicable funding for a Métis Knowledge study is underway but not yet incorporated in the assessment.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to include in the Final EIS, Métis Knowledge study findings on their perspectives on infrastructure and services. | <p>A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study.</p> <p>As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing</p> |

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| | | | | adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions. |
| 523 | MN-S (March 4, 2023) | Section 12.3.4.2.2 Potential Effect 2 – Change in Community Infrastructure and Services | Issue #12-027 and 12-028: Clarification is required to indicate how the on-site programs would support community-based health services. Recommendations: - Denison to provide additional information of on-site health services that will alleviate community-based health services in NR1 and NR3. - Denison needs to confirm how social responsibility guidelines will support community infrastructure and services in NR1 and NR3 to help offset some of the interactions and effects to local communities and timelines for the action. | As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions. As the Project site will be self-sufficient in terms of meeting the needs of the Project and its workforce, the effects related to local communities are associated with the effects of participation in employment and the associated commuter rotation system. With the application of mitigation measures described in Section 12.3.5, and given the distance between communities in the LSA and the Project site, the residual adverse effects are expected to be low in magnitude. The overall conclusion relative to changes to Infrastructure and Services is not significant. |
| 524 | MN-S (March 4, 2023) | Section 12.3.5 Mitigation Measures | Issue #12-029: Most of the mitigations provided are standard worker health and safety and materials handling measures required for worker and environmental safety and don't address potential effects to traffic within the LSA. Detail is required to demonstrate how measures will address potential hazards from increased traffic volumes, and potential risk for conflict between road users and mining traffic. Recommendations: - Denison needs to provide additional information in the Final EIS on how the mitigation will alleviate traffic related impacts. | Denison believes the mitigations it has outlined for transportation management (and associated risks thereof) as detailed in the draft EIS (Section 12.3.5, Section 14, Appendix 14-A) are reasonable and practical measures it can take to manage its Project activities. It is acknowledged that the information provided in the EIS and its supporting documentation is presented at a planning level; however, this level of detail is appropriate at this stage of Project development. Further details as to how these mitigations will be implemented will be developed during the licensing / permitting phase and will be available for review at that time, rather than as part of the final EIS. Further to this, and as noted elsewhere, Denison recognizes the level of concern regarding Project related transportation it has received through engagement activities to date and will continue to solicit input on transportation concerns as the Project moves forward and as the Program / Plan / Procedure documentation is developed during licensing since elements of this documentation directly align with management of the aforementioned concerns (e.g., emergency response planning, transportation management planning). Mitigations in Section 12.3.5 also require Denison truck traffic to slow to 40 km/hr for a minimum of 2.5 km on either side of the culture camp(s) in which are understood to occur in September and October (dates may be adjusted at the communities' direction). Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3 and is committed to such engagement with respect to mitigation measures and monitoring plans. |
| 525 | MN-S (March 4, 2023) | Section 13.1.1 Valued Component Selection | Issue #13-001: This section of the draft EIS states: "Residents in the LSA and Regional Study Area (RSA) have expressed interest and concern about the Project's effect on the local economy, through income, training and employment opportunities, and business opportunities. Initial direction and input into VC selection was obtained from: - discussions with Indigenous and non-Indigenous Communities of Interest (COI); - discussions with LK holders; - discussions with government agencies and the public; - results of Denison's baseline studies; - regional data from other EAs; - results from engagement and consultation activity; and - similar or recent projects in the region." (p. 13-5 to 13-6) Recommendations: | Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. At the direction of the MN-S, Denison participated in meetings on February 12, 2023 with NR1 and on February 13, 2023 with NR3. The participants at these sessions were identified and invited by the MN-S. During these meetings, Denison shared information about the Project and the associated VCs assessed as part of the environmental assessment. No new VCs were identified as part of that discussion, and should new ones emerge through process, we would consider them at that time. |

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| | | | <ul style="list-style-type: none"> - In the Final EIS, Denison needs to include the input from MN-S, NR1 Locals, NR3 Locals and indicate if VCs were altered. | |
| 526 | MN-S (March 4, 2023) | Section 13.1.3.1 Spatial Boundaries | <p>Issue #13-002: Denison has not included MN-S or NR1 and NR3 Métis communities in the LSA for the assessment of the economy.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs justify its selection of LSA communities and why no Indigenous Communities of Interest nearest to the site are not in the LSA. The omission calls into question any economic interests of Métis in close proximity to the Project could have. - In the Final EIS, Denison to expand its evaluation to Métis communities. | <p>Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. For the purposes of the organization of the EIS, such organizations as the MN-S and YNLR are understood as organizations.</p> <p>A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study.</p> <p>Section 12.2.4.2.1 describes that multiple pick-up points for workers will be determined as part of Project design, including additional locations to be determined relative to eligible labour force supply.</p> <p>As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> |
| 527 | MN-S (March 4, 2023) | Section 13.1.3.2 Temporal Boundaries | <p>Issue #13-003: MN-S is interested in understanding all potential Project-related effects during Post-Decommissioning including economic impacts.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - MN-S requests that in the Final EIS, Denison include the addition of interactions and effects analysis for Post- Decommissioning impacts to economics that may stem from Employment Income within the LSA communities related to monitoring and the implementation of management programs to respond adaptively to potential effects of the Project. This includes monitoring and management programs prepared with MN-S, NR1 Locals, and NR3 Locals involvement and agreement. | <p>As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> <p>As the Project site will be self-sufficient in terms of meeting the needs of the Project and its workforce, the effects related to local communities are associated with the effects of participation in employment and the associated commuter rotation system. With the application of mitigation measures described in Section 12.3.5, and given the distance between communities in the LSA and the Project site, the residual adverse effects are expected to be low in magnitude. The overall conclusion relative to changes to Infrastructure and Services is not significant.</p> |

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| 528 | MN-S (March 4, 2023) | Section 13.1.4 Influence of Indigenous Knowledge, Local Knowledge, and Engagement on the Assessment | Issue #13-004: Denison has not sufficiently engaged MN-S, NR1 communities, and NR3 communities on the assessment of the Economics VC. Recommendations: - Denison needs to meet with MN-S, NR1 Locals, and NR3 Locals to discuss Project- related economic issues and interests. - MN-S request additional detail is included within the Final EIS, on how the input provided by MN-S, NR1 Locals, and NR3 Locals will influence the assessment of the Economics VC. | Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. At the direction of the MN-S, Denison participated in meetings on February 12, 2023 with NR1 and on February 13, 2023 with NR3. The participants at these sessions were identified and invited by the MN-S. During these meetings, Denison shared information about the Project and the associated VCs assessed as part of the environmental assessment. No new VCs were identified as part of that discussion, and should new ones emerge through process, we would consider them at that time. |
| 529 | MN-S (March 4, 2023) | Section 13.2.1.2 Participation Rate | Issue #13-005: Denison has not assessed the participation rate, employment rate, or unemployment rate of MN-S or NR1 and NR3 communities. Recommendations: - In the Final EIS, Denison needs to expand the description of the existing environment to include NR1 communities and NR3 communities. | Spatial boundaries for the Economy VC were selected to reflect the geographic areas where economic impacts from the Project are likely to be detectable and measurable. These impacts are expected to be driven primarily by the relationship and interactions between the Project and the COI. Further, Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. |
| 530 | MN-S (March 4, 2023) | Section 13.2.1.3 Employment Rate | Issue #13-006: Denison acknowledges that several barriers to employment in northern Saskatchewan exist without providing solutions to address and/or mitigate such barriers. Recommendations: - Denison needs to provide more detail within the Final EIS related to their role in developing and providing resources for training and employment as access has already been identified as a barrier to local communities. | Section 13.4 Mitigation and Enhancement Measures provides details on Denison's Human Resource Development Plan, which will initially prioritize Indigenous and non-Indigenous communities in the Local Study Area in terms of employment and training opportunities and will work with the leadership of these communities to assist in determining hiring and training practices during all phases of the Project - such as on the job training and career counselling to help with advancement from foundational positions, advance sharing of job qualification requirements, clearly identifying training requirements and working with various training institutions, including Northlands College, to make sure such appropriate training is available, and creation of scholarship and support programs. Priority for employment and training will then focus on Indigenous and non-Indigenous residents of the Regional Study Area and then beyond the Regional Study Area. A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study. |
| 531 | MN-S (March 4, 2023) | Section 13.2.3 Key Indicator: Traditional Economy | Issue #13-007: The Métis Knowledge study by MN-S has not been completed and included in the Draft EIS. Recommendations: - Denison needs to engage all potentially impacted Métis communities. Specifically, Denison should equally engage all NR1 and NR3 Locals in addition to Kineepik Metis Local #9 on potential Project-related effects to Métis traditional economy throughout the life of the Project. - The Final EIS needs to include the Métis Knowledge Study once completed. | A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study. As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions. |

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| 532 | MN-S (March 4, 2023) | Section 13.2.4.1 Local Businesses | <p>Issue #13-008: The EIS states: “Economic leakage (i.e., money leaving the local economy) is a relevant concern, particularly for small, concentrated economies. Economic leakage can occur at various points through the cascade of spending in an economy, but the closer that leakage occurs to the point source of investment, the more potential economic benefit that is lost.” (p. 13-51)</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide more certainty and detail within the Final EIS related to local employment and procurement mitigation to manage for and reduce ‘economic leakage’. | Denison's Indigenous Peoples Policy sets out priority for Indigenous employment and procurement (among other items). With respect to employment, as noted in Section 13.3.2.1 of the EIS, Residents of Saskatchewan's North (i.e., those resident in the northern administration district of Saskatchewan) are prioritized for employment as an expected condition of the Surface Lease Agreement, similarly for goods and services to service the Project. With respect to procurement, Denison has established an internal procurement policy approach. The approach requires that Denison consider businesses within the local study area first and the Northern Administrative District second, prior to looking elsewhere (southern Saskatchewan and/or outside of Saskatchewan) throughout all phases of the Project. Section 13.4 Mitigation and Enhancement Measures also provides details on Denison's Human Resource Development Plan, which will initially prioritize Indigenous and non-Indigenous communities in the Local Study Area in terms of employment and training opportunities and will work with the leadership of these communities to assist in determining hiring and training practices during all phases of the Project, priority for employment and training will then focus on Indigenous and non-Indigenous residents of the Regional Study Area and then beyond the Regional Study Area. |
| 533 | MN-S (March 4, 2023) | Section 13.3.1 Potential Interactions Between the Project and Valued Component / Key Indicators | <p>Issue #13-009: Denison does not include MN-S or NR1 communities within the LSA in the assessment on the economy and therefore employment, training, and business opportunities will not be prioritized for all potentially impacted Métis.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison to include MN-S and all NR1 communities in the LSA for the economy VC in the Final EIS. | <p>Spatial boundaries for the Economy VC were selected to reflect the geographic areas where economic impacts from the Project are likely to be detectable and measurable. These impacts are expected to be driven primarily by the relationship and interactions between the Project and the COI.</p> <p>Further, Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS.</p> |
| 534 | MN-S (March 4, 2023) | Section 13.3.1 Potential Interactions Between the Project and Valued Component / Key Indicators | <p>Issue #13-010: Potential Project interactions for the Economy VC do not reflect feedback shared by MN-S/NR1 and NR3 Locals.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to discuss potential Project interactions for economy to Métis peoples and update Table 13.3-1 to reflect feedback shared by MN-S/NR1 and NR3 Locals. | <p>Spatial boundaries for the Economy VC were selected to reflect the geographic areas where economic impacts from the Project are likely to be detectable and measurable. These impacts are expected to be driven primarily by the relationship and interactions between the Project and the COI.</p> <p>Further, Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS.</p> |
| 535 | MN-S (March 4, 2023) | Section 13.3.2.1 Potential Effect 1 - Employment and Training | <p>Issue #13-011: Denison has not included MN-S or NR1 and NR3 Métis communities in the LSA for the assessment of the economy. Denison also has not engaged MN-S or all potentially impacted NR1 and NR3 communities to understand Métis concerns and/or interests related to employment and training opportunities.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to engage all potentially impacted Métis communities. Specifically, Denison should equally engage all NR1 and NR3 Locals in addition to Kineepik Metis Local #9 on interests and concerns related to employment and training opportunities throughout the life of the Project. - Denison needs to provide more detail within the Final EIS related to their role in developing and providing resources for training and employment as access has already been identified as a barrier to local communities. This includes training programs prepared with MN-S/NR1 and NR3 Locals involvement and agreement. | <p>Spatial boundaries for the Economy VC were selected to reflect the geographic areas where economic impacts from the Project are likely to be detectable and measurable. These impacts are expected to be driven primarily by the relationship and interactions between the Project and the COI. Further, Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS.</p> <p>Section 13.4 Mitigation and Enhancement Measures provides details on Denison's Human Resource Development Plan, which will initially prioritize Indigenous and non-Indigenous communities in the Local Study Area in terms of employment and training opportunities and will work with the leadership of these communities to assist in determining hiring and training practices during all phases of the Project - such as on the job training and career counselling to help with advancement from foundational positions, advance sharing of job qualification requirements, clearly identifying training requirements and working with various training institutions (such as Northlands College) to make sure such appropriate training is available, and creation of scholarship and support programs. Priority for employment and training will then focus on Indigenous and non-Indigenous residents of the Regional Study Area and then beyond the Regional Study Area.</p> |

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| 536 | MN-S (March 4, 2023) | Section 13.3.2.1 Potential Effect 1 - Employment and Training | <p>Issue #13-012 and 13-013: Denison has not identified Métis-specific considerations to their employment and training program. Denison has indicated that there will in-house training, as well. It is not clear how this will be delivered.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide more certainty and detail within the Final EIS related to local training and employment. More detail within the Final EIS related to Denison's role in developing and providing resources for training and employment as access has already been identified as a barrier to local communities. This includes training programs prepared with MN-S/NR1 and NR3 Locals involvement and agreement. - More information is needed to understand Denison's approach and commitment to addressing effects to local employment especially as it relates to Foundational positions and why a Grade 12 education is required. - Denison needs to update the Economics Section to reflect the latest census and the effects that Covid has had on employment in the LSA and RSA. - Denison needs to engage MN-S, NR1 Locals, and NR3 Locals to discuss employment and training opportunities for Métis (e.g., discussing Métis-specific recruitment strategies). Opportunities to discuss include (but are not limited to): hiring and training practices during all phases of the Project, on-the-job training and career counselling to help with advancement from foundational positions, advance sharing of job qualification requirements, clearly identifying training requirements and working with various training institutions to make sure such appropriate training is available, and creation of scholarship and support programs. | <p>Denison, through a Human Resource Development Plan, will initially prioritize Indigenous and non-Indigenous communities in the LSA in terms of employment and training opportunities (anticipated to be in institutions in northern Saskatchewan) and will work with the leadership of these communities to assist in determining hiring and training practices during all phases of the Project, which could include such items as on-the-job training and career counselling to help with advancement from foundational positions, advance sharing of job qualification requirements, clearly identifying training requirements and working with various training institutions (such as Northlands College) to make sure such appropriate training is available, and creation of scholarship and support programs. Priority for employment and training will then focus on Indigenous and non-Indigenous residents of the RSA and then beyond the RSA.</p> <p>All positions at the Project will require a Grade 12 education or equivalent. Section 13.3.2.1 describes how foundational positions (i.e. entry level) require Grade 12 education and in-house training programs, although a combination of skills and experience may be considered. These positions would include process plant operators, site services, drillers, and catering/janitorial staff.</p> <p>Denison will update the Economics Section to reflect the latest census and the effects that Covid has had on employment in the LSA and RSA.</p> <p>Further, Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS.</p> |
| 537 | MN-S (March 4, 2023) | Section 13.3.2.2 Potential Effect 2 – Income | <p>Issue #13-014: Initiating efforts with LSA communities excludes most of the Métis communities and keeps them from benefiting.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - The Final EIS needs to include additional evaluation of non- LSA communities potential for income benefits. | <p>Denison's Indigenous Peoples Policy sets out priority for Indigenous employment and procurement (among other items). With respect to employment, as noted in Section 13.3.2.1 of the EIS, Residents of Saskatchewan's North (i.e., those resident in the northern administration district of Saskatchewan) are prioritized for employment as an expected condition of the Surface Lease Agreement, similarly for goods and services to service the Project. With respect to procurement, Denison has established an internal procurement policy approach. The approach requires that Denison consider businesses within the local study area first and the Northern Administrative District second, prior to looking elsewhere (southern Saskatchewan and/or outside of Saskatchewan) throughout all phases of the Project. Section 13.4 Mitigation and Enhancement Measures also provides details on Denison's Human Resource Development Plan, which will initially prioritize Indigenous and non-Indigenous communities in the Local Study Area in terms of employment and training opportunities and will work with the leadership of these communities to assist in determining hiring and training practices during all phases of the Project, priority for employment and training will then focus on Indigenous and non-Indigenous residents of the Regional Study Area and then beyond the Regional Study Area.</p> |
| 538 | MN-S (March 4, 2023) | Section 13.3.2.3 Potential Effect 3 - Traditional Economy | <p>Issue #13-015: Denison has not incorporated Métis Knowledge from MN-S, NR1, or NR3 (except Métis Knowledge from Kineepik).</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison will need to revise the potential effects evaluation after completion of the MKS. | <p>A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study.</p> <p>As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> |

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| 539 | MN-S (March 4, 2023) | Section 13.3.2.3 Potential Effect 3 - Traditional Economy | Issue #13-016: Denison has not included details on closure planning including traditional economic activities that can be expected upon decommissioning. Recommendations: In the Final EIS, Denison needs to provide additional information on closure planning and what traditional economic activities can be expected upon decommissioning. | The draft EIS includes the Project's Conceptual Decommissioning Plan (CDP) (see Section 2.2.3). As the name implies the decommissioning plan for the site is presented at a relatively high level commensurate with the stage of Project development, including consideration of physical decommissioning activities and reclamation (or restoration) activities. With specific reference to reclamation / restoration the draft EIS notes that disturbed areas would be returned to become a self-sustaining and viable wildlife habitat, but little further detail is provided at this early stage. That detail will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP. As the decommissioning plan becomes more specific and granular it is expected that the design basis will become more detailed. Denison noted the MN-S interest in how traditional economic activities can be integrated into the decommissioning plan and such considerations can be made as the plan evolves. Denison is committed to continued engagement with the MN-S at their direction, inclusive of engagement in NR1 and NR3, and within that context expects that integration of traditional economic activities within the context of site decommissioning will be part of those discussions. |
| 540 | MN-S (March 4, 2023) | Section 13.3.2.3 Potential Effect 3 - Traditional Economy | Issue #13-017: Denison has not engaged MN-S, NR1, and NR3 to understand Métis-specific effects of the Project's proposed commuter-rotation schedule. Recommendations: (1) In the Final EIS, Denison needs to provide more detail related to worker rotation system mitigation. Particularly considering the identification of reported difficulty in balancing the demands of a worker rotation system with traditional economy activities. | Denison acknowledges the concern raised regarding participation in the traditional economy related to working at an industrial operation. Participation in the worker rotation system would present similar challenges as those described in the Métis Knowledge Study Report which describes how people's ability to go out on the land is challenged by work schedules generally and the busyness of the modern world. Mitigation offered for other VCs would equally apply to an individual's ability to continue to participate in culturally important activities, such as: - working with Indigenous COIs to understand culturally important periods relative to harvest times and cultural camps to facilitate Indigenous employees taking time off to participate in such activities; and - implementation of Denison's Indigenous Peoples Policy and advancement of reconciliation; Other uranium operations in northern Saskatchewan have shown that using a commuter rotation system has been effective in allowing Indigenous employees continued opportunities to spend time on the land, which similarly supports the traditional economy. Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3, and within that context expects that the concerns raised by the review comment will be part of those discussions. |
| 541 | MN-S (March 4, 2023) | Section 13.3.2.3 Potential Effect 3 - Traditional Economy | Issue #13-018: As identified in section 11.1.6 (p. 11-66 to 11-68), Indigenous land use may be affected by the Project despite mitigations. It is reported that Project-related effects such as noise and dust can cause avoidance of the area by some resource harvesters while others may be undeterred. Recommendations: (1) Denison needs to include in the Final EIS, information provided by Métis in NR1 and NR3 once the MKS is completed. (2) Denison needs to support Métis training opportunities through Northlands College. | Section 13.4 Mitigation and Enhancement Measures provides details on Denison's Human Resource Development Plan, which will initially prioritize Indigenous and non-Indigenous communities in the Local Study Area in terms of employment and training opportunities and will work with the leadership of these communities to assist in determining hiring and training practices during all phases of the Project - such as on the job training and career counselling to help with advancement from foundational positions, advance sharing of job qualification requirements, clearly identifying training requirements and working with various training institutions, including Northlands College, to make sure such appropriate training is available, and creation of scholarship and support programs. Priority for employment and training will then focus on Indigenous and non-Indigenous residents of the Regional Study Area and then beyond the Regional Study Area. A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study. |

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| 542 | MN-S (March 4, 2023) | Section 13.4 Mitigation and Enhancement Measures | <p>Issue #13-019: Limited listing of potential measures for consideration.</p> <p>Recommendations:</p> <p>(1) It is unclear from the description of Mitigation and Enhancement Measures whether Impact and Benefit Agreements (IBAs) will be included. Impact and Benefit Agreements are a normal vehicle for extending economic benefits to Indigenous communities.</p> <p>(2) In the Final EIS, confirm whether IBAs are also a mitigation and enhancement measure.</p> | <p>Denison's Indigenous Peoples Policy sets out priority for Indigenous employment and procurement (among other items). With respect to employment, as noted in Section 13.3.2.1 of the EIS, Residents of Saskatchewan's North (i.e., those resident in the northern administration district of Saskatchewan) are prioritized for employment as an expected condition of the Surface Lease Agreement, similarly for goods and services to service the Project. With respect to procurement, Denison has established an internal procurement policy approach. The approach requires that Denison consider businesses within the local study area first and the Northern Administrative District second, prior to looking elsewhere (southern Saskatchewan and/or outside of Saskatchewan) throughout all phases of the Project. Section 13.4 Mitigation and Enhancement Measures also provides details on Denison's Human Resource Development Plan, which will initially prioritize Indigenous and non-Indigenous communities in the Local Study Area in terms of employment and training opportunities and will work with the leadership of these communities to assist in determining hiring and training practices during all phases of the Project, priority for employment and training will then focus on Indigenous and non-Indigenous residents of the Regional Study Area and then beyond the Regional Study Area.</p> |
| 543 | MN-S (March 4, 2023) | Section 13.4 Mitigation and Enhancement Measures | <p>Issue #13-20: Denison has not engaged MN-S or all NR1 Locals and NR3 Locals to understand employment and training needs to support Métis involvement in the Project.</p> <p>Recommendations: Denison indicated multiple pick-up points but a minimum of 3 points (2 in the LSA and 1 in Saskatoon). In the Final EIS, Denison needs to clarify if pick-up points will be extended to the RSA communities so that they can take advantage of employment opportunities.</p> | <p>Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. For the purposes of the organization of the EIS, such organizations as the MN-S and YNLR are understood as organizations.</p> <p>A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study.</p> <p>Section 12.2.4.2.1 describes that multiple pick-up points for workers will be determined as part of Project design, including additional locations to be determined relative to eligible labour force supply.</p> <p>As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> |
| 544 | MN-S (March 4, 2023) | Section 13.5.1.1 Employment and Training | <p>Issue #13-021: Denison has not identified mitigation and enhancement measures to support their conclusion that employment and training residual effects are expected to be low to moderate in magnitude.</p> <p>Recommendations:</p> <p>(1) Denison needs to expand its description of mitigation and enhancement measures to better support their conclusion that employment and training residual effects that are low to moderate in magnitude in Section 13.5.</p> | <p>Denison recognizes that there is a need for and will be an annual evaluation of outcomes. The residual effect on employment and training during Construction, Operation, and Decommissioning is expected to be positive. Positive effects are expected to occur primarily in the LSA and RSA but are also expected to extend beyond the RSA as the labour demands of the Project are unlikely to be met with local resources only. Effects associated with employment are expected to occur continuously through each Project phase, while it is anticipated that training efforts will be focused largely during the operational phase (although some initiatives may be in place prior to the onset of Operation to maximize opportunities). Effects will be reversed after Decommissioning is completed; however, individuals who benefits from employment and training will have skills to carry forward to future opportunities.</p> <p>Section 13.5 describes the mitigation and enhancement measures for economy, including those specific to education and training:</p> <ul style="list-style-type: none"> Denison, through a Human Resource Development Plan, will initially prioritize Indigenous and non-Indigenous communities in the LSA in terms of employment and training opportunities (anticipated to be in institutions in northern Saskatchewan) and will work with the leadership of these communities to assist in determining hiring and training practices during all phases of the |

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| | | | | <p>Project, which could include such items as on-the-job training and career counselling to help with advancement from foundational positions, advance sharing of job qualification requirements, clearly identifying training requirements and working with various training institutions (such as Northlands College) to make sure such appropriate training is available, and creation of scholarship and support programs. Priority for employment and training will then focus on Indigenous and non-Indigenous residents of the RSA and then beyond the RSA.</p> <ul style="list-style-type: none"> • Denison will plan a workforce transition plan prior to Decommissioning of the mine. • Denison will negotiate with the Province of Saskatchewan to develop the Project's SLA and the Human Resource Development Agreement, which will outline measures in relation to socio-economic parameters related to the Project. |
| 545 | MN-S (March 4, 2023) | Section 13.6.1 Climate Change Considerations | <p>Issue #13-022: Denison did not identify how the Métis would be involved in the development, review, and/or implementation of the Project's detailed plans and procedures.</p> <p>Recommendations:</p> <p>(1) The Final EIS needs to include the detailed plans and procedures for review.</p> <p>(2) The plans and procedures need to include input from MN-S, and NR1 and NR3 Locals.</p> | <p>Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. For the purposes of the organization of the EIS, such organizations as the MN-S and YNLR are understood as organizations.</p> <p>A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study.</p> <p>Section 12.2.4.2.1 describes that multiple pick-up points for workers will be determined as part of Project design, including additional locations to be determined relative to eligible labour force supply.</p> <p>As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> |
| 546 | MN-S (March 4, 2023) | Section 15.5.3 Effects on the Project | <p>Issue #15-001: Meeting current regulations and building codes may not be sufficient for short-term or long-term environmental effects as they are characterized in the Draft EIS (e.g., forest fires, flooding). Please provide detail on how the Project will be designed to exceed current regulations in anticipation of changing to environmental conditions.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide additional detail in the Final EIS describing how the Project will be designed beyond current regulations and building codes in anticipation of changes to environmental conditions. | <p>From an operations perspective the current mine design is sufficiently robust such that changes in environmental conditions that may be expected, such as increased precipitation event intensity, over the operational life of the mine can be accommodated. For example, the design basis for water management infrastructure far exceeds standard design basis. The following is noted regarding the design basis for water management infrastructure for reference. The probable maximum precipitation (PMP) value of 493 mm selected for design of water management infrastructure, such as ponds, is similar to total annual precipitation (456 mm from Key Lake station, and 483 mm from 1981-2020 climate normals). The selected PMP is well above (>5 times higher): 1) current/measured 24-hour maximum precipitation, 2) modelled 1 in 100 year 24-hour return for current conditions, 3) modelled 1:100 year 24 hour return for a future (2020-2050) period, 4) the predicted maximum 1-day precipitation under different emissions scenarios for the future (including RCP8.5 in the 2021-2050 period).</p> <p>Design basis to accommodate environmental change over the longer term is a factor that will be considered as it pertains to decommissioning. The Project's Conceptual Decommissioning Plan (CDP) is included in the draft EIS, and are presented at a relatively high level commensurate with the stage of Project development. The details of decommissioning and restoration will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP. As the decommissioning plan becomes more specific and granular it is expected that the design basis will become more detailed. Denison is committed to and will factor in longer term considerations of environment and climate within the evolution of the decommissioning plan,</p> |

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| | | | | and in particular as it concerns how changes in environment and climate could affect decommissioning and restoration goals. |
| 547 | MN-S (March 4, 2023) | Section 15.5.3 Effects on the Project | <p>Issue #15-002: Further details are required on how emergency preparedness and response plans will adaptively respond to changing climatic conditions and potential unforeseen effects to the Project.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide additional detail in the Final EIS about their commitment to developed adaptive emergency preparedness and response plans to address unforeseen effects to the Project resulting from climate change. | <p>Section 2.9.1.3.5 of the draft EIS provides the commitment to develop an Emergency Preparedness and Response Program (EPRP). The EPRP would be established to identify how the Project will prepare for and addresses emergencies that may affect the health and safety of persons, the environment, and the protection of property. The EPRP would be developed in a manner that aligns with guidance provided by CNSC in REGDOC-2.10.1. As noted on the draft EIS, Denison has opted to execute the overall Project approvals process - that is, the environmental assessment and licensing / permitting processes - in series and not simultaneously. As such, the documentation will be developed during the licensing / permitting phase and will be available for review at that time rather than as part of the final EIS. The level of information provided in the draft EIS is appropriate for the stage at which the overall Project approvals process currently sits, and as noted, MN-S and others, will have an opportunity to review documentation that is developed at later stages of the overall approvals process as appropriate. It is confirmed that the EPRP will include provision for change management and an explanation as to how change management will occur. The EPRP will be a living document that will be reviewed regularly and updated as needed - such updates may be required for a myriad of reasons including those related to climate change as noted by the review comment.</p> |
| 548 | MN-S (March 4, 2023) | Appendix 2-A 19-EN-CNSC-1.23, Workshop, 2018-01-16 | <p>Issue #2A-001: The site tour on January 16, 2018 only included the following Métis representation: A La Baie Métis Local #21, Kineepik Métis Local #9, MN-S, and Patuanak Métis Local #82. In addition, other Indigenous Nations were present. It is unclear from Denison's table format who asked how long to freeze and would the freeze wall be kept intact for the life of the operation. Denison shared responses to these questions in their Draft EIS.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Engagement on the proposed Project needs to extend to NR1 communities. The Final EIS should include proof of this engagement and responses to concerns raised. | <p>Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. For the purposes of the organization of the EIS, such organizations as the MN-S and YNLR are understood as organizations.</p> <p>A Capacity Funding Agreement was signed with the MN-S to complete a Métis Knowledge Study by the end of October 2023. As part of this study agreement, Denison agreed to fully fund the Métis Knowledge Study. Denison received the Métis Knowledge Study from the MN-S on October 24, 2023. Denison has updated the revised draft EIS to include relevant information in the assessment from the Métis Knowledge Study.</p> <p>Section 12.2.4.2.1 describes that multiple pick-up points for workers will be determined as part of Project design, including additional locations to be determined relative to eligible labour force supply.</p> <p>As noted in the draft EIS, Section 8.2.9 "Specific follow-up and monitoring plans will be prepared to refine and finalize approach in consultation with Indigenous groups, other interested parties, and relevant federal and provincial agencies with interest in the development and implementation of this VC specific program." MN-S will be informed throughout the monitoring program design and implementation process. Monitoring program design and implementation will be guided by the following principles: meet regulatory requirements, confirm the effectiveness of mitigation measures and predictions made in the assessment, implementing adaptive management (if/where applicable) to reduce effects during the lifetime of the Project, and will ensure that spatial boundaries are sufficiently extensive to measure EIS predictions.</p> |

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| 549 | MN-S (March 4, 2023) | Appendix 2-A 22-EN-EQC-648.1, Presentation, 2022- 03-03 | Issue #2A-002: These meetings had representation from Métis Local #39 (La Loche) and no other Métis. It is unclear who asked, "What are the concerns with groundwater monitoring...". MN-S does not consider Denison's engagement with the EQC as engagement with MN-S or Métis communities. MN-S prefers Denison specify feedback shared at joint workshops by Indigenous Nation. Recommendations: - Denison engagement with Métis communities has been limited. In the Final EIS, MN-S expects to see more informed engagement and responses to concerns raised. | Thanks and noted. Denison continues to engage with the MN-S at their direction, inclusive of engagement in NR1 and NR3. Denison understands the MN-S is a governing body of the Métis Citizens in Saskatchewan and recognizes that communities the MN-S governs may be included as a COI and are recognized as such in the EIS. |
| 550 | MN-S (March 4, 2023) | Appendix 7-C, Numerical Modelling: Post-decommissioning Evaluation, Executive Summary | Issue #7C-001: Page ii of this document states states: ""By accounting for these reactions, the simulated dissolved constituent plumes emanating from the ore zone reach their maximum extents within the deeper units (i.e., Lower Sandstone Aquifer and deeper parts of the Desilicified Zone) after approximately 10,000 years. Consequently, concentrations at Whitefish Lake throughout the future centuries are simulated to be similar to background concentrations. Under the base case scenario, which represents a conservative estimate of the conditions present, there are no exceedances of the groundwater quality screening criteria protective of freshwater aquatic life in the receiving environment." Whether conditions are "conservative" or not, is dependent on perspective. Recommendations: - Denison needs to provide further rationale detailing how the "base case scenario" represents a conservative estimate of the conditions present. | It is acknowledged that additional details could have been added to the Appendix 7-C Executive Summary to provide more fulsome context for the comment that the "base case scenario" is conservative. The basis for this statement was the robust data set of subsurface geochemistry that supported the assumptions in the model with respect to concentrations of sorbing mineral phases and the uncertainty analysis that was performed. The uncertainty analysis evaluated the potential that conditions at the base case were not adequately conservative. The uncertainty analysis is detailed in Section 4.7 of the report. This included increasing the mass of chemical constituents of potential concern (COPCs) within the source (mining area), increasing the hydraulic conductivity of key zone and/or hydrostratigraphic units, decreasing the number of reactive sites for sorption of COPCs, removing some sorbent phases altogether from key hydrostratigraphic units, and other scenarios focused on geochemical and hydrologic uncertainties. Altogether, there were 15 uncertainty scenarios tested in addition to the base case. For the base case, and all uncertainty scenarios, no exceedances of ground water quality screening criteria were generated at Whitefish Lake into the future (i.e. over the "future centuries" period), apart from those that reflect natural conditions. The results are provided in detail in Sections 4.6.6 and 4.7.1 of Appendix 7-C and the consistency of the uncertainty results with the base case affirms that the base case simulation is appropriate for decision-making. |
| 551 | MN-S (March 4, 2023) | Appendix 7-C, Numerical Modelling: Post-decommissioning Evaluation, Executive Summary | Issue #7C-001: Denison provides no rationale for "conservative dispersivity values" in the Draft EIS. Recommendations: - Denison needs to provide site-specific research to confirm literature dispersivity values are conservative in the Final EIS. | Site-specific research, as understood from the comment, would require a natural gradient tracer test over the distances of interest (> 1 km). Such testing would take centuries, and therefore is not practical. For this reason, use of literature dispersivities is standard practice. |
| 552 | MN-S (March 4, 2023) | Appendix 7-C, Numerical Modelling: Post-decommissioning Evaluation, Executive Summary | Issue #7C-001: Additional modelling will be needed to confirm at the time of decommissioning the assumption that there is "large assimilative capacity" of the groundwater system, in order to manage risk in Whitefish Lake. Recommendations: - Denison to complete simulations that increase focus on maintaining containment of the contaminant source for a greater period of time (i.e., a higher level of focus on source term control and flushing), and less reliance on management of contaminant along the pathway, prior to the contaminant reaching the receptor. In other words, simulations that focus, to a greater extent, on evaluating the benefit of additional effort and time on source term control (the first step in the risk hierarchy of source, pathway, receptor). | The comment is noted and it is Denison's intent to continue to evaluate what is reasonably achievable with respect to remediation of the mining zone water quality prior to discontinuation of containment measures. After 30+ years of monitoring we will be in a better position to update predictions and have enhanced confidence in the assimilative capacity. Flushing of the source zone is part of the planned remedy and would only be stopped once the target level of remediation has been achieved. Beyond that flushing period (which may take years), if conditions indicate additional long-term source control is required, then Denison may have to do that, but our current understanding suggests long-term source control is not needed so long as the flushing is able to reduce source concentrations to the target amounts. Lab testing suggests the proposed flushing will be effective at reducing concentrations to the target values. Additionally, we note that refinement of the mining area decommissioning objectives and associated modelling will be done as the Project progresses through updates to the Decommissioning Plan; nevertheless, the objectives as they may evolve will be bound by the objectives evaluated in the EIS, which as shown are protective of aquatic biota in Whitefish Lake. The final acceptable mining area decommissioning objectives will be developed prior to initiation of groundwater remediation, as part of the Detailed Decommissioning Plan (DDP). Prior to executing decommissioning activities, Denison shall prepare and submit the DDP to regulators for acceptance. In this case the DDP would reflect input that will be solicited from Indigenous Nations and communities and others prior to its submission and would also be informed by conditions on the ground at the site at that time, operational experience that has |

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| | | | | been gained and the regulatory landscape at that time. As is highlighted above, the decommissioning plan will evolve over time and the plan will become more refined as the Project advances. |
| 553 | MN-S (March 4, 2023) | Appendix 7-C, Numerical Modelling: Post- decommissioning Evaluation, 2.4 Scope of Work | Issue #7C-001: Denison assumes non-surface reaching groundwater will not be extracted or accessed by future generations. Recommendations: - Denison to study and provide further understanding of deep groundwater characteristics with MN-S, NR1 Locals, and NR3 Locals prior to commencement of mining operations. This information may affect final closure options. - Denison to consider modelling for surface receptors of deep groundwater beyond the boundaries identified in Section 1.1. | Denison did complete engagement with Interested Parties, including Indigenous Communities of Interest and it is based on that engagement that it is understood deep groundwater use does not presently occur, nor is expected to in the future. Further, impacted groundwater is 100's of meters below ground surface, which is far below what would be needed for a future water supply as the flow through the shallower aquifer is far greater than through the deep aquifer. During operations, Denison will continue and expand groundwater monitoring to ensure that current study findings are realistic. Modelling simulations report the highest levels of predicted discharge to surface water - any discharge to more distant surface water bodies would be at even further reduced concentrations. Prior to executing decommissioning activities, Denison shall prepare and submit the DDP to regulators for acceptance. In this case the DDP would reflect input that will be solicited from Indigenous Nations and communities and others prior to its submission and would also be informed by conditions on the ground at the site at that time, operational experience that has been gained and the regulatory landscape at that time. |
| 554 | MN-S (March 4, 2023) | Appendix 7-C, Numerical Modelling: Post- decommissioning Evaluation 2.4.1 Groundwater Recharge | Issue #7C-001: Denison's Draft EIS does not confirm if the groundwater recharge rates were adjusted for potential changes to recharge as a result of climate change. Recommendations: - Denison should develop a Project-specific climate change model database, which clearly articulates the shared socioeconomic pathway (SSP) the Project is choosing from IPCC AR6, and show how that scenario has been down-scaled for use within Project modelling predictions, and present the results in the Final EIS. | <p>A qualitative and quantitative assessment of climate change and groundwater and surface water is provided:</p> <p>The experience of the Project team regarding studies of climate change and the impacts on groundwater at other sites generally shows a range of potential positive and offsetting negative impacts. While warmer temperatures will lead to extended periods of summer drought conditions extending into early fall, warmer winters are predicted as well, resulting in less snowpack accumulation, more frequent snowmelt events, and more frequent rainfall during periods when evapotranspiration is negligible. These warmer winter conditions are often simulated to produce enhanced groundwater recharge during late fall, winter, and early spring conditions. In particular, the lack of enhanced snowpack is simulated to result in less severe spring run-off conditions, indicating that more of the winter precipitation that falls will infiltrate. Overall, this is anticipated to result in enhanced groundwater recharge in the mid- to late-century periods.</p> <p>If, however, lower groundwater recharge was to result from climate change, it would reduce the groundwater driving force for mass transport of mining related fluids, and reduce mass loading to receiving water bodies such as Whitefish Lake. In other words, lower groundwater recharge resulting from higher evapotranspiration would result in slower mass transport to the receiving water bodies, reducing the risk of exposure.</p> <p>Section 8.1.3.4 (and Appendix 8-C) provides a quantitative assessment of the potential changes in surface water quantity due to climate change. The 1:100 year, 24-hour return period rainfall events for the baseline and climate change influenced IDF curves are 79.9 mm and 88.6 mm, respectively. The PMP for the Project is estimated to be 493 mm (refer to IR-15 and AD-15) which is well above both 24-hour maximum precipitation and 1:100, 24 hour return precipitation events. The PMP is very conservative (e.g., assumes effectively a full year of precipitation in one event) under both existing and future conditions (climate change). The potential impacts of climate change to precipitation and therefore flows was summarized in Appendix 6-C, Table 10 with the total annual precipitation and the maximum 1-day events being variable over the next four decades (Table 1). Regardless, the climate change scenario indicates a potential increase in event based assimilative capacity in the receiving environment.</p> <p>TABLE 1- Existing and Predicted Precipitation Data for Key Lake (provided in EIS, Appendix 6- C, Table 10).</p> |

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| | | | | <p>To mitigate the potential for unplanned release of deleterious substances into the surface water environment even during the next 40 years of climate change, the PMP of 493 mm was used for water management engineering designs. During a PMP, water requiring management will report to the wellfield runoff pond which will be sized to accommodate a PMP event at the site. This pond has been sized to 38,200 m³ (excluding a freeboard of 1 meter). From the wellfield runoff pond, water will then be sent to the process water pond for treatment if required. In Section 2.8 Project Design Features, Denison notes that "Ponds will be designed to maintain a minimum freeboard of at least 1.0 m to allow for continued functioning during a probable maximum precipitation (PMP) event." As such, the project has been designed to manage water during PMP and greater, and therefore mitigation of potential impacts to water quality due to climate change has been initially included as part of the EIS. As a result, it is Denison's opinion that a quantitative assessment of potential impacts to surface water quality is not warranted as it is likely to indicate improved results from the conservative assessment of potential water quality changes during operation and decommissioning phases. Continued monitoring of background, effluent and receiver water quality will be undertaken and provide the ability for adaptive management throughout the life of the mine in association with potential climatic changes to the local and regional area.</p> <p>As a result the continued technical review until October 2024, Denison has made the following commitment: Denison will conduct a sensitivity analysis of low flows and high flows to assess how low and high flows may change under future climate conditions and the potential implications on water quality predictions made during the EA phase.</p> |
| 555 | MN-S (March 4, 2023) | Appendix 7-C 2.4.2 Surface Water Features | <p>Issue #7C-001: Water levels in surface water features are not static; they change in response to regional climate and flow conditions. This would influence the interaction between groundwater and surface water, as the assumption by the model developer is that water levels are input as static head boundary conditions.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to explain in the Final EIS why static head boundary conditions are used for the modelling beyond a need to simplify the modelling. | <p>Water levels within surface water bodies were monitored over several years. The range of observed water levels at Whitefish Lake (SA-6) during 2016-2018 was 499.5 to 500.2 m ASL, with an average of 500.1 m ASL; as such the value assigned in the model (500.0) is an accurate (and slightly conservative) reflection of the average water level observed. What is important is the hydraulic head difference over the 300-year (or more) transport travel time. Recognizing that future conditions could be different by as much as 2 m (i.e., the depth of Whitefish Lake), this range of water level could be tested.</p> |
| 556 | MN-S (March 4, 2023) | Appendix 7-C 2.5.2.1 Water Level Elevations – Quantitative Calibration | <p>Issue #7C-001: Denison does not provide the basis, explanation, or literature to state that a calibrated model to observe water levels is sufficient with a deviation of +/- 2m.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide an explanation, basis, and/or literature to state that a calibrated model to observe water levels is sufficient with a deviation of +/- 2m in the Final EIS. | <p>The mean residual is 0.23 m, not 2 m as inferred. The 2 m guidelines are merely presented for reference. The literature is quoted regarding the goodness of fit parameter NRMS, which is normalized so that it can be applied to any model. The NRMS achieved within the Denison model is 4.1%, whereas the literature (Spitz and Moreno) recommend 10% or less. As such the model is considered calibrated by literature standards. The qualitative term "excellent match" is based on 30-years of experience in developing 100's of similar numerical groundwater flow models.</p> |
| 557 | MN-S (March 4, 2023) | Appendix 7-C 2.5.2.3 Statistical Measures of Calibration to Water Levels | <p>Issue #7C-001: Denison provides no rationale/basis for considering a mean error of 0.23 considered to be an "excellent match" to the observed water levels.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison should provide an explanation, basis, and/or literature for why a mean error of 0.23 is considered to be an "excellent match" to the observed water levels in the Final EIS. | <p>The mean residual is 0.23 m, not 2 m as inferred. The 2 m guidelines are merely presented for reference. The literature is quoted regarding the goodness of fit parameter NRMS, which is normalized so that it can be applied to any model. The NRMS achieved within the Denison model is 4.1%, whereas the literature (Spitz and Moreno) recommend 10% or less. As such the model is considered calibrated by literature standards. The qualitative term "excellent match" is based on 30-years of experience in developing 100's of similar numerical groundwater flow models.</p> |

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| 558 | MN-S (March 4, 2023) | Appendix 7-C 2.6.3 Groundwater Flow Quantity | Issue #7C-001: Ecological receptors could potentially be exposed to groundwater flows. Recommendations: - Denison should provide an understanding of deep groundwater as a contaminant pathway to ecological receptors within immediate vicinity in the Final EIS. | Denison and its SMEs believe that this (i.e., what is referenced in the review comments) is what has been done (and presented in the report) by evaluating groundwater flow to a small portion of Whitefish Lake. At other locations (e.g., the edges of the Lake), shallow groundwater will be discharging, which has not come into contact with the deeper groundwater. |
| 559 | MN-S (March 4, 2023) | Appendix 7-C 2.7.1 Groundwater Demand | Issue #7C-001: The Project has assumed that it is “conservative” to supply all water for the Project from outside the ore zone, and assume minimal influent from re-cycled / treated water. This statement supports that position. Recommendations: - Denison should provide simulations that maximize recycling treated water, rather than minimize using recycled water for the Project. - Denison to confirm how groundwater quality predictions differ when recycled and treated water is used to supply water to the Project, as compared to assuming conditions as noted in this statement. | <p>With respect to the first bullet: It is believed that the analysis completed is appropriate given that it represents a conservative (i.e., protective) means by which to assess the activities potential effects. The scenarios / simulations referenced in the review comment therefore are bounded by the conservative water supply assessment as it concerns potential Project effects to groundwater quantity. Denison concurs with the idea that it would be beneficial to maximize recycling of water and will strive to do so; however, this is more of an operational consideration. As outlined in draft EIS Section 2.2.3, Denison intends to recycle process water to the greatest extent possible, thereby reducing the demand for fresh water supply and volume of treated effluent. In an effort to develop a conservative assessment basis for the EA, the water recycle flows from the industrial wastewater treatment plant back into the processing plant and wellfield have not been incorporated into the estimates for freshwater withdrawal and treated effluent discharge.</p> <p>An overview of the site water balance during Construction, Operation, and Decommissioning are provided in draft EIS Figure 2.2-14, Figure 2.2-15, and Figure 2.2-16, respectively. These figures provide a summary of the water needs for certain Project activities, plans for water treatment (both potable and wastewater), and the general flow of managed water at the site. The estimated flows in the site water balances do not account for water recycle back into the processing plant and wellfield. This results in a conservative estimate of both freshwater withdrawal needs and treated effluent discharge rates.</p> <p>With respect to the second bullet point: Under the modelled scenarios, in which water is withdrawn from three water supply wells, the shallow groundwater system is simulated to recover very quickly following the cessation of decommissioning. Thus, the taking of shallow groundwater during Operations and Decommissioning will not influence the overall transport of potential contaminants in Post-Decommissioning after the containment (including the freeze wall) is removed. In addition, it should be recognized that if less water is withdrawn from the shallow bedrock for Operation, that additional groundwater left in the flow system will naturally act to further dilute any concentrations reaching the shallow aquifer and surface water receptors. That is why we feel the simulations presented are conservative.</p> |
| 560 | MN-S (March 4, 2023) | Appendix 7-C 2.7.3 Hydrogeological Change Due to Mine Operations | Issue #7C-001: The interaction of increase drought or increased precipitation (i.e., climate change) could potentially affect the length of time for full recovery of groundwater recharge due to potential changes in climate conditions. Recommendations: - MN-S requests that interaction between climate change scenarios and groundwater modelling should be included in the Final EIS. | <p>The experience of the Project team regarding studies of climate change and the impacts on groundwater at other sites generally shows a range of potential positive and offsetting negative impacts. While warmer temperatures will lead to extended periods of summer drought conditions extending into early fall, warmer winters are predicted as well, resulting in less snowpack accumulation, more frequent snowmelt events, and more frequent rainfall during periods when evapotranspiration is negligible. These warmer winter conditions are often simulated to produce enhanced groundwater recharge during late fall, winter, and early spring conditions. In particular, the lack of enhanced snowpack is simulated to result in less severe spring run-off conditions, indicating that more of the winter precipitation that falls will infiltrate. Overall, this is anticipated to result in enhanced groundwater recharge in the mid- to late-century periods. If, however, lower groundwater recharge was to result from climate change, it would reduce the groundwater driving force for mass transport of mining related fluids, and reduce mass loading to receiving water bodies such as Whitefish Lake. In other words, lower groundwater recharge resulting from higher evapotranspiration would result in slower mass transport to the receiving water bodies, reducing the risk of exposure.</p> <p>The groundwater model will be updated over the course of mine life to among other things support the decommissioning plan that will consider recovery in the mining zone. Such model</p> |

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| | | | | scenarios would incorporate up to date information with respect to climate change and the potential effects of climate change on the groundwater environment. |
| 561 | MN-S (March 4, 2023) | Appendix 7-C 2.7.3 Hydrogeological Change Due to Mine Operations | <p>Issue #7C-001: It is unclear if the statements made about full recovery and 90% recovery are defensible given that calibrated hydraulic conductivity values, as shown in Table 2-2 (p. 2.7), for the lower sandstone aquifer ranges over 2 orders of magnitude, and the ore zone calibrated hydraulic conductivity over nearly 5 orders of magnitude, and that no range in hydraulic conductivity is reported for the desilicified sandstone aquifer (i.e., a single calibration value is reported).</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison should provide simulations that consider the full range of calibrated hydraulic conductivity values in the Final EIS. | <p>The calibrated hydraulic conductivity values are consistent with observed data. The calibrated K value for the intermediate aquitard was 1×10^{-8} m/s, which is in the middle of the range of values reported from point testing within this unit (Range: 10^{-10} to 3.8×10^{-6} m/s), and similar to the geomean value (8.4×10^{-9} m/s). Thus, the calibrated K value is within a factor of 1.2 of, and higher than, the geomean value. The hydraulic conductivity value for the Intermediate Aquitard is similar to that applied by AECL at Cigar Lake (5×10^{-8} m/s). Similarly, the K values applied for the Upper and Lower Sandstone Aquifer units are consistent with the field measured values, particularly for this fractured rock environment. The high end of the packer tested range of K values varied by 2 orders of magnitude between the aquifer and aquitard units, which is consistent with the definition of aquifer / aquitard differentiation. The interpretation of an aquifer-aquitard-aquifer sequence is consistent with the AECL interpretation of the Athabasca Sandstone at the Cigar Lake mine.</p> <p>When packer testing in fractured rock, the hydraulic conductivity associated with any test depends on whether the packed zone contains a continuous fracture set. However, for the unit as a whole, it is important that the model represent the hydraulic conductivity (or transmissivity) representative of the interconnected fracture network. Thus, it is appropriate that the applied hydraulic conductivity values within the aquifers are consistent with the higher end of tested conductivity values within those units. Within aquitard units, having singular higher conductivity fracture values from packer tests that test local fractures only, does not necessarily indicate large-scale transmissivity.</p> <p>A fault feature is suspected along the western perimeter of the Lower Sandstone Aquifer near Kratchkowsky and Williams Lake, located 1.5 km west of the mine site (also as depicted on the Hydrogeological Conceptual Site Model). This feature was interpreted to exist based on the similarity in groundwater levels between deep and shallow aquifers in that particular area (c.f., water levels along the creek south of Williams Lake and within GWR-029, as well as water levels recorded in open boreholes near Kratchkowsky Lake), as well as geochemistry in GWR-029. The geochemistry and water levels show in the vicinity of GWR-029 are different, however, than conditions within the Lower Sandstone aquifer further east of this area, above and east of the Phoenix deposit.</p> <p>The effect of the fault feature along the western edge of the Lower Sandstone aquifer was incorporated within the numerical model both through enhanced hydraulic conductivity parameters, as required to match observed water levels, and boundary conditions applied to introduce as much inflowing water to the Lower Sandstone Aquifer as the water level data suggest is reasonable.</p> <p>As a result of the continued technical review until October 2024, Denison will do additional sampling and characterization of the desilicified zone to support the post operation transport model.</p> |

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| 562 | MN-S (March 4, 2023) | Appendix 7-C 3.1.1 Groundwater Remediation | <p>Issue #7C-001: No time period is provided to reach acceptable levels of remaining contaminants or effective remediation accomplished in order to leave the area in a pre- mining condition.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide more clarity on what the expected time period to reach acceptable levels of remaining contaminants or effective remediation in order to leave the area in a pre- mining condition. This unknown time frame may play into the viability of remediation and final closure costing. | <p>Groundwater remediation targets provided in the draft EIS were from derived from metallurgical test results completed from 2017 to 2021 with over 125 kg of material recovered from Phoenix deposit that underwent leaching and neutralization test work (see response to IR-67). In 2022 and 2023, metallurgical test work continued to further optimize remediation and strategies and confirm test work results presented in the draft EIS. It is expected that metallurgical test work will continue in the future to further optimize remediation targets, and this will be advanced through updates to the Decommissioning Plan. The Feasibility Field Test (FFT) provided additional confirmation that pH target and remediation targets could be met. Data gathered during the neutralization phase of the FFT provide confidence that groundwater targets proposed in the draft EIS can be met technically and economically. Based on laboratory testing and the results of the 2022 field testing, subsurface remediation is planned to consist of rinsing the ore zone with 35 pore volumes of fresh water, slowly raising the pH and then pumping about 75 pore volumes of basic solution through the same portion of the ore zone. This basic solution will in effect further raise the pH to a level that impedes further leaching of the deposit and reduces aqueous concentrations of contaminants of concern to below their environmental target levels.</p> <p>Refinement of the mining area decommissioning objectives and associated modelling will be done as the Project progresses through updates to the Decommissioning Plan; nevertheless, the objectives as they may evolve will be bound by the objectives evaluated in the EIS, which as shown are protective of aquatic biota in Whitefish Lake. The final acceptable mining area decommissioning objectives will be developed prior to initiation of groundwater remediation, as part of the Detailed Decommissioning Plan (DDP). Prior to executing decommissioning activities, Denison shall prepare and submit the DDP to regulators for acceptance. In this case the DDP would reflect input that will be solicited from Indigenous Nations and communities and others prior to its submission and would also be informed by conditions on the ground at the site at that time, operational experience that has been gained and the regulatory landscape at that time. As is highlighted above, the decommissioning plan will evolve over time and the plan will become more refined as the Project advances.</p> <p>As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Métis Local on a monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project.</p> |
| 563 | MN-S (March 4, 2023) | Appendix 7-C 5.2.2 Assumptions | <p>Issue #7C-001: Climate change as a variable does not appear to have been incorporated into the modelling.</p> <p>Recommendations:</p> <ul style="list-style-type: none"> - Denison needs to provide more clarity in the Final EIS on how climate change as a variable has been incorporated into the ground water modelling as climate changes scenarios and effects on the groundwater could affect the closure pathway. | <p>The experience of the Project team regarding studies of climate change and the impacts on groundwater at other sites generally shows a range of potential positive and offsetting negative impacts. While warmer temperatures will lead to extended periods of summer drought conditions extending into early all, warmer winters are predicted as well, resulting in less snowpack accumulation, more frequent snowmelt events, and more frequent rainfall during periods when evapotranspiration is negligible. These warmer winter conditions are often simulated to produce enhanced groundwater recharge during late all, winter, and early spring conditions. In particular, the lack of enhanced snowpack is simulated to result in less severe spring run-off conditions, indicating that more of the winter precipitation that falls will infiltrate. Overall, this is anticipated to result in enhanced groundwater recharge in the mid- to late-century periods. If, however, lower groundwater recharge was to result from climate change, it would reduce the groundwater driving force for mass transport of mining related fluids, and reduce mass loading to receiving water bodies such as Whitefish Lake. In other words, lower groundwater recharge resulting from higher evapotranspiration would result in slower mass transport to the receiving water bodies, reducing the risk of exposure.</p> <p>The groundwater model will be updated over the course of mine life to among other things support the decommissioning plan that will consider recovery in the mining zone. Such model scenarios would incorporate up to date information with respect to climate change and the potential effects of climate change on the groundwater environment.</p> |

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| 564 | Prince Albert Grand Council (PAGC) (March 6, 2023) | General Comments | <p>Overall Comments from the PAGC submission: The EIS does not address multiple issues related to ecosystems, human health, and the long-term sustainability of the Wheeler River project, particularly Indigenous concerns regarding the loss of caribou, wolverine and other culturally significant animals. There are no details on economic benefits from the mines through Indigenous partnerships, including equity-based participation in the workforce with training opportunities for Indigenous personnel to operate in management roles.</p> <p>[Additional questions on this topic directed to regulators or government entities are included in the CNSC table]</p> | <p>The potential effects of the Wheeler River Project on the aquatic and terrestrial environments have been comprehensively assessed in the EIS and related supporting documentation. The spatial scale is very small (resulting from ISR mining method) of 160 hectares. A conservative approach was taken in the assessment and the overall conclusion was made that there would be no significant adverse residual effects in consideration of proposed mitigations.</p> <p>The Wildlife LSA was designed to capture the majority of the Project effects. The Wildlife LSA extends beyond the Project Area of the site to include a reasonable estimation of where sensory disturbance from Project-related activities would extend and where effects on wildlife including caribou are most likely to occur. Further the Local Study Area for Indigenous Land and Resource Use (Section 11.1) is defined as the Project footprint plus the maximum combined extents of the supporting Valued Components for the Regional Study Area for aquatic, terrestrial, noise, and health as these components can affect the Indigenous resource use environment to ensure that all possible effects to resources were considered. Section 9 describes how consideration of potential effects to wildlife and wildlife habitat are considered within the EIS. In regard to caribou, Denison has developed a Conceptual Caribou Mitigation Plan based on discussions between Denison and Saskatchewan Ministry of Environment. Denison utilized Traditional Knowledge provided by Indigenous communities in the assessment and in the development of the Plan.</p> <p>A Human Health Risk Assessment (HHRA) was undertaken for the Project in Section 10. The HHRA evaluated direct exposure to constituents of potential concern (or contaminants) released to air and water, and through indirect exposure to the constituents associated with soil, sediment, and food, such as fish, wildlife, and plants. The assessment was inclusive of information based on use of traditional foods. The overall conclusion of the HHRA was that there would be no significant adverse effects to human health from the Project.</p> <p>Denison's decommissioning commitment is to return the land back to the Province of Saskatchewan for unrestricted surface land use post-closure. The Project's Conceptual Decommissioning Plan (CDP) is included in the draft EIS. The details of decommissioning and restoration will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP.</p> <p>Denison, through a Human Resource Development Plan, will initially prioritize Indigenous and non-Indigenous communities in the LSA in terms of employment and training opportunities (anticipated to be with institutions in northern Saskatchewan) and will work with the leadership of these communities to assist in determining hiring and training practices during all phases of the Project, which could include such items as on-the-job training and career counselling to help with advancement from foundational positions, advance sharing of job qualification requirements, clearly identifying training requirements and working with various training institutions to make sure such appropriate training is available, and creation of scholarship and support programs. Priority for employment and training will then focus on Indigenous and non-Indigenous residents of the RSA and then beyond the RSA.</p> |
| 565 | PAGC (March 6, 2023) | Loss of Use and Access to Traditional Lands and Resources | <p>The EIS does not capture Indigenous Elders' understanding of the human impact, climate change and cumulative effects on wildlife including caribou or other species at risk and the resulting impacts on Indigenous livelihoods. Denison's EIS states that existing disturbances in the area are from exploration activities with a general description of how disturbances from these activities will be managed. PAGC does not find sufficient evidence that the affected areas can be restored to their former state and will impact woodland caribou habitats.</p> <p>PAGC Elders prioritize the removal or reduction of human disturbances to the landscape for caribou recovery and wish to avoid projects which have a significant environmental impact. PAGC elders do not want to see any animals or plants disappear from the landscapes they use based on their traditional understanding of the relationship between humans and nature. This impacts the ability to practice treaty rights and entitlements to the lands which impact physical and mental health and mixed economy connected to hunting and gathering.</p> <p>PAGC urges Denison to understand and take an eco-cultural approach to preserve wildlife and landscape health when planning mining operations and decommissioning processes. This should include use of Indigenous Knowledge in delineating caribou habitats despite the data</p> | <p>Denison remains committed to conducting meaningful engagement with Indigenous communities potentially affected by the Project and to understanding how the proposed development of the Project may affect the ability of Indigenous peoples to exercise collective Indigenous and Treaty Rights.</p> <p>The potential effects of the Wheeler River Project on the aquatic and terrestrial environments have been comprehensively assessed in the EIS and related supporting documentation. The spatial scale is very small (resulting from ISR mining method) of 160 hectares. A conservative approach was taken in the assessment and the overall conclusion was made that there would be no significant adverse residual effects in consideration of proposed mitigations.</p> <p>The Wildlife LSA was designed to capture the majority of the Project effects. The LSA extends beyond Project Area of the site to include a reasonable estimation of where sensory disturbance from Project-related activities would extend and where effects on wildlife including caribou are most likely to occur. Section 9 describes how consideration of potential effects to wildlife and wildlife habitat are considered within the EIS. In regard to caribou, Denison has developed a Caribou Management Framework based on discussions between Denison and Saskatchewan Ministry of Environment. Denison utilized Indigenous Knowledge provided by Indigenous</p> |

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| | | | and woodland caribou traditional ecological knowledge available in the report published by Mamun and Brook (2017). | <p>communities in the assessment and in the development of the Framework. Denison notes that the objective of Mamun and Brook (2017) was to support the provincial range planning process for conservation of woodland caribou. The range planning process for SK1 is currently underway. As needed, Denison's Framework will be updated to be consistent with the management goals defined by ENV for SK1. Additionally, as part of its boreal caribou management efforts, the province is working with industry to develop effective and practice approaches to mitigate potential effects of activities on woodland caribou through offsetting. Denison is committed to continue to work with the province to finalize the habitat offset requirement using the province's habitat offset calculator.</p> <p>Section 11 of the draft EIS provides the assessment of potential Project effects on Indigenous Land and Resource Use (Section 11.1) and Other Land and Resource Use (Section 11.2). The mitigation measures proposed in the aquatic and terrestrial assessments translated into undetectable changes in resource availability to existing and future users and rightsholders. The assessment does not take an eco-cultural approach but rather one focused on VCs, key indicators and associated measurable parameters, which are standard in impact assessment. Mitigation to eliminate, reduce, or control potential adverse effects of the Project on Indigenous Land and Resource Use would apply to any uses proximal to the Project. Given proven mitigation is to be applied to traffic disturbances, noise, air quality, and increased competition for resources, the effects are expected to be minimal.</p> <p>Denison's decommissioning commitment is to return the land back to the Province of Saskatchewan for unrestricted surface land use post-closure. The Project's Conceptual Decommissioning Plan (CDP) is included in the draft EIS. The details of decommissioning and restoration will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP.</p> |
| 566 | PAGC (March 6, 2023) | Appendix 7-C 2.5.2.3 Statistical Measures of Calibration to Water Levels | Additional traffic and associated noise from the proposed project are a concern and PAGC requests that Denison puts a speed limit of about 70km/hour for trucks in the boreal forest where woodland caribou reside and are used by barren land caribou in winter. | <p>The proposed operation is fly-in, so Project related traffic, and associated noise, to the area would only be related to deliveries of materials to and from the site. On-site staff will not have access to personal (or company) vehicles. The Project will not change public access to the area. The existing gate on Highway 914 near Cameco's Key Lake Operation will remain in place and no changes to the gate and the process for controlling access to Highway 914 north of the Key Lake Operation are proposed as part of the Wheeler River Project.</p> <p>Section 12.3.4.2.1 of the draft EIS describes change in traffic as a result of the Project, including truck average annual daily traffic and average annual daily traffic. Given proven mitigation, as described in Section 12.3.5, to be applied to traffic disturbances and associated noise the effects are expected to be minimal. Section 11.1.5 also describes the mitigation measures to reduce the impacts of traffic and noise, among others. For example, air transportation will be used to transport most workers between the Project site and designated pick-up and drop-off points in communities and noise generating equipment will be situated behind on-site obstructions.</p> <p>In regard to caribou, Denison has developed a Conceptual Caribou Mitigation Plan based on discussions between Denison and Saskatchewan Ministry of Environment. Denison recognizes the level of concern regarding Project related transportation it has received through engagement activities to date and will continue to solicit input on transportation concerns as the Project moves forward. As outlined in Denison's Indigenous Peoples Policy, Denison is committed to respecting Indigenous knowledge and values regarding environmental stewardship and Indigenous peoples' connection to the land, and to minimize potential effects where possible. As an example, Section 11.1.5.3 describes that Denison will require truck traffic to slow down to 40 km/hr for a minimum of 2.5 km o either side of the ERFN and KML (Pinehouse #9) cultural camps, which are understood to occur in September and October (but may be adjusted at the communities direction).</p> |

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| 567 | PAGC (March 6, 2023) | Appendix 7-C 2.6.3 Groundwater Flow Quantity | PAGC finds that science-based models used for EIA reports put Indigenous people at a disadvantage as Indigenous communities are not involved in the collection, analysis and interpretation of data for models. Indigenous culture does not make use of models, rather, they follow natural changes and patterns which sometimes are not reflected in scientific findings. Requesting feedback from Indigenous communities on a report full of models prepared without Indigenous involvement has limited value as PAGC members are not fully engaged throughout the process. This approach is somewhat disrespectful to Indigenous communities as they are not part of the development process and PAGC reserves the right to reject the EIA or EIS. PAGC requests a commitment from Denison to get Indigenous communities involved in each stage of the documentation and report preparation process. | Denison acknowledges that Indigenous ways of knowing are distinct from western science, and have included Indigenous knowledge shared by communities in the impact assessment process. For example, Section 10.1.2 describes that Indigenous Knowledge and Local Knowledge were used to inform assumptions used in the human health risk assessment which helped identify human health receptors (i.e., people) who consume traditional foods, specifically in terms of their locations, residency times, and components of the traditional foods diet. In this instance, Indigenous knowledge was used to complement western science. Denison remains committed to conducting meaningful engagement with Indigenous communities potentially affected by the Project and to understanding how the proposed development of the Project may affect the ability of Indigenous peoples to exercise collective Indigenous and Treaty Rights. Through the environmental assessment process ERFN and other Indigenous communities have opted to utilize third party supports to complement their review of the EIS. Third party reviews were supported by both agreements executed between Denison and Indigenous communities, along with participant funding offered by the CNSC. Section 4 of the EIS describes the engagement undertaken with Indigenous communities and organizations. Denison continues to work with its Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, and an example of their continued involvement from the outset to end of a process includes the commitment to collaborating with English River First Nation and Kineepik Métis Local on a community specific monitoring regime, suited to each of their interests and needs, in an agreed-upon fashion. Denison is committed to continual improvement in relation to such collaborative monitoring programs, in order to adapt to areas of interest which can change over time. It is expected that the data collected through such monitoring regimes would also be relevant to other Indigenous nations who may have interest in the Project. |
| 568 | PAGC (March 6, 2023) | Appendix 7-C 2.7.1 Groundwater Demand | PAGC request additional details from Denison regarding plans to incorporate Indigenous partnership in the economic benefit of the mines, equity-based participation in the workforce and training opportunities for Indigenous personnel to operate in management roles. PACG suggest arranging long-term funding for youth education in science that would prepare them for careers in biology and environmental science, which is very uncommon among Indigenous communities. Increasing Indigenous representation in science and technology, and participation in development planning is therefore a valuable long-term goal. | As outlined in Denison's Indigenous Peoples Policy, Denison recognizes the critical necessity of advancing reconciliation with Indigenous peoples in Canada and the important role of Canadian business in the reconciliation process. Denison is committed to providing Indigenous people and businesses with sustainable economic opportunities and benefits and sharing the economic benefits of Denison's business activities. Denison's Indigenous Peoples Policy sets out priority for Indigenous employment and procurement (among other items). With respect to employment, as noted in the Economics section of the EIS, Residents of Saskatchewan's North (i.e., those resident in the northern administration district of Saskatchewan) are prioritized for employment as an expected condition of the Surface Lease Agreement, similarly for goods and services to service the Project. With respect to procurement, Denison has established an internal procurement policy approach. The approach requires that Denison consider businesses within the local study area first and the Northern Administrative District second, prior to looking elsewhere (southern Saskatchewan and/or outside of Saskatchewan) throughout all phases of the Project. Denison, through a Human Resource Development Plan, will initially prioritize Indigenous and non-Indigenous communities in the LSA in terms of employment and training opportunities (anticipated to be in institutions in northern Saskatchewan) and will work with the leadership of these communities to assist in determining hiring and training practices during all phases of the Project. This may include initiatives associated with youth education in science if that is the interest and priority of the communities. Training could also include such items as on-the-job training and career counselling to help with advancement from foundational positions, advance sharing of job qualification requirements, clearly identifying training requirements and working with various training institutions to make sure such appropriate training is available, and creation of scholarship and support programs. Priority for employment and training will then focus on Indigenous and non-Indigenous residents of the RSA and then beyond the RSA. |

Attachment: IR-10

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| Number | IR-10 |
| Dept. | ECCC |
| Project effects link | Fish and fish habitat |
| Reference to EIS, appendices, or supporting documentation | Section 2.2.1.4.2.3, Tertiary Containment of Mining Solution - Freeze Wall |
| Context and Rationale | <p>Context: The Proponent stated that as a tertiary means of containment for the mining area, the uranium deposit is proposed to be surrounded by a freeze wall that extends from the surface to the basement rock, isolating the mining area from regional groundwater. Current plans are for the freeze wall to be a minimum of 10 m thick, be installed 25 m away from the uranium deposit, and extend 30 m into the basement rock (Figure 2.2-6).</p> <p>As explained in Section 2.2.1.4.2.2, mining solution will be injected into the ore zone under pressure and will likely react, not just with the uranium in the ore zone, but also the binding or cementing material in the sandstone. This means that some portion of the sandstone above the uranium layer and perhaps some portions of the freeze wall will dissolve, thereby creating more void than just the thickness of the uranium layer or horizon. The void may affect the integrity of the freeze wall as containment.</p> <p>Rationale: It is not clear how the Proponent will monitor the freeze wall to verify whether portions of the freeze wall are being dissolved in the mining process and how it plans to verify the integrity of the freeze wall as a containment for the mining solution. In addition, if the dissolution reaction of the uranium ore is exothermic, then the heat generated may also affect the integrity of the freeze wall.</p> |
| Information Requirement | <ol style="list-style-type: none"> 1. Explain how the integrity of the freeze wall will be maintained as a means of containment that prevents migration of the mining solution out of the ore zone into the receiving environment. 2. Demonstrate that the mining solution injected under pressure will not compromise the integrity of the freeze wall as a containment. |

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| | <p>3. Demonstrate how both exothermic and chemical reactions of the mining solution used to dissolve the uranium ore will not compromise the integrity of the freeze wall as a containment.</p> <p>Technical Discussion Required: Yes. ECCC would like to better understand the chemical constituents that compose the mining solution and the chemical reactions that it will cause</p> |
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Response:

The general theme of the comments and questions stated above seem to be related to:

- verification of the freeze wall extents;
- response of the freeze wall to potential chemical interaction with the lixiviant;
- response of the freeze wall to induced hydraulic or lithostatic stress; and
- response of the freeze wall to potential exothermic processes related to ISR.

The alignment of the freeze wall is located 25 m offset from the lateral extent of the recoverable ore and the freeze wall will grow in thickness both towards the ore and away from the ore. The freeze wall will solidify all liquid porewater and develop into a contiguous impermeable barrier many metres thick. Ground temperature monitoring will be installed on both the ore and non-ore sides of the freeze wall to confirm the thickness of frozen ground and to validate thermal finite element models of the entire area. Thermal models can very accurately represent real conditions because ground thermal properties used in the analyses only vary by a factor of two to four across all ground types, unlike hydraulic or strength properties, which can vary by many orders of magnitude across relatively short distances.

The figures below are an example of field data validating modelled predictions for a shaft freeze wall at depth.

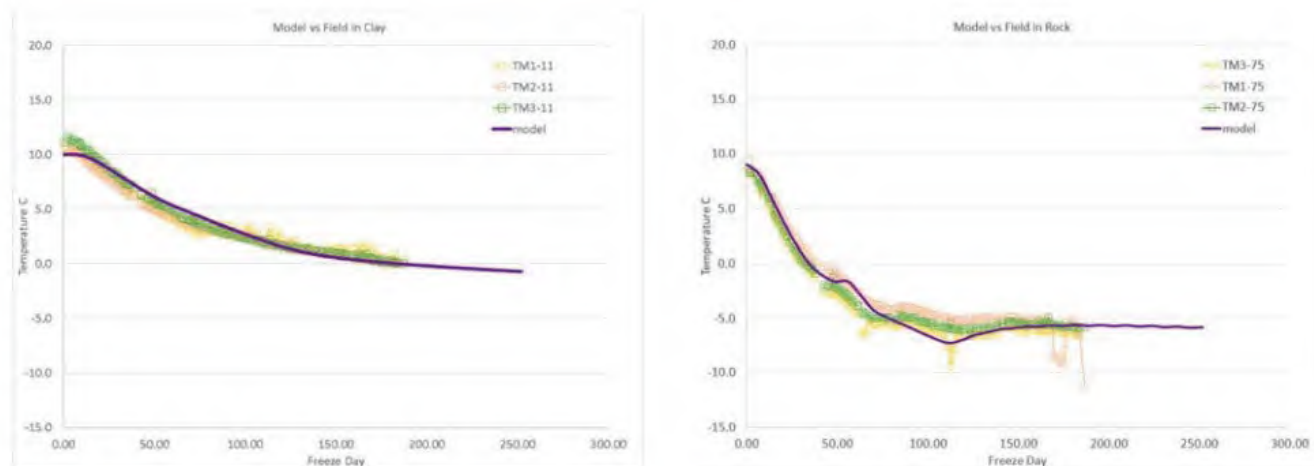


Figure 1: Illustration of a calibrated FEM model for freezing in clay (left) and rock (right). Temperatures were measured offset from the freeze wall pipe locations and compared with model predictions at the same location.

The injection and recovery wells will be set up such that they are within the confines of the ore itself and migration of fluids towards the freeze wall and through non ore ground between the ore and freeze wall should be minimized because hydraulic gradients will induce preferential flow to recovery wells and away from the freeze wall. Having said that, if significant excursion of lixiviant were to occur and it were to contact the freeze wall, it is not expected to chemically dissolve the in situ ice. The freezing point depression of the lixiviant proposed for this project was determined to be -1°C and, as such, it would freeze off and become immobile before significant volume could negatively impact the freeze wall. If the lixiviant were to dissolve some of the host soil / rock binding material at the freeze wall surface, it would occupy the resulting void space, but then freeze off, which would halt further migration within the freeze wall.

Freeze walls, when fully developed, are capable of withstanding significant external pressures because the ice in the pore voids greatly improves the bulk strength of the soil. For example, in the province of Saskatchewan, ground freezing is used to support the sinking of deep potash mine shafts, which must penetrate through the Mannville formation at a depth between 400 and 500 m below surface. The Mannville formation is often described as saturated, unconsolidated beach sand and it would not support shaft excavation in a thawed state. Freezing is used to create a structural and impermeable wall up to 5 m thick, which can resist a stress gradient driven by full hydrostatic and/or lithostatic pressures on the outside of the wall, and an open to atmosphere excavation within the shaft. This loading condition is much more extreme than any condition the freeze walls at the Phoenix deposit will experience because the interior side of the freeze wall where active ISR mining is occurring is not open to atmosphere and is fluid filled in the same way that the regional groundwater system is on the exterior side of the freeze wall, creating a balanced pressure system, where loading is equal on both the interior and exterior sides.. While freeze walls are very strong when fully developed, they are also plastic in nature. This means that they can slowly deform without failing in response to localized ground deformations. As the freeze wall deforms towards a lower stress zone, it maintains its thickness and integrity. While the above example referred to potash shafts, other examples can be drawn from the experience at the McArthur River or Cigar Lake uranium mines. At McArthur River, open stopes are generated directly adjacent to a freeze wall that is a nominal 4 m thick. At Cigar Lake, open mine cavities 10 m high and several metres in diameter commonly exist within the frozen ground. Neither site has had a breach of the freeze wall during mining activity. Given that the freeze wall at Denison will be much thicker than at McArthur River and that it will be located up to 25 m from the ore zone, it is not anticipated that it will be exposed to a stress environment that will put it at risk.

The leaching process has the potential to be exothermic and generate heat, which may flow toward the freeze wall. In this instance, there is low sulphur content in the ore zone and the exothermic reaction will be minimal. Despite this, all thermal modelling in support of the freeze design assumed that the freeze wall had to develop and be sustained in the presence of an ore zone that generated a nominal amount of heat—sufficient enough to sustain a minimum temperature of 10°C even though it would naturally tend to cool below this in response to the freeze system. It is understood that the lixiviant may be heated as part of the pre-injection process, so some accounting for heat in the ore zone was included in the analysis to date. Should the lixiviant generate more exothermic reaction than predicted, there is a very low risk of it degrading the freeze wall in any significant amount. Referring back to the potash mine shaft freezing illustration, it is not uncommon for in shaft excavation activity and concrete work to

generate temperatures between 30 and 60°C that act on a freeze wall only 5 m thick and only a few metres away from the exposed shaft wall. In this extreme case, the freeze wall is more than capable of removing the generated heat. The physics of heat flow are such that heat generated by the ISR process would be free to flow towards the freeze wall; however, most of it would flow to the coldest location (e.g., the actual freeze pipes at the mid-point of the wall thickness) before it is manifested as an observable significant rise in ground temperature. Even if the heat were to warm the ore side of the freeze wall, it would not impact the non-ore side of the wall (which is where half of the total wall thickness resides). This heat may penetrate to the center of the wall but if the refrigeration plant is operating, that heat can not then flow “up gradient” on the non-ore side of the wall and thaw that side.

The concentration of the lixiviant (max ~8% sulfuric acid conc.) has a freezing point of ~-4°C. The lixiviant itself will not react chemically with the freeze wall, other than having a slightly different freezing point than formation water. The main reaction expected is dissolution of uraninite with the combination of sulfuric acid, hydrogen peroxide, and ferric iron. This reaction is exothermic, but there are several natural mitigating factors of the wellfield that aid in minimizing heat transport to the freeze wall:

- The wellfield will have flexibility in terms of reagent concentrations being added. With the bulk of the uranium being contained within a higher-grade core (interior to the deposit), the exterior of the deposit will see either lower injection/recovery flows or lower concentrations of lixiviant to be efficient with reagent consumption. Whether the concentration or flow is reduced, this limits the reaction rate and therefore total heat generation at the extremities of the deposit.
- There is no refortification of reagents underground compared to typical uranium tank leaching. This prevents additional heat generation from dilution of sulfuric acid or hydrogen peroxide.
- The heat capacity of lixiviant/UBS should be higher than the ore in the deposit, which means the UBS solution will carry the majority of the heat to surface rather than keeping the heat of reaction at depth.
- In the event the freeze wall thickness monitoring network detected an actionable thinning to the freeze wall, the concentration of lixiviant could be decreased which would reduce the heat generated per m³ of lixiviant and re-establish the desired freeze wall thickness.

To summarize the risk of the degradation of the freeze wall due to exothermic reaction, it is almost impossible—with the freeze plant operating—to practically add sufficient sustained heat to thaw the proposed freeze wall to the point hydraulic containment is compromised. Sufficient operational controls will be in place to verify the freeze plant is operating, to measure the temperature in the ore zone, and to measure the temperature on adjacent sides of the freeze wall so that early detection of any upset conditions can be identified and addressed. Options for addressing issues are to lower the temperature of the freeze system to draw more heat out, to increase the freeze coolant flow rates in freeze wells nearer to active ISR cells, or to adaptively manage the lixiviant injection and recovery rates in cells located nearer the freeze wall.

To: Ya'Thi Néné Lands and Resource Office

From: Denison Mines Corp.

Date: November 22, 2023

Re: Wheeler River Project Environmental Impact Statement - Denison's Response to Woodland
Caribou Habitat Comments

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Attachments

Attachment A: Ya'Thi Néné Lands and Resource Office Comments Related to Woodland
Caribou Habitat

Attachment B: Pilot Program: Linear Feature Mitigation Interim Report – Status Update and
Preliminary Results

Attachment C: Conceptual Caribou Mitigation Plan

1 Summary of Ya'Thi Néné Lands and Resource Office (YNLR) Comments

Denison Mines Corp. (Denison) received consolidated comments from Indigenous Nations and Communities and the public on the draft Wheeler River Project (the Project) Environmental Impact Statement (EIS) from the Canadian Nuclear Safety Commission on June 27, 2023.

These comments are at: [available on the federal impact assessment registry \(https://iaac-aeic.gc.ca/050/documents/p80178/152187E.pdf\)](https://iaac-aeic.gc.ca/050/documents/p80178/152187E.pdf).

This technical memorandum (memo) is provided to supplement Denison's responses to YNLR's comments that can be found in the comment / disposition table. The memo addresses a number of comments that pertained to a similar theme – that is, woodland caribou habitat and questions regarding how the Project could add to the existing disturbances on the landscape, primary mineral exploration cutlines. Specifically, this memo considers YNLR comments numbers 53 to 68 and provides a more coherent, inclusive, and integrated response to facilitate review.

2 Existing Anthropogenic Disturbance: Considerations in the Terrestrial Environment Component of the Environmental Impact Assessment

2.1 Baseline Characterization

A two-step procedure was used to develop baseline mapping for the Local Study Area (LSA) and Regional Study Area (RSA) that including delineation of anthropogenic disturbance. First, the Environment and Climate Change Canada (ECCC) national level anthropogenic mapping was downloaded and clipped to the study area boundaries (ECCC 2015). Second, to improve the resolution and ensure appropriate characterization of disturbance, all visually discernible anthropogenic features in the area were digitized at a scale 1:5,000. To support this process and enhance the final product, a combination of 2018 project specific ortho-photography, Landsat Imagery (2018) and Map Info Microsoft Bing Imagery (2018) were used to visually identify/confirm anthropogenic features. Industrial clearings (polygons) were hand drawn based on the imagery. All linear features were digitized as lines and buffered to create polygons as per the widths detailed below:

- Cutline: 1.75 m
- Right-of-way (ROW): 2.5 m
- Trail: 4 m
- Rough Road: 5.5 m
- Road: 10 m
- Transmission ROW: 40 m
- McArthur-Key Haul Road/Highway 914: 40-60 m

The baseline efforts to characterize and map anthropogenic disturbance in the LSA and RSA were used to develop the ecosite mapping that was used in Section 9 of the EIS to support assessment of potential Project related effects on relevant Valued Components and Key

Indicators. Considering this approach, existing geophysical cutlines are included in baseline studies and results from baseline field surveys reflect wildlife species use of the area under existing conditions.

2.2 Exploration Activities

As noted in the YNLR review comment mineral exploration activities occur in the Athabasca Basin. Denison believes it is useful herein to clarify mineral exploration terminology within the context of its understanding of such activities in the region (in which it engages) and terminology used by YNLR.

For clarification seismic lines and cut lines are two very different items in terms of scale. A seismic survey is a geophysical survey type that is not typically used in the Athabasca Basin as part of exploration activities as it has had limited positive results. When used, it requires the development of relatively large and wide lines (~5 m; seismic lines) to accommodate the movement of seismic equipment that is mounted on a half-ton sized equipment. In Denison's experience, seismic survey applications are generally restricted to projects in an advanced state of development, as they are expensive to complete and do not provide good value at the early stage of the exploration cycle. In contrast, cut lines, which are generally no more than a 1 m wide, are the preferred methods to orientate a ground survey once airborne surveys have identified an area of exploration interest. These cut lines do not remove the roots of the trees and leave slash (tree branches, woody debris) behind to promote new vegetation growth. Cut lines can facilitate geophysical surveys such as magnetics, electromagnetic, gravity, and resistivity. More recently, technologies such as drones have been adapted to accommodate detailed magnetic and electromagnetic surveys which can be flown close to the ground surface without the need of cut lines. Other surveys such as resistivity still require a level of precision that rely on the use of cut lines to accommodate crews and equipment.

In order to conduct mineral exploration activities on Crown land within Saskatchewan, surface disturbance permits are required from the Ministry of Environment before any work can be started. The Mineral Exploration Guidelines for Saskatchewan provides information to assist in the planning, initiation, and completion of a mineral exploration program in a fashion that will help minimize environmental impacts and meet relevant legislative requirements. The Mineral Exploration Guidelines include a variety of best management practices including those related to access and forest clearing/harvesting operations.

For context and to relate this information back to Section 2.1 Baseline Characterization, the majority of the straight linear features digitized in the LSA and RSA as part of the baseline anthropogenic mapping were cutlines. These lines were buffered by 1.75 m to create polygons.

2.3 Appendix 9-B

Appendix 9-B of the draft EIS presents the baseline inventory for wildlife and vegetation which was completed by Omnia Biological Services (Omnia) from 2016 to 2019. The baseline report is meant to summarize the findings from targeted studies and field surveys. The objectives of the terrestrial baseline surveys were to:

- Characterize the existing terrestrial environment in the Project Area,
- Inform pre-feasibility engineering design work,
- Inform environmental effects and technical assessments,
- Establish a framework to facilitate future environmental effects monitoring, and
- Support the development of project specific mitigation strategies .

Accordingly, **the baseline report was not intended to provide an assessment of Project effects**. It is recognized that Appendix 9-B, Section 2.3 Linear Feature Natural Regeneration Assessment, is not aligned with the overall objectives of the baseline report and moreover, is not meant to be read in conjunction with, or contribute to, the effects assessment presented in the EIS.

In addition, there are incorrect statements contained in Appendix 9-B, Section 2.3 Linear Feature Natural Regeneration Assessment, which are a result of incorrect interpretation of methodological approach to consider caribou habitat disturbance. These statements were effectively outside the scope of the baseline scope and report objectives and in retrospect should not have been reported.

Here is one of the statements in Appendix 9-B, Section 2.3 Linear Feature Natural Regeneration Assessment which has caused confusion around existing disturbance on the landscape:

For SK1, in 2018, ECCC indicated that to ensure sustainable caribou populations total buffered anthropogenic disturbance should not exceed five percent and that total disturbance (natural + buffered anthropogenic) should not exceed 40 percent. Currently, under this scheme, the Denison project area is considered to be completely disturbed when taking into account buffered anthropogenic disturbance in the LSA and is 82% disturbed in the RSA. Linear disturbances, in the form of exploration lines, temporary exploration trails and all season and seasonal roads were most common.

Denison provides the following clarifications and corrections:

- The baseline information used an outdated recovery strategy. The Omnia baseline report was finalized in 2019 and the most recent recovery strategy available at that time and referenced in the report was from 2012 (EC 2012). The 2020 amended recovery strategy (ECCC 2020) replaces the 2012 Recovery Strategy (ECCC 2012).
- The anthropogenic mapping completed to support the draft EIS was done at a higher resolution/scale compared to ECCC's approach in the amended recovery strategy (ECCC 2020).

- As noted above, **anthropogenic mapping was done using digitization at the 1:5,000 scale** to support the EIS.
- ECCC (2020) mapped total disturbance levels on boreal caribou ranges across their distribution in Canada as a predictor of self-sustainability for boreal caribou local populations. The total disturbance footprint was measured as the combined effects of fire that has occurred in the past 40 years and **buffered (500 m) anthropogenic disturbance defined as any human-caused disturbance to the landscape that could be visually identified from Landsat imagery at a scale of 1:50,000.**
- Contrary to what was shown Section 2.3 of Appendix 9-B, applying a 500 m buffer to geophysical cut lines digitized at 1:5,000 scale is not consistent with the amended recovery strategy (ECCC 2020). **At the 1:50,000 using Landsat imagery, geophysical cutlines would not be visible.**
- Given the above, the information presented in the Omnia baseline report (Appendix 9-B, Section 2.3 Linear Feature Natural Regeneration Assessment) was erroneous in that it was beyond the scope and objective of the baseline program. In fact, this section of the baseline report reflects and is related to Denison's initiation of a proactive, multi-year research program to better understand how wildlife use linear features. We have attached an interim report from Omnia for YNLR's reference. Among other things the report includes information on wildlife landscape use and movement from trail camera data that indicates considerable use of and movement along linear features. This interim report and the linear feature deactivation work is also discussed in the conceptual woodland caribou mitigation plan. The baseline report should have focused on the results of surveys and existing information that describe the existing conditions in the project areas and should not have extended beyond this scope. The assessment of potential Project effects on the various terrestrial Valued Components (VCs) is included in the main part of Section 9 and as indicated Appendix 9-B, Section 2.3 Linear Feature Natural Regeneration Assessment, was not meant to be read in conjunction with, or contribute to, the effects assessment presented in the EIS.

Denison recognizes that a number of YNLR's comments reference Appendix 9-B and regrets the confusion it has caused during YNLR's review of the draft EIS. Denison will revise Appendix 9-B to remove the discussion on cumulative effects and buffered anthropogenic disturbances. We refer YNLR to the analysis and assessment completed by the environmental assessment (EA) technical leads and biologists at EDI Environmental Dynamics Inc., as presented in Section 9 of the draft EIS.

2.4 Assessment of Potential Effects on Woodland Caribou and their Habitat

All past anthropogenic disturbances (which includes cutlines to support mineral exploration) were considered in the various terrestrial environment assessment components. These human

disturbances were mapped and considered/addressed appropriately in Section 9 including the Existing Environment, Residual Effects Characterization, and Cumulative Effects Assessment sections, as they relate to Terrain, Soil and Organic Matter/Peat (Section 9.1); Vegetation and Ecosystems, Listed Plant Species and Wetlands (Section 9.2); Ungulates, Furbearers and Woodland Caribou (Section 9.3); Raptors, Migratory Breeding Birds, and Bird Species at Risk (Section 9.4). **The cutlines were classified as previously disturbed areas and considered as low-quality habitat or no habitat, depending on the species being assessed and their habitat requirements.**

An anthropogenic disturbance layer is included on draft EIS, Figure 9.2-6, which includes geophysical cutlines. Please note that anthropogenic disturbance features were mapped at IKONOS 1:5,000. This anthropogenic disturbance layer is not listed under available habitat types for any of the wildlife or avian VCs in subsequent assessments (e.g., Figures 9.3-9 to 9.3-14, Figures 9.4-8 to 9.4-11, Figures 9.4-13 to 9.4-15), except for Common Nighthawk (Figure 9.4-12) that is a species known to use anthropogenic features.

In terms of the woodland caribou population in SK1, the likelihood of self-sustainability for the Boreal Shield range (SK1) has been updated from “unknown” (EC 2012) to “likely” in the amended recovery strategy (ECCC 2020). The SK1 range comprises more than 18,000,000 ha and is characterized by high fire disturbance and low anthropogenic disturbance (ECCC 2020). For SK1, the amended recovery strategy (ECCC 2020) identifies 40% undisturbed habitat in the range as the disturbance management threshold, which provides a measurable probability (71%) for the local population to be self-sustaining. This threshold is considered a minimum threshold because at 40% undisturbed habitat there remains a risk (29%) that the SK1 local population cannot be self-sustaining. According to ECCC (2020) disturbed habitat is habitat showing: i) anthropogenic disturbance visible on Landsat at a scale of 1:50,000, including habitat within a 500 m buffer of the anthropogenic disturbance; and/or ii) fire disturbance in the last 40 years, as identified in data from each provincial and territorial jurisdiction (without buffer). In contrast, according to ECCC (2020) undisturbed habitat is habitat not showing any: i) anthropogenic disturbance visible on Landsat at a scale of 1:50,000, including habitat within a 500 m buffer of the anthropogenic disturbance; and/or ii) fire disturbance in the last 40 years, as identified in data from each provincial and territorial jurisdiction (without buffer). The cumulative effects assessment in the draft EIS showed that the Project is expected to add 0.001% of anthropogenic disturbance at the scale of the SK1 Boreal Shield Woodland Caribou Management Unit (Section 9.3.7.3.3 of the EIS).

Specific to woodland caribou, the draft EIS evaluated and assessed potential Project-related effects on the boreal population of woodland caribou following standard environmental assessment (EA) methodology. The assessment of potential effects considered both direct (i.e., habitat loss) and indirect effects (i.e., habitat alteration) on caribou and their habitat, while assuming that caribou were present year-round and during all of their life stages (i.e., calving, rearing, mating, over wintering). In this way, the EIS took a precautionary or conservative approach to understanding/addressing the likely residual effects (i.e., effects remaining after mitigation measures were considered) of the Project on caribou and their habitat. This approach provides is appropriate as a planning tool to inform/support future Project-related

regulatory approvals processes and to guide the scope and nature of follow-up monitoring. After consideration of measures to avoid and mitigate the potential for effects on caribou and their habitat it was concluded that the likely residual effects of the Project on caribou and their habitat were **not significant**. While the EIS did not consider specific additional opportunities to offset the non-significant effects, Denison has been working to develop a Conceptual Caribou Mitigation Plan (see Section 5 below). The plan was submitted to the provincial and federal review teams as part of the response to federal information requirements in August 2023 as the Conceptual Caribou Mitigation Plan and Denison has been in close contact with the Saskatchewan Ministry of Environment (SK ENV), as stewards of woodland caribou from a regulatory perspective.

3 Spatial Scale for the Caribou Assessment

Several of YNLR comments were related to the spatial scale of the caribou assessment. This section presents an overview of the approach taken in the terrestrial assessment and specifically where the SK1 range was considered in the caribou assessment.

The rationale for the definition of study areas for the purpose of the assessment of the Terrestrial Environment valued components (VCs) is described in Section 9.1.1 of the draft EIS. The Project Area (169 ha or 1.69 km²) and LSA were delineated based on the expected extent of potential direct (footprint) and indirect (sensory disturbance) Project effects; whereas, the RSA considered an 8 km buffer around the Project Area to provide an appropriate spatial scale upon which potential Project effects could be evaluated at the landscape scale where key Terrestrial Environment VCs reside and move within and upon which cumulative effects could be assessed.

Boreal caribou occur as one continuous population across the SK1 range (18,034,870 ha), including within the Terrestrial RSA. After consideration, it was decided by Denison and its Subject Matter Experts at EDI Environmental Dynamics Inc. to use the Terrestrial RSA for the cumulative effects assessment for caribou rather than the entire SK1 range. This decision was made largely on the basis that it would not be feasible / appropriate to use a such large area like the SK1 range to assess cumulative effects since consideration of such a large spatial extent would likely "dilute" the contribution of the Project to potential effects at that scale. In support of this decision, comparison of the Project-specific habitat effects (i.e., the Project Area plus a 500 m buffer to account for sensory disturbance) relative to the scale of the SK1 range (as the applicable management unit for portion of the woodland caribou population that uses the Terrestrial RSA) was made. The comparison indicated that the Project is expected to add 0.001% of anthropogenic disturbance at the scale of the SK1 Boreal Shield Woodland Caribou Management Unit (Section 9.3.7.3.3 of the EIS). As can be seen, the default conclusion at the range scale could only be that the Project does not contribute to cumulative effects at a practical measurable level.

In addition, it is appropriate to also consider the assessment of terrestrial environment from the perspective of Land and Resource Use per Section 11 of the draft EIS, since the two (Terrestrial Environment and Land Are Resource Use) are so intimately related. For context the Terrestrial Environment RSA, fits within the Indigenous Land and Resource Use RSA. Section 11 of the

EIS is focused on Land and Resource Use and includes consideration for various terrestrial VCs and key indicators (KIs) as resources. With respect to Indigenous Land and Resource Use, the definition of spatial boundaries is offered in Table 11.2-2, which notes that the LSA is inclusive of the area in which direct and indirect effects to relevant VCs could likely occur, and includes the maximum combined extent of supporting VCs associated with the aquatic, terrestrial, noise, and health LSAs. Additionally, it is inclusive of trapping, fishing, and travel through and adjacent to the Project Area. The RSA is inclusive of trapping block N-18, which represent a familiar reference for local Indigenous communities and capture the broad land usage patterns of local communities.

4 Cumulative Effects Assessment under the Canadian Environmental Assessment Act, 2012

The Wheeler River Project EIS is subject the *Canadian Environmental Assessment Act, 2012*. In this assessment framework, the Project-specific cumulative effects assessment (CEA) considers whether residual adverse effects of the Project on a given VC will overlap spatially and/or temporally with residual adverse effects on the VC resulting from other past, present, and reasonably foreseeable projects or activities. The CEA follows standard methodology as per provincial (e.g., Guidelines for an Environmental Assessment [Government of Saskatchewan 2022]) and federal guidance (e.g., Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012 [Government of Canada 2019]).

For residual effects to be considered in the CEA for the Project, the following criteria had to be met:

- potential exists for a residual adverse effect of the Project on a VC;
- the residual adverse effect can be demonstrated to act cumulatively with the residual adverse effects from other projects or activities on the same VC;
- other projects or activities must have been, or are expected to be, carried out in the reasonably foreseeable future; and,
- the cumulative effect is likely to occur.

The approach for assessing cumulative effects considers both the current conditions (which include changes caused by past development, projects, and activities, and are, therefore, considered in the baseline condition of the VC) and the identified reasonably foreseeable future projects and/or activities.

The steps of the CEA for each VC are:

1. Determine the spatial boundaries for the CEA, which is VC specific, and typically the RSA for the VC.
2. Determine the project inclusion list of all other past, present, and reasonably foreseeable projects and/or activities that are expected to have adverse residual effects that extend into the VC RSA.

3. Consider all Project-related residual effects that were identified during the effects assessment for each VC, regardless of significance.
4. Identify the potential for interaction (i.e., must overlap spatially and temporally) of the Project-related residual effects with those of other projects and activities identified in Step 2 above.
5. Identify and describe the cumulative effects, and if practical, identify technically and economically feasible mitigation measures (i.e., in addition to those already identified to mitigate potential Project effects) to avoid, reduce, or otherwise mitigate the predicted cumulative effects.
6. Qualitatively assess and evaluate (i.e., characterize) the cumulative effects with respect to the likely nature and degree of change from the existing (baseline) environment as a result of the Project's residual effects in combination with the residual effects of other relevant future projects and activities.
7. Determine the significance of the cumulative effect using characterization criteria as defined for the residual effects evaluation.

In the draft EIS, Denison included a number of project activities as existing/present and reasonably foreseeable. This includes historic anthropogenic disturbance associated with exploration activity, drilling, and access creation in support of past exploration and mining activities have occurred within the Athabasca Basin since the 1940s when uranium was first discovered in the region.

4.1 Woodland Caribou CEA

The CEA framework described above provides the framework upon which the CEA for woodland caribou was conducted. Residual effects resulting from the Project in combination with those from ongoing and reasonably foreseeable projects and activities that were identified (see draft EIS, Section 9.3.7.2) may act cumulatively to potentially affect woodland caribou in the Terrestrial RSA. The key endpoints through which the CEA was considered included the alteration and/or loss of habitat and change in mortality. For reference, for alteration and/or loss of habitat the draft EIS considers existing habitat disturbances due to past and ongoing anthropogenic development, which includes old exploration trails and disturbances associated with line cutting, drilling, and access development.

The woodland caribou population in the region is reported to be stable and their anthropogenic habitat disturbance is currently estimated at 1.5% in the Terrestrial RSA, which is below the 5% threshold of anthropogenic disturbance recommended as a requirement to sustain viable populations (ECCC 2019). The Project will add another 0.4% of anthropogenic disturbance (considering the Project Area of 169.6 ha) adding up to 1.9% of anthropogenic disturbance in the Terrestrial RSA. It is not expected that the cumulative effect of alteration and/or loss of habitat will alter the integrity of woodland caribou habitat within the Terrestrial RSA to the point where it is not sustainable or available to contribute to ecological functions. Therefore, the cumulative effect resulting from the Project's residual effect interacting with residual effects from other projects and activities is predicted to be **not significant**.

4.2 How Indigenous Perspectives Influenced the Cumulative Effects Assessment

Cumulative effects assessment is important to Indigenous communities in general because incremental changes to the environment can weaken resource economies, affect important resources such as plants, fish, and wildlife, affect rights-based and cultural activities, and affect both the health of wildlife and humans (Indigenous Centre for Cumulative Effects 2021). Indigenous perspectives can be complementary to the CEA for the Project, and Denison acknowledges the important relationship of the Indigenous Communities of Interest to the lands and waters. The Indigenous Communities of Interest of English River First Nation (ERFN) and the Kineepik Métis Local #9 at Pinehouse (KML) have shared their Indigenous Knowledge on past, present, and predicted cumulative effects through the following sources:

- Wheeler River Project – Summary of Health and Socio-Economic Study Results (ERFN and SVS 2022a);
- Wheeler River Project - Summary of Traditional Knowledge Study Results (ERFN and SVS 2022b);
- Kineepik Valued Ecosystem Components – KML Pre-statement for Denison EIS (KML and NVP 2022); and
- Response to the Environment Impact Assessment For the proposed Ministry of Highways 914 Extension Project (KML and Limnos Environmental 2022).

These perspectives on cumulative effects have been summarized in Section 3.4.8 of draft EIS. Denison and the Communities of Interest agreed on the high value of this contribution being part of the EIS.

Denison recognizes that Indigenous Knowledge systems offer an alternative source of knowledge, often complementary to western science (Eckert et al. 2020). The CEA for the Project followed standard methodology as per provincial (Government of Saskatchewan 2022) and federal guidance (Government of Canada 2019). Among the sources of information to consider, the federal guidance notes the importance of “Aboriginal traditional knowledge, community knowledge and scientific knowledge, or simply an expression of concern regarding potential cumulative effects to a particular VC” (Government of Canada 2019). All sources of information were considered by discipline leads as described in the respective draft EIS sections and in Section 4, Engagement. The CEA for all VCs completed for the Project incorporated, as appropriate, the characterization of activities/events that have shaped the existing environment and continue to influence the VCs used for the EIS.

5 Conceptual Caribou Mitigation Plan

Following submission of the draft EIS in October 2022, Denison has met with Saskatchewan Ministry of Environment (SK ENV) staff to develop a framework for future woodland caribou offset. This information has been presented to the provincial and federal review teams as part of the response to federal information requirements in August 2023 as the Conceptual Caribou Mitigation Plan (**Error! Reference source not found.**).

The Conceptual Caribou Mitigation Plan (the Plan), developed proactively by Denison, has a different objective than the draft EIS. The Plan builds on the assessment of potential Project effects and commitments to consider additional mitigation (offset) to account for non-significant residual effects highlighted in the draft EIS. The Plan is expected to be advanced with ongoing consultation with the SK ENV, as SK ENV finalize the caribou range plan for SK1. The EIS is a conservative planning tool, whereas the Plan is a practical, living document designed to define management works associated with caribou. The Plan is not a requirement for EA determination *per se*, but is provided as a guidance document to help Denison proactively describe and inform the development and implementation of appropriate mitigation measures related to caribou and their habitat.

The Plan is an evergreen document. It will be consistent with the management goals of SK ENV for the SK-1 caribou conservation unit and will be developed/refined in consultation with local communities including English River First Nation and Kineepik Métis Local in Pinehouse and regulators. As noted above, the boreal caribou range plan for SK-1 is under development and it is understood that this Plan will be updated as more information becomes available. The conceptual nature of the Plan is in part due to the absence of range plan priorities and reflects Denison's commitment to continue to work with the province to meet the management objectives and management strategies for the SK1 range.

Denison is continuing to work with SK ENV to estimate habitat offset scenarios based on the current Project design which will be refined as the Project advances. A boreal caribou habitat offset calculator is under development by SK ENV and Denison is collaborating with SK ENV to define key scenario attributes. SK ENV will engage with Indigenous communities and nations as the province develops and refines the range management plan for SK1.

6 Closing

Denison is confident in the methodology used in the terrestrial assessments and the assumptions used to conduct the woodland caribou assessment were conservative and the assessment followed a precautionary approach. The CEA was conducted in a manner consistent with the requirements of CEAA 2012 and related guidance documents for a Project-specific CEA and appropriately assessed potential cumulative effects for woodland caribou at the RSA and range (SK1) scales. The EIS concluded that the Project could be implemented in consideration of proposed mitigations whereby **both Project-related and cumulative residual effects would be not significant.**

7 References

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Kineepik Métis Local (KML) and Northern Village of Pinehouse Lake (NVP). 2022. Response to the Environment Impact Assessment. For the Proposed Ministry of Highways 914 Extension Project. Submitted February 11, 2022.



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Wheeler River Project

Public Notice - Conformity Review for the Wheeler River Project EIS Submission

August 29, 2023: On August 18, 2023, Denison Mines Corp. (Denison) re-submitted responses to the Federal Indigenous Review Team's information requests (IRs) for the proposed Wheeler River Project to the Canadian Nuclear Safety Commission (CNSC). CNSC staff conducted a completeness check and determined that outstanding IRs have passed completeness and supporting submissions are adequate to proceed to the EIS Technical Review. More information can be found in the [August 28, 2023 letter to Denison](#), and [completeness check table](#).

The next phase of technical review by the Federal Indigenous Review Team will run from August 30, 2023 to November 27, 2023. Subject Matter experts will review the responses to IRs provided to Denison in March 2023, which includes the following documents:

- Wheeler River Project: Denison's Responses to Information Requests from the Federal and Indigenous Review Team (August 18, 2023).
- Update to Indigenous Engagement Activities for the Wheeler River Project - draft EIS
- Wheeler River Project Commitments Table - draft EIS

*October 17, 2024 edit: date added to title

Document reference number: 89

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Public Notice - Technical Review for the Wheeler River Project EIS Submission

December 5, 2023: The federal and Indigenous review team (FIRT) has completed their technical review of the responses to information requirements (IRs) submitted by Denison Mines Corp. (Denison) and has found that the information provided does not fully address the regulatory requirements for the environmental assessment (EA). To date, the FIRT technical review of Denison's responses to the 238 information requests (IRs) has resulted in 144 accepted IRs and 18 follow-up IRs.

Additional information in the advice to proponent table contain guidance and advice that Denison should take into consideration when responding to IRs and when revising the draft EIS.

The following documents have been posted:

- Letter from CNSC staff to Denison with the Outcome of Denison's Submission of Responses to Information Requests
- Annex 1 - FIRT - Information Requirements for the Wheeler River Environmental Impact Statement
- Annex 2 - FIRT - Advice to the Proponent for the Wheeler River Environmental Impact Statement

CNSC staff expect Denison to submit complete revised responses to all outstanding and new IRs as well as advice to the proponent, along with a revised EIS and supporting documentation. Denison's responses may be reviewed several times to ensure the responses meet requirements. Once the revised draft EIS meets regulatory requirements, CNSC staff will proceed with developing an EA report.

Document reference number: 98

Date modified: 2023-12-08



e-Doc: 7149498

December 5, 2023

Ms. Janna Switzer
Director, HSE Regulatory Compliance
Denison Mines Corp.
jswitzer@denisonmines.com

Subject: Results of the Federal-Indigenous Review Team technical review of the August 18, 2022 responses to Information Requests for the proposed Wheeler River Project

Dear Mrs. Switzer,

On August 18, 2023, Denison Mines Corp. (Denison) submitted responses to Information Requests (IRs) for the Wheeler River Project [1]. On August 30, 2023, CNSC staff found the submission [1] to contain the required information to proceed with the Federal-Indigenous Review Team (FIRT) technical review of the responses to information requests for the proposed Wheeler River Project [2].

Outcome of the EIS Technical Review

The FIRT has completed the technical review of the submission and has found that the information provided does not fully address the regulatory requirements for the environmental assessment (EA). To date, the FIRT technical review of Denison's responses to 238 IRs has resulted in 144 accepted IRs and 18 follow-up IRs triggered by responses to an original IR or supplementary material provided in Denison's submission. Of the 94 IRs that were not accepted, there are cases where the technical approach is accepted and the IRs can be resolved once text for the EIS has been provided and accepted by the FIRT. The updated table is provided in the attached Annex 1 [3].

Additional information in an Advice to Proponent table contains guidance and advice that Denison should take into consideration when responding to IRs and revising the draft EIS. This is included in the attached Annex 2 [4].

Expectations and Next Steps

On December 5th, 2023 or shortly thereafter, CNSC staff will post IR response [3] and Advice to Proponent [4] tables on the Canadian Impact Assessment Registry for the [Wheeler River Project](#) (Reference number: 80178).

CNSC staff expect Denison to submit complete responses to all IRs and advice to proponent comments and re-submit a revised EIS. CNCS staff also request that Denison provide a document revision history

with the revised EIS and concordance table, for reviewers to locate the changes that have been made to revised documents. It is expected that Denison clearly indicate how the revised EIS incorporated changes as a result of responses to the IRs. CNSC staff and members of the FIRT are available and willing to meet with Denison to discuss the path forward and to clarify expectations for the IR responses.

Revisions to Evergreen Documents

CNSC staff are also formally requesting that Denison provide revised versions of the Commitments table and Indigenous Engagement Reports, as part of its revised EIS documentation.

Commitments Table

The Commitments table, or Report, should capture all mitigation measures, follow-up program measures and commitments that have been referenced in the EA documentation in a single location for completeness and traceability. As requested in March 2023 [5], this report should include a listing of all commitments made by Denison based on the documentation submitted to date including:

- the EIS
- correspondence with the public and Indigenous Nations and communities
- responses to IRs
- additional commitments Denison has made in any documentation to members of the public and Indigenous Nations and communities and to whom these commitments apply

These commitments should be triaged based on whether they are within the scope of regulatory requirements or beyond (e.g., good governance, social responsibility), and indicate how each of these commitments will be tracked as part of Denison's programs.

As also mentioned in the March letter [5], it would be helpful if Denison could organize this information in tabular format providing the following information:

- details of the commitment
- the phase(s) of the project where the commitment will be carried out (e.g., all phases)
- where the commitment is referenced (which document, table, etc. and where it can be found)
- how this commitment will be tracked (project EA follow-up program, site-wide programs, etc.)

Indigenous Engagement Report

Similarly, it is expected that as per the requirements of REGDOC 3.2.2 Indigenous Engagement, an updated Indigenous Engagement Report (IER) be submitted to the CNSC as Denison's engagement activities progress. This is considered supplementary information that underpins responses to IRs. Therefore, CNSC staff expect Denison to submit an update on all engagement activities to date as part of Denison's next submission in a revised IER.

Both of these documents are evergreen and should continue to be updated over the remainder of the regulatory review process, as well as if the project is approved, after the public hearings and Commission decisions.

Should you have any questions, please do not hesitate to contact me, directly by phone at 343-540-6213 or by email at Jessica.Way@cnsccsn.gc.ca.

Sincerely,

- Original Signed By -

Jessica Way
Environmental Review Officer
Environmental Review Division

c.c.:

CNSC: N. Kwamena, P. Burton, K. Gorzkowski, W. Yen
Denison: K. Himbeault, C. Inglis-McQuay, R. Nagel

References:

- [1] Letter, J. Switzer (Denison) to J. Way (CNSC), *Wheeler River Project - Submission of Draft Environmental Impact Statement*, August 11, 2023 (e-doc [7110011](#))
- [2] Letter, J. Way (CNSC) to J. Switzer (Denison), *CNSC Conclusions: Outcome of the Wheeler River Conformity Review*, August 30, 2022 (e-doc [6943662](#))
- [3] Annex 1, Federal and Indigenous Review Team, *Wheeler River Project – Information Requests*, November 27, 2023 (e-doc [7117212](#))
- [4] Annex 2, Federal and Indigenous Review Team, *Wheeler River Project – Advice to Proponent*, November 27, 2023 (e-doc [7165554](#))
- [5] Letter, J. Way (CNSC) to J. Switzer (Denison), *CNSC Conclusions: Outcome of the Wheeler River Technical Review*, March 21, 2023 (e-doc [6991467](#))

Annex 1

Federal Indigenous Review Team (FIRT) Review of Denison Responses to Information Requests (IRs) and Supporting Documents Received August 18, 2023

| Original IR# | Follow-Up IR # | SME | Project Effects Link | Reference to EIS, appendices, or supporting documentation | Context and Rationale | Information Requirement (IR) | Rationale for Status | Status |
|--------------|----------------|---|---|---|--|---|----------------------|----------|
| IR-01 | - | English River First Nation (ERFN) | Current use of lands and resources for traditional purposes | General | <p>Context: Denison has not gone far enough in terms of learning from and incorporating information from ERFN provided in the <i>Traditional Knowledge Study and Health and Socio-Economic Study Report</i>. It appears Denison put a disproportionate amount of reliance on the views and interests of one ERFN land user. While we applaud the efforts of Denison to seek feedback from ERFN land users directly and to work closely with such land users, ERFN’s rights and interests in the region of the Project (and the potential of the Project to adversely impact such rights and interests) extend well beyond that of just one land user.</p> <p>Rationale: It is important for the Proponent and regulators to understand that while the rights and interests of individual ERFN members are important to consider, the Elders and elected leaders of ERFN represent the collective rights and interests of ERFN as a Nation. The results of the scoping study indicated that ERFN holds firmly established rights to the area where the planned project is located. Numerous studies conducted over several decades have examined ERFN's relationship and connection to land use and occupancy of the region where the proposed mine is located from traditional land use, subsistence harvesting, ecological, and sociocultural and economic perspective.</p> | <p>The draft EIS should be revised to reflect the totality of ERFN TK and land use information.</p> <p>Denison and CNSC must continue to work with ERFN to ensure that impacts on ERFN rights are appropriately and fully considered, mitigated, and accommodated.</p> | | Accepted |
| IR-02 | - | Canadian Nuclear Safety Commission (CNSC) | Mitigation Measures | General Appendix 16-C | <p>Context: Denison’s 2019 Wheeler River Terms of Reference states: “The EIA will also discuss the monitoring programs required to demonstrate regulatory compliance and compliance with the commitments Denison has made to its Indigenous and non-Indigenous Stakeholders.”</p> <p>The CNSC’s Generic Guidelines for the Preparation of an Environmental Impact Statement (EIS), also state: “The EIS will then describe mitigation measures that are specific to each environmental effect identified. Measures will be written as specific commitments that clearly describe how the Proponent intends to implement them and the environmental outcome the mitigation is designed to address.</p> <p>Rationale: The EIS and the Summary of Monitoring and Follow-up Programs provided in Appendix 16-C contains very high-level information. It is not clear which monitoring programs will be employed to demonstrate regulatory compliance, and compliance with the commitments Denison has made to its Indigenous and non-Indigenous Stakeholders.</p> | <p>CNSC staff expect Denison to provide a comprehensive list of commitments along with the next version of the EIS, including any commitments made to Indigenous Nations and communities and other stakeholders (As committed in the Wheeler River Terms of reference, and as noted in the November 28th, 2022 email from CNSC staff to Denison: <i>Future Submission of a Commitments Table for Wheeler River EIS</i>).</p> | | Accepted |
| IR-03 | - | CNSC | Site preparation | Section 1.3.2 Temporal Boundaries | <p>Context: The EIS and TSD-ERA provide assessment on the Project timeframe, including construction, operation, and decommissioning phases.</p> <p>Rational: The site preparation phase is not included in the timeframe (EIS</p> | <p>Please provide an assessment of those facility characteristics and activities that may interact with the environment during the site preparation phase, along with an assessment of their potential effects, in order to reflect the entire lifecycle or provide a rationale for its exclusion.</p> | | Accepted |

| Original IR# | Follow-Up IR # | SME | Project Effects Link | Reference to EIS, appendices, or supporting documentation | Context and Rationale | Information Requirement (IR) | Rationale for Status | Status |
|--------------|----------------|--|--|---|---|--|--|--------------|
| | | | | Appendix 10-A (ERA) | and TSD-ERA). As per REGDOC 2.9.1, the sub-section 4.1.1 Complexity of the environmental risk assessment requirements states that “The applicant or licensee shall identify facility characteristics and activities that may interact with the environment during the relevant phase of the facility or activity’s lifecycle (for example, site preparation, construction, operation, and decommissioning.” | | | |
| IR-04 | - | Environment and Climate Change Canada (ECCC) | Fish and fish habitat | Section 2, Project Description Section: Glossary | <p>Context: The Proponent defines ‘clean waste rock’ as “Waste rock generated as sandstone cuttings and core from drilling activities associated with well and freeze hole development that does not have uranium containing materials”.</p> <p>ECCC notes that the use of the term “Clean Waste Rock” could be misunderstood to mean that the waste rock is devoid of any contaminant. Even when the waste rock referred to as “clean waste rock” does not contain uranium materials, it could contain other metals or contaminants that could have adverse environmental effects. It is also not clear whether the “clean waste rock” is characterized for Acid Rock Drainage/Metal Leaching (ARD/ML) given that some portion of the basement rock is to be drilled out to anchor the freeze walls and may have ARD/ML potential.</p> <p>Rationale: The current definition of ‘clean waste rock’ in the draft EIS could lead to inappropriate handling and disposal if it is assumed to be devoid of any metals or other contaminants that might negatively affect the environment.</p> | Provide a clear and more detailed definition of the term ‘clean waste rock’. | | Accepted |
| IR-05 | - | CNSC | Change to an environmental component due to hazardous contaminants | Section 2.2.1.2 | <p>Context: Water volumes for mud/diamond drilling is listed as minimal as the mud will be re-used. The mud is identified as a mixture of water, clay, and environmentally friendly polymers that clean out the cuttings and help to keep the drilling bit cool.</p> <p>Rationale: Although the mud for drilling will be re-used, there could be environmental impacts should there be an accident while drilling.</p> | Please identify the components of the environmentally friendly polymers for the drilling mud and potential environmental impacts should the mud not be recovered. | | Accepted |
| IR-06 | - | CNSC | Geology and groundwater | Section 2.2.1.4, Wellfield for In Situ Recovery Mining | <p>Context: This Section of the EIS indicates that a tracer test was completed in 2021 and a feasibility field test was initiated in 2022. No information from these tests is included in the EIS and no reporting timelines are provided.</p> <p>Rationale: Guidance from the IAEA (2001) and best practices highlighted by regulatory regimes in other countries such as the United States (IAEA, 2016) and Australia (Geoscience Australia, 2010) indicates that single and multi-well trial (feasibility) testing for mining and remediation techniques should be carried out before a licence for full-scale operations can be granted. This is part of the requirement for Proponents to demonstrate to government authorities that all potential risks have been considered during the life of operation and post-remediation of the mine.</p> | <p>1. Please provide a summary of the results of field tests (i.e., tracer tests, wellfield leach tests, and remediation trials) in the EIS, or provide a technical supporting document with this information, and ensure the documentation is appropriately referenced in the EIS.</p> <p>2. Please indicate how outcomes from these field tests inform the design of In Situ Recovery. This information should include:</p> <ul style="list-style-type: none">• feasibility of meeting remediation targets.• groundwater flow conditions and validation of flow models.• mobilization of contaminants (e.g., Al, Se or V).• potential for free gas evolution/two-phase flow.• identifying composition of lixiviant and production solutions. | <p>This response has not been accepted.</p> <p>The mining area decommissioning objectives shown in Table 2.3-3 of the original EIS (Section 2.3.3.1.1) show different numerical values when compared to those shown in Table IR-06-1 of Denison's response to IR-06. Notably, allowable proportions of Al, As, Cd, Cr, Cu, Fe, Mo, SO4, Se, U, V, and Zn are increased over the initial decommissioning objectives. Denison's Final Proposed EIS update for IR-06 does not include any text regarding alteration of decommissioning objectives for the mining area.</p> <p>Please also see follow-up IR-06-R1.</p> | Not Accepted |

| Original IR# | Follow-Up IR # | SME | Project Effects Link | Reference to EIS, appendices, or supporting documentation | Context and Rationale | Information Requirement (IR) | Rationale for Status | Status |
|--------------|----------------|------|-------------------------|---|---|---|--|--------------|
| | | | | | <p>Additionally, Section 8.5.2 of the Generic EIS Guidelines states: “Units may be characterized as aquifers or aquitards, and unit descriptions should include their geochemical characteristics, vertical and lateral permeabilities, transport mechanism (diffusion versus advection) and the directions of groundwater flow”,</p> <p>And that “The applicant or licensee should present a conceptual and numerical hydrogeological model that discusses the hydrostratigraphy and groundwater flow systems”.</p> <p>Outcomes from the tracer test inform model parameters such as effective porosity (see IR-78), dispersion, and dispersivity (see IR-96). The wellfield leach tests and remediation trails ultimately inform environmental monitoring during site activities, and the source term for the groundwater model. This source term represents the contaminants which flow through the desilicified zone into Whitefish Lake, which represents a source of contamination considered in the ERA.</p> <p>References: [1] International Atomic Energy Agency (IAEA). 2001. Manual of Acid in Site Leach Uranium Mining Technology. IAEA-TECDOC-1239. Vienna. 283 p. [2] International Atomic Energy Agency (IAEA). 2016. In Situ Leach Uranium Mining: An Overview of Operations. IAEA Nuclear Energy Series No. NF-T-1.4. Vienna. 76 p. [3] Commonwealth of Australia (Geoscience Australia). 2010. Australia’s in situ recovery uranium mining best practice guide. ISBN 978-1-921672-95-8. Canberra. 33 p.</p> | <ul style="list-style-type: none">• success despite presence of >2% carbonate minerals (siderite, FeCO3) in the ore zone (see Table 4-3 of Appendix 7-A).• site-specific data to parameterize, validate, and refine solute transport models (hydraulic conductivity, effective porosity, dispersivity, diffusion, etc.). <p>3. Please provide further information of proposed operations including % recovery, uranium concentrations, optimal liquid/solid ratios, anticipated reagent consumption, etc.</p> | | |
| IR-06 | IR-06-R1 | CNSC | Geology and groundwater | Section 2.2.1.4, Wellfield for In Situ Recovery Mining | <p>Context: This Section of the EIS indicates that a tracer test was completed in 2021 and a feasibility field test was initiated in 2022. No information from these tests is included in the EIS and no reporting timelines are provided.</p> <p>Rationale: Guidance from the IAEA (2001) and best practices highlighted by regulatory regimes in other countries such as the United States (IAEA, 2016) and Australia (Geoscience Australia, 2010) indicates that single and multi-well trial (feasibility) testing for mining and remediation techniques should be carried out before a licence for full-scale operations can be granted. This is part of the requirement for Proponents to demonstrate to government authorities that all potential risks have been considered during the life of operation and post-remediation of the mine.</p> <p>Additionally, Section 8.5.2 of the Generic EIS Guidelines states: “Units may be characterized as aquifers or aquitards, and unit descriptions should include their geochemical characteristics, vertical and lateral permeabilities, transport mechanism (diffusion versus advection) and the directions of groundwater flow”,</p> | <p>1. Please provide a summary of the results of field tests (i.e., tracer tests, wellfield leach tests, and remediation trials) in the EIS, or provide a technical supporting document with this information, and ensure the documentation is appropriately referenced in the EIS.</p> <p>2. Please indicate how outcomes from these field tests inform the design of In Situ Recovery. This information should include:</p> <ul style="list-style-type: none">• feasibility of meeting remediation targets.• groundwater flow conditions and validation of flow models.• mobilization of contaminants (e.g., Al, Se or V).• potential for free gas evolution/two-phase flow.• identifying composition of lixiviant and production solutions.• success despite presence of >2% carbonate minerals (siderite, FeCO3) in the ore zone (see Table 4-3 of Appendix 7-A).• site-specific data to parameterize, validate, and refine solute transport models (hydraulic conductivity, effective porosity, dispersivity, diffusion, etc.). | <p>CNSC staff request that Denison provide clarification relating to the alteration of mining area decommissioning objectives. Additionally, Denison is requested to provide a discussion on how alteration of the mining area decommissioning objectives fits within the geochemical reactive transport modelling presented in Appendix 7-C (i.e. effect of increase proportions of allowable COPCs on surface water quality), given that these objectives (as shown by "Restored Solution #1" in Table 3-5 of Appendix 7-C) are used as the bounding scenario for groundwater quality during reactive transport scenarios.</p> <p>Original EIS – Table 2.3-3:</p> | Follow-up IR |

| Original IR# | Follow-Up IR # | SME | Project Effects Link | Reference to EIS, appendices, or supporting documentation | Context and Rationale | Information Requirement (IR) | Rationale for Status | Status | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------|----------------|----------------------------------|---|--|---|---|--|-----------|-------|-------------------|----|--|-----|----------|------|---|---------|------|------|---------|------|-------|--------|------|---|----------|------|------|--------|------|------|------|------|-----|------------|------|-----|--------|------|-----|------|------|-----|----------|------|-----|----------|------|------|------|------|-----|---------|------|-----|----------|------|------|-----------------------|------|----------|-----------|-------|----------------------------------|---|----|----------|-----|------|---------------|------|-----|-----|--------------|------|-----|------|-------------|------|-----|------|--------------|------|-----|-----|--------------|------|-----|---------|-------------|------|------|--------|---------------|------|------|---------|-------------|------|------|-------|-----------|------|-----|-----|---------------|------|----|-----|----------------|------|------|------|-----------------|------|------|------|-------------|------|-----|-----|-------------|------|------|------|-----------|------|---|------|---------|------|-------|------|----------|------|------|--------|---------|------|-----|----|-----------|-------|----------------------------------|---|----------|------|------|-----|------|------|------|-----|
| | | | | | <p>And that “The applicant or licensee should present a conceptual and numerical hydrogeological model that discusses the hydrostratigraphy and groundwater flow systems”.</p> <p>Outcomes from the tracer test inform model parameters such as effective porosity (see IR-78), dispersion, and dispersivity (see IR-96). The wellfield leach tests and remediation trails ultimately inform environmental monitoring during site activities, and the source term for the groundwater model. This source term represents the contaminants which flow through the desilicified zone into Whitefish Lake, which represents a source of contamination considered in the ERA.</p> <p>References: [1] International Atomic Energy Agency (IAEA). 2001. Manual of Acid in Site Leach Uranium Mining Technology. IAEA-TECDOC-1239. Vienna. 283 p. [2] International Atomic Energy Agency (IAEA). 2016. In Situ Leach Uranium Mining: An Overview of Operations. IAEA Nuclear Energy Series No. NF-T-1.4. Vienna. 76 p. [3] Commonwealth of Australia (Geoscience Australia). 2010. Australia’s in situ recovery uranium mining best practice guide. ISBN 978-1-921672-95-8. Canberra. 33 p.</p> | 3. Please provide further information of proposed operations including % recovery, uranium concentrations, optimal liquid/solid ratios, anticipated reagent consumption, etc. | <div><div>Table 2.3-3: Mining Area Decommissioning Objectives</div><table><tr><th>Parameter</th><th>Units</th><th>Restored Solution</th></tr><tr><td>pH</td><td></td><td>4.3</td></tr><tr><td>Aluminum</td><td>mg/L</td><td>7</td></tr><tr><td>Arsenic</td><td>mg/L</td><td>0.06</td></tr><tr><td>Cadmium</td><td>mg/L</td><td>0.015</td></tr><tr><td>Cobalt</td><td>mg/L</td><td>2</td></tr><tr><td>Chromium</td><td>mg/L</td><td>0.05</td></tr><tr><td>Copper</td><td>mg/L</td><td>0.17</td></tr><tr><td>Iron</td><td>mg/L</td><td>100</td></tr><tr><td>Molybdenum</td><td>mg/L</td><td>0.1</td></tr><tr><td>Nickel</td><td>mg/L</td><td>9.7</td></tr><tr><td>Lead</td><td>mg/L</td><td>3.1</td></tr><tr><td>Sulphate</td><td>mg/L</td><td>703</td></tr><tr><td>Selenium</td><td>mg/L</td><td>0.08</td></tr><tr><td>Zinc</td><td>mg/L</td><td>1.4</td></tr><tr><td>Uranium</td><td>mg/L</td><td>100</td></tr><tr><td>Vanadium</td><td>mg/L</td><td>0.51</td></tr><tr><td>²²⁶Radium</td><td>Bq/L</td><td>2.00E+02</td></tr></table></div> <div><div>IR-06 Response – Table IR-06-1:</div><div>Table IR-06-1: Feasibility Field Test Leaching Zone Remediation Targets compared to Interim (December 2022) Groundwater Well Monitoring Results</div><table><tr><th>Parameter</th><th>Units</th><th>Leaching Zone Remediation Target</th><th>Neutralization Phase Results ¹</th></tr><tr><td>pH</td><td>pH units</td><td>3.5</td><td>6.24</td></tr><tr><td>Aluminum (Al)</td><td>mg/L</td><td>9.1</td><td>3.3</td></tr><tr><td>Arsenic (As)</td><td>mg/L</td><td>0.7</td><td>0.05</td></tr><tr><td>Barium (Ba)</td><td>mg/L</td><td>0.2</td><td>0.07</td></tr><tr><td>Calcium (Ca)</td><td>mg/L</td><td>535</td><td>203</td></tr><tr><td>Cadmium (Cd)</td><td>mg/L</td><td>0.3</td><td>0.00001</td></tr><tr><td>Cobalt (Co)</td><td>mg/L</td><td>0.24</td><td>0.0001</td></tr><tr><td>Chromium (Cr)</td><td>mg/L</td><td>0.38</td><td><0.0005</td></tr><tr><td>Copper (Cu)</td><td>mg/L</td><td>0.19</td><td>0.001</td></tr><tr><td>Iron (Fe)</td><td>mg/L</td><td>390</td><td>144</td></tr><tr><td>Potassium (K)</td><td>mg/L</td><td>45</td><td>185</td></tr><tr><td>Magnesium (Mg)</td><td>mg/L</td><td>8.92</td><td>22.6</td></tr><tr><td>Molybdenum (Mo)</td><td>mg/L</td><td>0.16</td><td>0.04</td></tr><tr><td>Sodium (Na)</td><td>mg/L</td><td>628</td><td>183</td></tr><tr><td>Nickel (Ni)</td><td>mg/L</td><td>1.17</td><td>0.02</td></tr><tr><td>Lead (Pb)</td><td>mg/L</td><td>2</td><td>0.04</td></tr><tr><td>Sulfate</td><td>mg/L</td><td>4,147</td><td>1114</td></tr><tr><td>Selenium</td><td>mg/L</td><td>0.47</td><td>0.0002</td></tr><tr><td>Uranium</td><td>mg/L</td><td>301</td><td>85</td></tr></table><div>E-doc: 6858049p. 93/419</div></div> <div><div>Annex 1 – FIRT IR Table – Technical Review of the Wheeler River Project draft EIS Decision Response - August 18, 2023</div><table><tr><th>Parameter</th><th>Units</th><th>Leaching Zone Remediation Target</th><th>Neutralization Phase Results ¹</th></tr><tr><td>Vanadium</td><td>mg/L</td><td>19.3</td><td>0.2</td></tr><tr><td>Zinc</td><td>mg/L</td><td>17.1</td><td>0.5</td></tr></table><div>¹ Results are the average of three groundwater monitoring wells (GWR-036, -040 -041) sampled in December 2022</div></div> | Parameter | Units | Restored Solution | pH | | 4.3 | Aluminum | mg/L | 7 | Arsenic | mg/L | 0.06 | Cadmium | mg/L | 0.015 | Cobalt | mg/L | 2 | Chromium | mg/L | 0.05 | Copper | mg/L | 0.17 | Iron | mg/L | 100 | Molybdenum | mg/L | 0.1 | Nickel | mg/L | 9.7 | Lead | mg/L | 3.1 | Sulphate | mg/L | 703 | Selenium | mg/L | 0.08 | Zinc | mg/L | 1.4 | Uranium | mg/L | 100 | Vanadium | mg/L | 0.51 | ²²⁶ Radium | Bq/L | 2.00E+02 | Parameter | Units | Leaching Zone Remediation Target | Neutralization Phase Results ¹ | pH | pH units | 3.5 | 6.24 | Aluminum (Al) | mg/L | 9.1 | 3.3 | Arsenic (As) | mg/L | 0.7 | 0.05 | Barium (Ba) | mg/L | 0.2 | 0.07 | Calcium (Ca) | mg/L | 535 | 203 | Cadmium (Cd) | mg/L | 0.3 | 0.00001 | Cobalt (Co) | mg/L | 0.24 | 0.0001 | Chromium (Cr) | mg/L | 0.38 | <0.0005 | Copper (Cu) | mg/L | 0.19 | 0.001 | Iron (Fe) | mg/L | 390 | 144 | Potassium (K) | mg/L | 45 | 185 | Magnesium (Mg) | mg/L | 8.92 | 22.6 | Molybdenum (Mo) | mg/L | 0.16 | 0.04 | Sodium (Na) | mg/L | 628 | 183 | Nickel (Ni) | mg/L | 1.17 | 0.02 | Lead (Pb) | mg/L | 2 | 0.04 | Sulfate | mg/L | 4,147 | 1114 | Selenium | mg/L | 0.47 | 0.0002 | Uranium | mg/L | 301 | 85 | Parameter | Units | Leaching Zone Remediation Target | Neutralization Phase Results ¹ | Vanadium | mg/L | 19.3 | 0.2 | Zinc | mg/L | 17.1 | 0.5 |
| Parameter | Units | Restored Solution | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| pH | | 4.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | mg/L | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Arsenic | mg/L | 0.06 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cadmium | mg/L | 0.015 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cobalt | mg/L | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chromium | mg/L | 0.05 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Copper | mg/L | 0.17 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Iron | mg/L | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Molybdenum | mg/L | 0.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Nickel | mg/L | 9.7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead | mg/L | 3.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sulphate | mg/L | 703 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Selenium | mg/L | 0.08 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Zinc | mg/L | 1.4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Uranium | mg/L | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Vanadium | mg/L | 0.51 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ²²⁶ Radium | Bq/L | 2.00E+02 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Parameter | Units | Leaching Zone Remediation Target | Neutralization Phase Results ¹ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| pH | pH units | 3.5 | 6.24 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum (Al) | mg/L | 9.1 | 3.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Arsenic (As) | mg/L | 0.7 | 0.05 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Barium (Ba) | mg/L | 0.2 | 0.07 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calcium (Ca) | mg/L | 535 | 203 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cadmium (Cd) | mg/L | 0.3 | 0.00001 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cobalt (Co) | mg/L | 0.24 | 0.0001 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chromium (Cr) | mg/L | 0.38 | <0.0005 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Copper (Cu) | mg/L | 0.19 | 0.001 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Iron (Fe) | mg/L | 390 | 144 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Potassium (K) | mg/L | 45 | 185 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Magnesium (Mg) | mg/L | 8.92 | 22.6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Molybdenum (Mo) | mg/L | 0.16 | 0.04 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sodium (Na) | mg/L | 628 | 183 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Nickel (Ni) | mg/L | 1.17 | 0.02 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lead (Pb) | mg/L | 2 | 0.04 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sulfate | mg/L | 4,147 | 1114 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Selenium | mg/L | 0.47 | 0.0002 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Uranium | mg/L | 301 | 85 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Parameter | Units | Leaching Zone Remediation Target | Neutralization Phase Results ¹ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Vanadium | mg/L | 19.3 | 0.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Zinc | mg/L | 17.1 | 0.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IR-07 | - | ECCC | Fish and fish habitat | <p>Section 2.2.1.4.2, Wellfield Operation</p> <p>Section 2.2.1.4.2.2, Secondary Containment of Mining Solution – Pumping</p> | <p>Context: The description in Sections 2.2.1.4.2 and 2.2.1.4.2.2 refer to the differential rates of injection and withdrawal, which implies that more solution will be withdrawn through the recovery well than volume of mining solution injected. According to the description of the site, a freeze wall will create a barrier between the uranium deposit to be mined and outside the isolated area to prevent inflow of groundwater from the sandstone outside the freeze wall. Secondly, it was indicated that the basement rock below the uranium deposit will prevent infusion of groundwater from below.</p> | Clarify where the extra groundwater will come from to sustain this differential rate of injection and withdrawals during operation and if this extra water has been accounted for in the model and the amount of water that ends up in the receiving environment. | | Accepted | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Original IR# | Follow-Up IR # | SME | Project Effects Link | Reference to EIS, appendices, or supporting documentation | Context and Rationale | Information Requirement (IR) | Rationale for Status | Status |
|--------------|----------------|------|---|---|--|--|----------------------|----------|
| | | | | | <p>The Proponent stated that inward hydraulic gradient will be created by recovering more solution than is being injected. In general, the wellfield will operate to draw a minimum of 1% more solution out of the wellfield compared to solutions injected in. This will help avoid increased subsurface pressures from injection pressure build up within the deposit.</p> <p>Rationale: It is not clear where the extra groundwater will come from that will sustain this differential rate of injection and withdrawals as the freeze wall and bedrock basement will isolate the injection well from groundwater.</p> <p>If it is assumed that there is limited amount of groundwater present in the sandstone layer above the uranium deposit, that amount of groundwater in the sandstone layer is finite and will be exhausted at some point. Therefore, it is not clear where the extra groundwater will come from. If the extra volume of water is not accounted for in the modelling, that would ultimately affect the volume of water that ends up in the receiving environment and likewise the amount of contaminants contained.</p> | | | |
| IR-08 | - | ECCC | Change to an environmental component due to radiological contaminants | Section 2.2.1.4.2.2 Project Description | <p>Context: This section describes how an inward hydraulic gradient will be created within the mining area as a secondary containment method for control of mining solution. While the process is described, there is no information on contingency measures in place for pump failure or system maintenance solutions. There is also no information on how quickly the hydraulic gradient, and therefore secondary containment, would be compromised if any pumps stopped working. It is also unclear how primary containment (i.e., well design) failure, such as physical/mechanical issues compromising casings, would affect the creation of the hydraulic gradient and secondary containment as well.</p> <p>Rationale: It is important to have contingency planning in place in the event that there are any issues with the hydraulic gradient and secondary containment system for control of the acidic mining solution.</p> <p>There is no information in this section on how the hydraulic gradient (i.e., secondary containment) would be maintained if a well or pump (i.e., Primary containment) experienced problems.</p> | Provide further information regarding how the inward hydraulic gradient system functions, with particular focus on how the hydraulic gradient and secondary containment will be maintained if any wells or pumps were compromised. | | Accepted |
| IR-09 | - | CNSC | Geology and Groundwater | Section 2.2.1.4.2.2 | <p>Context: This section indicates that mining solution within the mining area can primarily be controlled by maintaining an inward hydraulic gradient. The inward hydraulic gradient will be created by recovering more solution than is being injected.</p> <p>Rationale: If, for some reason, the recovered solution is much more than that being injected, an excessive drawdown could be created. If, by accident, mining solution is leaking into the upper sandstone aquifer through crack in injection/recovery well casing at the same time, it would be challenging to</p> | Please clarify if any measure will be implemented to avoid excessive drawdown and develop contingency measures to address such accident. | | Accepted |

| Original IR# | Follow-Up IR # | SME | Project Effects Link | Reference to EIS, appendices, or supporting documentation | Context and Rationale | Information Requirement (IR) | Rationale for Status | Status |
|--------------|----------------|------|--|--|---|---|--|----------|
| | | | | | remediate the upper sandstone aquifer in dry conditions (due to excessive drawdown). | | | |
| IR-10 | - | ECCC | Fish and fish habitat | Section 2.2.1.4.2.3, Tertiary Containment of Mining Solution - Freeze Wall | <p>Context: The Proponent stated that as a tertiary means of containment for the mining area, the uranium deposit is proposed to be surrounded by a freeze wall that extends from the surface to the basement rock, isolating the mining area from regional groundwater. Current plans are for the freeze wall to be a minimum of 10 m thick, be installed 25 m away from the uranium deposit, and extend 30 m into the basement rock (Figure 2.2-6).</p> <p>As explained in Section 2.2.1.4.2.2, mining solution will be injected into the ore zone under pressure and will likely react, not just with the uranium in the ore zone, but also the binding or cementing material in the sandstone. This means that some portion of the sandstone above the uranium layer and perhaps some portions of the freeze wall will dissolve, thereby creating more void than just the thickness of the uranium layer or horizon. The void may affect the integrity of the freeze wall as containment.</p> <p>Rationale: It is not clear how the Proponent will monitor the freeze wall to verify whether portions of the freeze wall are being dissolved in the mining process and how it plans to verify the integrity of the freeze wall as a containment for the mining solution. In addition, if the dissolution reaction of the uranium ore is exothermic, then the heat generated may also affect the integrity of the freeze wall.</p> | <p>1. Explain how the integrity of the freeze wall will be maintained as a means of containment that prevents migration of the mining solution out of the ore zone into the receiving environment.</p> <p>2. Demonstrate that the mining solution injected under pressure will not compromise the integrity of the freeze wall as a containment.</p> <p>3. Demonstrate how both exothermic and chemical reactions of the mining solution used to dissolve the uranium ore will not compromise the integrity of the freeze wall as a containment.</p> <p>Technical Discussion Required: Yes. ECCC would like to better understand the chemical constituents that compose the mining solution and the chemical reactions that it will cause.</p> | The Proponent’s response is accepted but see AD-50 in the Advice to Proponent table. | Accepted |
| IR-11 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 2.2.3 Project Description | <p>Context: It is unclear how much contact water may be produced during the drilling of the mine well field during the construction phase of the proposed Project. Figure 2.2-14 indicates that no water will be produced during the drilling process in the construction phase. In Section 2.2.1.2 both mud rotary drilling and diamond drilling are proposed for the creation of wells. Both processes require water, however only mud rotary drilling produces liquid mud that is then reused in the drilling process.</p> <p>Rationale: It is unclear if the liquid mud produced during drilling can be reused indefinitely with further water additions, or if this eventually becomes the clean sand grain cutting and how it will be disposed of (i.e., liquid or solid waste). If the mud produced from drilling is classified as liquid waste and disposed of as contact water, it is not clear if this is accounted for in the site water management plan and water balance during the construction phase. Contact water from well drilling during the construction phase has not been quantified or accounted for in Figure 2.2-1, and therefore it is unclear if proposed infrastructure during the construction phase has the capacity to contain this waste stream in addition to the waste streams currently outlined in Figure 2.2-1.</p> | Provide further information on potential wastewater produced during the construction phase from drilling processes, and if proposed infrastructure can contain any water produced. | | Accepted |

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| IR-12 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 2.2.3, Project Description | <p>Context: There is not enough information provided within the draft EIS and site water infrastructure designs to determine if the infrastructure will sufficiently contain mine site contact and non-contact water runoff. It is unclear how water management will occur during all proposed Project stages at the Project airstrip, which is located away from the main Project site. No information has been provided regarding water that may come into contact with fuels and oils from machinery on the air strip, how and where that contaminated water will be treated, and how surface runoff around the airstrip will be managed. Additionally, it is unclear if contaminants from heavy machinery on roads have been considered during runoff collection plans throughout the mine Project site. Water management at the airstrip and roads can have impacts on surface water quality and sediment quality and contaminants (e.g., Hydrocarbons) from these sources should be considered in overall site water management plans.</p> <p>In Section 2.2.3.1 a site drainage plan for contact and non-contact water has been provided in Figure 2.2-17, and water balances have been provided for the different Project phases in Figures 2.2-14 to 2.2-16. In Section 2.2.3.4 a volume of 30,000m³ for the process water pond is provided, and it is stated that the process water pond has the capacity to contain Probable Maximum Precipitation (PMP) event estimated to be 483.3mm while allowing for 1.0m of freeboard. However, there are no estimates on the total volume of water that may be drained from the overall site infrastructure (i.e., the well field, processing areas, etc.) during a 24-hr PMP event. Additionally, in Figure 2.2.17 culvert locations are provided, however there is no further information on culvert designs, flow ratings and capacity for PMP events.</p> <p>Rationale: In order to be able to understand site water management and flood risk potential, more information needs to be provided regarding the site water infrastructure designs and capture volumes during PMP events. This information will aid ECCC in understanding how contact and non-contact water will be conveyed throughout the site. Runoff from roads and the site airstrip will contain contaminants from vehicles, heavy machinery, aircrafts and de-icing practices. Additional information on the runoff collection systems and expected contaminant concentrations for the site airstrip and roads is needed to determine if the receiving environment and aquatic and terrestrial receptors are protected.</p> | <ol style="list-style-type: none">1. Provide information on how contact and non-contact water from the site airstrip will be managed. Include information on potential contaminant characterization and loadings and an assessment of risk to the environment.2. Provide further information on how potential contaminants in runoff from roads have been considered in the site water management. Include information on potential contaminant characterization and loadings and an assessment of risk to the environment.3. Provide estimated volumes of water to be drained from overall site infrastructure (such as the mine terrace, airstrip, camp area etc.), during a 24-hr PMP event.4. Provide additional information on culvert designs and conveyance capacity for PMP events. | <p>This response has not been accepted, for the following reasons (numbers correspond with original IR):</p> <p>1-2. In Figure 2.2-17 (Site Drainage Plan with Flow Direction and Culvert Locations) of EIS, site drainage or water management layout is not included for the access road to the airport and the airport area although they constitute part of the Project site. Although surface run off from airstrip or site road are mainly expected to be clean or non-contact water, CNSC expects Denison to provide information on water management system to mitigate risk of flooding and erosion at the airport and the access road. In addition, the access road connecting the mining site with airport crosses two streams (Kratchkowsky Creek and Hart Creek) that flow into Whitefish Lake, CNSC staff expects Denison to ascertain that culverts or crossings will be designed in such a manner that the flood hazard does not increase. Therefore, CNSC staff request that Decision provide information on how the surface runoff generated at airstrip and airport access road would be managed.</p> <p>3. CNSC accepts estimated total volume of runoff from the wellfield area to Wellfield Pond however the PMP value of 489.3mm is obtained from 1999 study [A.1], based on historical rainfall data pre-1998, which appears to require updated PMP value.</p> <p>CNSC requests that Denison use a PMP value that is estimated using historical rainfall data that includes the most up to date meteorological data or provide justification on the validity of the current PMP.</p> <p>Further, the site infrastructure runoff water has not been considered in the water management infrastructure. Site water management planning should consider the capture of noncontact water to understand the potential effects of contaminants from non-contact water on the surrounding environment.</p> <p>Please also see follow-up IR-12-R1A and IR-12-R1B, related to this IR.</p> <p>Reference: [A.1] Atmospheric & Hydrologic Sciences Division – Atmospheric Environment Branch. 1999. Environment Canada Prairie & Northern Region – Point Probable Maximum Precipitation for the Prairie Provinces. Regina, Saskatchewan. Report No. AHSD – R99 – 01.</p> | Not Accepted |
| IR-12 | IR-12-R1A | ECCC | Change to an environmental component due to hazardous contaminants | Section 2.2.3, Project Description Proponent response to IR-12 | <p>Context: Runoff water from site infrastructure such as the airstrip and roads may be categorized as non-contact water because it does not come into contact with contaminants of potential concern (COPCs) directly from mining operations infrastructure. However, it still has the potential to contain deleterious substances from mine-related activities such as operation of vehicles, including heavy machinery and aircraft, spills, fire management</p> | <ol style="list-style-type: none">1. Update site water management plans to include management of potentially deleterious substances contained in non-contact water from all site infrastructure.2. Provide updated estimates of water volumes to be drained and managed from overall site infrastructure (including runoff from roads, airstrip, camp | | Follow-Up IR |

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| | | | | | <p>practices, and snow removal practices. The <i>Metal and Diamond Mining Effluent Regulations</i> (MDMER) pursuant to the <i>Fisheries Act</i> requires all mine effluent and seepage from the mine site that contains deleterious substances be discharged through a final discharge point. This includes deleterious substances in non-contact water from all site infrastructure including the airstrip, roads, and camp area.</p> <p>Rationale: All mine effluent and seepage that contains deleterious substances must be discharged through a final discharge point. This includes site non-contact water which has the potential to contain deleterious substances such as those released from vehicles, machinery, aircrafts, spills, and de-icing practices. The Proponent has not included how non-contact water runoff from site infrastructure will be captured within site water management planning. To understand the potential effects of contaminants from non-contact water on the surrounding environment, site water management planning needs to be updated to include the capture of non-contact water.</p> | area, etc.) during the different Project phases. Include updated information on water treatment flows, capacity and effluent discharge during normal operations, and a 24-hr Probable Maximum Precipitation (PMP) Event. | | |
| IR-12 | IR-12-R1B | ECCC | Water Quality - Change to an environmental component due to hazardous contaminants | Section 2.2.3, Project Description Proponent response to IR-12 | <p>Context: The Proponent has clarified that there is no infrastructure in place for management of non-contact water from site infrastructure that may contain COPCs, including but not limited to roads, the airstrip, and the campground.</p> <p>Rationale: To understand the potential effects of contaminants from non-contact water on the surrounding environment, site water management planning needs to be updated to include the type of infrastructure and its location for the capture of non-contact water.</p> | Provide a map marking the locations of proposed surface drainage structures for runoff collection including collection ditches, culverts, diversion ditches, perimeter berms, collection ponds and other similar structures. | | Follow-Up IR |
| IR-13 | - | ECCC CNSC | Fish and fish habitat | Section 2.2.4, Waste Management Section 2.2.7.7, Borrow Area Section 2.3.1.3 Site Preparation and Earthworks | <p>Context: The Proponent indicates that a borrow area is planned for an area northeast of the processing plant. The borrow material or overburden will be used during construction for roads, airstrip, pads, and in the batch plant for concrete production needs, during Operation for ongoing maintenance of various Project components and during decommissioning for fill and cover material. Suitable construction fill material will be sourced from the proposed borrow area and any suitable clean sandstone generated during freeze wall and well drilling (Section 2.2.7.7).</p> <p>It was also noted in Sections 2.2.1.3 and 2.2.14 that the freeze wall will be established by drilling over 300 vertical holes from surface to the basement rock. The freeze holes will extend 30 m into the basement rock and will produce waste rock from basement rock (Figure 2.2-6). However, there is no information whether the waste rock from basement rock would potentially be acid generating and/or metal leaching. This means that all the extra 30 m of basement rock should also be characterized for potential ARD/ML to determine use or appropriate disposal.</p> <p>Rationale: ECCC notes that the Proponent did not indicate whether the</p> | Please provide: 1. Information on whether the waste rock from the basement rock is potentially acid generating and metal leaching; a. Confirm that any borrow material to be used for construction will be characterized for potential ARD/ML. b. Confirm that the part of waste rock recovered from the basement rock, will also be tested for potential ARD/ML. 2. Criteria for segregating the potential acid generating and metal leaching waste rock, if it exists, from clean waste rock; and, 3. A plan to manage the potential acid generating and metal leaching waste rock, if it exists. | <p>This response has not been accepted.</p> <p>In the response, Denison expected that portion of basement rock will be potentially acid generating and stated that all basement rock will be stored on the special waste pad. Waste rock from the sandstone will also be characterized primarily based on geological and geochemical characteristics, and if a portion of the waste rock is potentially acid generating, it will also be stored on the special waste pad. However, criteria for segregating the potential acid generating waste rock from the clean waste rock are not provided.</p> <p>Denison will examine opportunities to reprocess the mineralized core and cuttings by either recovering uranium or placing the materials underground into the mining area at the end of a well's production. However, it is not clear how the potentially acid generating waste rock will be disposed of in the long term.</p> | Not Accepted |

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| | | | | | <p>borrow material and the drill out part of the sandstone layers and basement rock will be tested for Acid rock drainage/metal leaching (ARD/ML) potential before they will be used during construction, operation and decommissioning. ARD/ML is an environmental hazard that will have an adverse effect on waterbodies frequented by fish.</p> <p>Potential acid generating and metal leaching waste rock could pose negative impacts on the environment if they are not managed adequately.</p> | | | |
| IR-14 | - | CNSC | Wastes and Decommissioning | <p>Section 2.3.3.1.3 Decontamination, Demolition, and Disposal (p. 2-82)</p> <p>Table 4.3-2: Key Issues and Concerns from English River First Nation (p. 4-33)</p> | <p>Context: The EIS states “Concrete foundations will be left in place. Any portions of concrete foundations remaining above grade will be levelled and rebar will be cut-off at grade. Large slabs will be perforated on a 2-m grid to permit drainage. Concrete slabs will be covered with 0.5 m of development rock or locally stockpiled till.” (p. 2-82)</p> <p>Further, Denison notes that “Concern about responsible authority for restoring the environment, including contaminants when mining concludes. How long will it take to have the environment fully restored and, if Denison is no longer the operator, how will this be completed?” (p. 4-33). This comment status is noted as <i>Complete</i>.</p> <p>Rationale: Permanent structures will remain following decommissioning, according to the excerpt above. It’s unclear how engagement activities influenced Denison’s planned decommissioning approach, or how the comment above has been addressed or received.</p> | <p>How has the proposal to leave these foundations in place been received by the Indigenous Nations and communities during engagement sessions? Have engagement activities influenced Denison’s planned decommissioning approach? Describe in additional detail how the comment from p. 4-33 has been addressed and how this has been received by those who expressed this concern?</p> | <p>This response has not been accepted.</p> <p>The response provided in IR-28 indicates that responses will be updated in the final EIS and future iterations of the IER. Although Denison commits to provide a PDP at a later date, the commitment does not include incorporating or addressing Indigenous concerns. The current response also does not address the concerns raised by Indigenous Nations and communities regarding restoration of the environment or indicate that it was brought to their awareness).</p> <p>Additionally, IR-28 highlights examples of how engagement will be captured in future iterations of the IER and “final EIS”. Please provide proposed text for the revised EIS, for subject matter expert (SME) review and acceptance.</p> | Not Accepted |
| IR-15 | - | ECCC | Fish and fish habitat | <p>Section 2.2.3.4 Project Description</p> <p>Section 8.1.3.4.2, Aquatic Environment</p> | <p>Context: In Section 2.2.3.4 it is stated that the estimated PMP event for Project infrastructure planning is 483.3mm. In Section 8.1.3.4.2 it is stated that the PMP is 489.3 mm.</p> <p>Rationale: It is unclear which value is the correct PMP value and if Project infrastructure has been planned correctly.</p> | <p>Provide the correct PMP value and verify that Project infrastructure has been designed utilizing the correct value.</p> | | Accepted |
| IR-16 | - | CNSC | Human health with respect to hazardous contaminants | <p>Section 2.2.3.8</p> | <p>Context: The EIS and technical supporting documents do not provide sufficient justification for the selection of the proposed wastewater treatment systems for the industrial wastewater treatment plant or the domestic wastewater treatment plant.</p> <p>In addition, it is not clear how the upper bound of the industrial wastewater treatment plant effluent quality was obtained.</p> <p>Rationale: Draft REGDOC-2.9.2 formally documents the CNSC’s expectations to licensees for controlling releases to the environment. For proposed new facilities, these expectations include conducting a best available technology and techniques, economically achievable (BATEA) Assessment, and determining key parameters necessary to support the EIS. These include identifying:</p> | <p>Please provide a summary of the BATEA assessment to justify the selection of the wastewater treatment plant system.</p> <p>As part of the summary, please identify the anticipated environmental release targets used to inform the design, as well as the maximum predicted design release concentrations and loadings to the receiving environment. The maximum predicted design releases should be used in the ERA to demonstrate protection of people and the environment.</p> | | Accepted |

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| | | | | | <ul style="list-style-type: none">environmental release targets to inform the design of wastewater treatment systems to constrain the quantity and concentration of contaminants and physical stressors released into the environment,the best available technology and techniques through an options analysis; andthe anticipated influent characteristics, overall treatment efficiencies, and maximum predicted design release as the output of the assessment. <p>Consideration of the principle of pollution prevention and BATEA is also a requirement of REGDOC-2.9.1.</p> <p>CNSC staff have met with Denison to discuss the expectations in draft REGDOC-2.9.2.</p> | | | |
| IR-17 | - | CNSC | Human health with respect to hazardous contaminants | Section 2.2.3.8 | <p>Context: It is also acknowledged that Denison stated in meetings with CNSC staff that Denison intends to propose final release targets to the CNSC as part of the licence application submission.</p> <p>Rationale: It is not clear in the submission whether Denison has considered whether any applicable technology-based performance standards exist in Canada or internationally, and would be relevant as effluent discharge targets, in order to ensure principles of pollution prevention are applied. Consideration of this would help ensure that the proposed effluent discharge targets harmonize with existing federal, provincial/territorial, and/or municipal requirements. For example, there are release limits for radium-226, TSS, and pH outlined in the federal Metal and Diamond Mining Effluent Regulations, which have been demonstrated to be achievable in the uranium mine and mill industry.</p> <p>In addition, countries like the United States, where in-situ recovery has been conducted in the past, have specific technology-based limits. These are known as New Source Performance Standards and are identified in US Code of Federal Regulations (US CFR) 40, Chapter 1, Subchapter N, Part 440 – Ore Mining and Dressing Point Source Category. It is not clear whether these have been considered in Denison’s assessment. These should be considered when identifying suitable achievable technologies.</p> | Denison should harmonize their proposed Effluent Release Targets with the technology-based performance standards that exist in the Metal and Diamond Mining Effluent Regulations where applicable, or other suitable international regulations. | | Accepted |
| IR-18 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 2.2.3.9, Project Description Appendix 8-E | <p>Context: In Table 2.2-1 the upper bound Industrial Wastewater Treatment Plant (IWWTP) effluent quality final discharge targets for Constituents of Potential Concern (COPCs) are provided. General parameters (e.g., temperature, pH, etc.), and several Schedule 4 Substances with maximum authorized concentrations (lead, nickel, suspended solids, and un-ionized ammonia) under the Metal and Diamond Mining Effluent Regulations (MDMER) have not been provided in this table. There are several COPCs (aluminum, mercury, iron, nitrate, thallium, phosphorus and manganese) for effluent characterization under Schedule 5 Section 4 of the MDMER that</p> | <p>1. Update Table 2.2-1 and Appendix 8-E to include all general parameters required for environmental effects monitoring: pH, temperature, hardness, alkalinity, and conductivity.</p> <p>2. Update Table 2.2-1 and Appendix 8-E to include missing Schedule 4 Substances under the MDMER with maximum authorized concentrations: lead, nickel, suspended solids, and un-ionized ammonia.</p> <p>3. Update Table 2.2-1 and Appendix 8-E to include missing Schedule 5</p> | <p>This response has not been accepted.</p> <p>ECCC requested that the Proponent update Table 2.2-1 and Appendix 8-E to include all general water quality parameters required for environmental effects monitoring, including pH, temperature, hardness, alkalinity and conductivity. This information was not provided in the updated table in the Proponent’s response. ECCC also requested that the Proponent Update Table 2.2-1 and Appendix 8-E to include missing Schedule 5 Section 4 parameters required for effluent characterization under the Metal and</p> | Not Accepted |

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| | | | | | <p>have not been provided in this table. Additionally, no information on water quality guidelines has been provided in this table.</p> <p>Furthermore, it is stated that the final effluent quality discharge target for uranium is 0.057 mg/L. However, the Canadian Council of Ministers of the Environment (CCME) water short term (acute) water quality guidelines for the protection of aquatic life is 0.033 mg/L. The proposed effluent discharge target for uranium exceeds the acute water quality guidelines, indicating effluent may pose the risk of being acutely lethal to aquatic biota at end-of-pipe.</p> <p>Rationale: ECCC requests the Proponent include the general water quality parameters that influence water quality thresholds, parameters in Schedule 4 and Schedule 5 Section 4 of the MDMER, and their respective water quality guidelines for consideration and transparency.</p> <p>Discharges from the proposed Project will alter water quality in the immediate receiving area, and this may include some sublethal effects on aquatic biota, which must be minimized. It remains the Proponent’s responsibility to adhere to the MDMER to ensure that effluent at the end-of-pipe from all final discharge points be non- acutely lethal and meet requirements for prescribed deleterious substances under Schedule 4 of the regulations.</p> | <p>Section 4 parameters required for effluent characterization under the MDMER: aluminum, mercury, iron, nitrate, thallium, phosphorus and manganese.</p> <p>4. Include all acute and chronic water quality thresholds for each parameter in Table 2.2-1 and Appendix 8-E.</p> <p>5. Describe additional mitigation measures that can be considered to minimize impacts to aquatic biota from uranium concentrations in effluent.</p> | <p>Diamond Mining Effluent Regulations (MDMER) including aluminum, iron, nitrate, thallium and manganese. The Proponent has not provided the requested information for aluminum, iron, nitrate, thallium and manganese. In the Proponent’s response it is stated that, “Schedule 5 parameters are included where available.” However, it is unclear if this means that the requested effluent characterization concentrations for these parameters is currently unknown, or if these parameters are expected to have negligible concentrations in the effluent. Furthermore, ECCC requested that the Proponent include all acute and chronic water quality thresholds under the most stringent of the MDMER, CCME, and/or Provincial Guidelines for each parameter in Table 2.2-1 and Appendix 8-E. This information has not been provided as only chronic toxicity guidelines have been provided.</p> <p>The Proponent is legally required to meet MDMER release targets and intends to continue to refine effluent quality predictions as part of the BATEA assessment and licensing phase of the Project. ECCC must advise the CNSC of predicted effects of COPCs to surface water quality and recognize the Proponent’s legal requirement to comply with the MDMER. Therefore, proposed and draft effluent targets must be reviewed against the requirements of the regulations and with an eye to any potential effects to the receiving environment for both regulated and other effluent parameters. It is necessary for ECCC to review effluent targets for general water quality parameters and MDMER Schedule 5 Section 4 parameters required for effluent characterization and environmental effects monitoring to determine if effluent at the end-of-pipe from all final discharge points is not predicted to be acutely lethal. Additionally, the predicted uranium effluent concentration currently exceeds the acute water quality guidelines for the protection of aquatic life. Table 2.2-1 does not currently provide the information necessary to verify acute and chronic thresholds.</p> <p>Therefore, please see the following reiterated requests:</p> <p>1. Update Table 2.2-1 and Appendix 8-E to include all general parameters required for environmental effects monitoring: pH, temperature, hardness, alkalinity, and conductivity.</p> <p>2. Update Table 2.2-1 and Appendix 8-E to include the following missing Schedule 5 Section 4 parameters required for effluent characterization: aluminum, iron, nitrate, thallium, and manganese. Provide further explanation if this information is not available.</p> <p>3. Include all acute and chronic water quality thresholds for each parameter in Table 2.2-1 and Appendix 8-E. Include information on the concentrations of modifying environmental factors (i.e. pH, hardness, etc.) used to calculate these guidelines as footnotes.</p> | |

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| | | | | | | | 4. Provide a clear commitment to ECCC for continued consultation on developing effluent discharge targets including a review of final predicted effluent discharge targets once available. | |
| IR-19 | - | ECCC | Change to an environmental component due to radiological contaminants | Section 2.2.4 Project Description | <p>Context: In this section, it is proposed that the IWWTP precipitate pond will have a single geosynthetic composite liner system, which is used for ponds/pads that only store non-radioactive materials.</p> <p>However, from Section 2.2.3.9 on industrial wastewater treatment, it is unclear if the precipitates from the stage three neutralization process that are pumped to the IWWTP precipitates pond will have any residual radioactivity.</p> <p>Rationale: For the protection of the surrounding environment, it is important that any ponds/pads that are expected to store radiological contaminants be designed to have proper controls (i.e., liners with monitoring systems) in place.</p> | <p>1. Confirm the characterization of the precipitates that are to be stored in the IWWTP precipitate pond.</p> <p>2. If radiological constituents are expected within those precipitates, update the draft EIS to ensure the proposed geosynthetic liner system for the IWWTP precipitate pond will be adequate to ensure the protection of the surrounding environment.</p> | | Accepted |
| IR-20 | - | NRCan | Fish and fish habitat | Section 2.3.3.1.1 Appendix 7-C | <p>Context: The Proponent's objective for mining area remediation is to restore the groundwater within the confines of the freeze wall to an acceptable remediation target (EIS, sec. 2.3.3.1.1). The Proponent's acceptable decommissioning objectives for groundwater quality are provided in EIS Table 2.3-3 and in Table 3-5 of Appendix 7-C. These objectives were based on laboratory core flood tests performed by flushing samples of ore with groundwater and groundwater amended with sodium hydroxide or sodium bicarbonate. The composition of the remediated groundwater observed in the core flood tests serves as the source term for the post-decommissioning reactive transport modeling presented in section 4 of Appendix 7-C.</p> <p>Rationale: In NRCan's opinion, it is important for reviewers to be able to assess the level of remediation achieved in order to reach the Proponent's decommissioning groundwater quality objectives. Therefore, the Proponent should provide complete water quality data for the pregnant lixiviant that remains in the ore zone after the end of mining and prior to any remediation.</p> | NRCan requests that the Proponent revise Table 3-5 of Appendix 7-C to show the water quality in lixiviant remaining in the ore zone at the end of mining, prior to remediation activities. | | Accepted |
| IR-21 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 2.3.3.1.3, Project Description | <p>Context: The decommissioning process for the wellfield and associated infrastructure is discussed, however there is no information provided on the potential risk for subsidence of the ground above the depleted uranium deposit. After the uranium has been dissolved and pumped to the surface, a cavity will be formed in the area where the uranium used to exist. This could destabilize the overlying substrates, causing the ground at the surface to sink in the future. There is currently no information regarding this risk, and how it may alter the overlying environment, surface water features, runoff, or existing nearby waterbodies.</p> | Provide further information on the potential risks from subsidence including the probability of occurrence, how it may affect surface water features, and if there exists any risk to the planned decommissioning of waste management infrastructure. | | Accepted |

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| | | | | | Rationale: From a surface water and sediment quality perspective, it is important to understand how potential subsidence in the future post-decommissioning may affect the existing environment. It is currently unclear if there is any risk to the aquatic environment if subsidence were to occur and alter existing waterbodies, create new surface water features, or if there will be any risk to the decommissioned onsite industrial landfill and industrial wastewater treatment plant precipitate pond. | | | |
| IR-22 | - | NRCan | Fish and fish habitat | Section 2.10 Appendix 2-C, section 1.1.1.4 | Context: With respect to the choice of In-Situ Recovery (ISR) mining solution, two alternatives were assessed: alkaline and acidic lixivants (Appendix 2-C, sec. 1.1.1.4). In the consideration of technical and economic feasibility of the alternatives (Table 2, Appendix 2-C), the Proponent concludes that: Option 1 (alkaline) is not technically feasible based on the uranium deposit geochemistry. Option 2 (acidic) is technically and economically feasible based on the uranium deposit geochemistry and ability to dissolve uranium. Accordingly, the alkaline alternative was not carried forward into the Environmental Assessment (EIS, Table 2.10-1; Appendix 2-C, Table 3). While acidic ISR solutions are widely used internationally (e.g., Kazakhstan), in the United States, where the environmental regulatory regime is more strict, alkaline solutions have been used exclusively since 1970. Rationale: In NRCan's opinion, the Proponent should provide a more thorough technical justification for adopting an acidic ISR lixiviant. | In the Alternative Means Assessment (Appendix 2-C), NRCan requests that the Proponent provides a more thorough technical justification for selecting an acidic ISR lixiviant rather than a less environmentally problematic alkaline leach used exclusively in the USA. | | Accepted |
| IR-23 | - | CNSC | Alternative Means | Section 2.10.2 Alternative Means Appendix 2-A PD Engagement Tables Appendix 2-C Alternative Means Assessment (p. 3) | Context: There are multiple rows in the Indigenous Tables for Appendix 2-A where comments and concerns raised by Indigenous Nations and communities and other members of the public were taken into consideration in the Alternative Means Assessment. However, it is unclear how these were considered. A few examples: <ul style="list-style-type: none">16-EN-DesNd-101.1: Interested in any future business opportunities that may be available as Denison advances their Wheeler River Project.16-EN-ERFN-100.15: In that territory near the Wheeler River there are a lot of spawning and calving areas for moose, caribou; those creeks are for whitefish spawning. There's lots of heavy muskeg there. A lot of us have been there, and we'd like to know there'll still be access to the area.6-EN-ERFN-100.17: Today because of climate change, things are starting to happen that normally didn't happen. Even the permafrost is now further down. In the Wheeler River area, where there's some permafrost, have your environment guys seen a change? Will there be a change? These are some of the questions that need to be answered in order to come out with a positive spin. | Please explain how comments and concerns collected during Denison's engagement sessions were considered or influenced the alternative means assessment. Please include this information in the EIS and/or it's appendices. | This response has not been accepted. The response and additional Annex (Table 2.10-1) provided in the draft EIS submission do not address concerns listed in the examples requested by CNSC staff. The additional row in Table 2.10-3 meant to address input received from interested parties does not clearly demonstrate how comments received regarding alternative means were incorporated into the evaluation factor. Additionally, references provided in this row are not in the submission package or the original EIS. | Not Accepted |

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| | | | | | <p>Rationale: Appendix 2-C, Alternative Means assessment, states (p.3): “Engagement with Interested Parties naturally included alternatives means and the engagement input was included in the evaluation of alternative means. Refer to the references list below and <i>Appendix 2-A Engagement Database Summary – Project Description</i> for details of engagement information referenced in this alternative means assessment.”</p> <p>It is unclear in section 2.10.2 of the EIS, Appendix 2-A or Appendix 2C how the comments documented by Denison have been considered or influenced the alternative means assessment.</p> | | | |
| IR-24 | - | CNSC | Alternative Means | Section 2.10.2 Alternative Means | <p>Context: While Appendix 2-C (Alternative Means Assessment) is detailed and includes all aspects of the Alternative means assessment that are required, the summary of the analysis and conclusions in Section 2.10.2 of the EIS lacks the level of detail required to understand the methodology used, and how Denison arrived at these conclusions.</p> <p>Rationale: As noted in the Agency’s Operational Policy Statement on Addressing “Purpose of” and “Alternative Means” under the CEAA 2012: “If a preferred means is selected, the analysis and the rationale for the choice should be explained from the perspective of the Proponent, and be documented in the EIS in sufficient detail to provide context for public and technical comment periods during the project EA, and ultimately to allow the decision maker to understand the choice.”</p> | <p>Please summarize the analysis of the alternative means assessment within the body of the EIS, in sufficient detail that a reader of the EIS has adequate information to understand the methodology used, and how Denison arrived at these conclusions.</p> <p>*Note: In addition to the adding text to summarize, Table 6 in Appendix 2-C could be useful to understanding table 2.10.1 in the EIS.</p> | | Accepted |
| IR-25 | - | CNSC | Current use of lands and resources for traditional purposes | Section 3, Sections 4, Section 5, Section 11 (and all other applicable once Métis Knowledge Use Study is completed) | <p>Context: The EIS states that Denison is currently negotiating an agreement with MN-S and no traditional land use information is included throughout the EIS given no agreement was signed or Traditional land use information was shared at the time the EIS was being drafted.</p> <p>As noted in the EIS Denison has committed that: “As information becomes available from the agreed-upon process between the Métis Nation – Saskatchewan and Denison, it will be incorporated into the final EIS.” (p. 11-36)</p> <p>Rationale: More information is required to better understand the issues and concerns, valued components, and current use of lands and resources for traditional purposes by MN-S near the Project area.</p> <p>Requirements are detailed in CNSC’s Generic EIS Guidelines, section 8.9: Indigenous land and resource use.</p> | <p>Please update the revised Draft EIS to reflect the integration of the Métis Use and Knowledge Study in the Draft EIS where applicable, when this study is completed and provided to Denison.</p> <p>In addition, please include an updated Issues and Concerns table that includes relevant information from the MN-S as a result of engagement activities and relevant MN-S studies in the next version of the EIS, as appropriate.</p> <p>Should this information not be made available to Denison at the time of revising the draft EIS, the next version of the EIS and the response to this IR should provide a status update on discussions and engagement with MN-S and next steps.</p> | <p>This response has not been accepted.</p> <p>As the information from MN-S has not yet been incorporated into a version of the EIS for review, CNSC cannot accept this response as complete. MN-S has provided new information to Denison and this should be reflected in Denison’s assessment.</p> <p>CNSC requires that Denison provide additional information within the revised version of the EIS. The response should include the newly revised text within the EIS and the page numbers of where staff can find the information.</p> | Not Accepted |
| IR-26 | - | CNSC | Precautionary principle and approach | Section 3.4.8 Lands Taken Up from an Indigenous Perspective (p. 3-14) | <p>Context: Denison states: “Discrepancies among IK and western scientific information provide an opportunity for Denison to take a precautionary approach. Examples of concrete actions to address uncertainty in cases where IK and LK have differing conclusions on predicted Project effects</p> | <p>Please clarify how the precautionary principle, and the Privy Council Office’s, A Framework for the Application of Precaution in Science-based Decision Making About Risk, sets out guiding principles for the application of</p> | | Accepted |

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| | | | | | <p>include addressing uncertainty through monitoring and follow-up programs and communicating results of those monitoring and follow-up programs to demonstrate they have been responsive to the IK shared.” (p. 3-14)</p> <p>Rationale: CNSC’s Generic Guidelines for the Preparation of an EIS state: “In documenting the analyses included in the EIS, the Proponent will demonstrate that all aspects of the Project have been examined and planned in a careful and precautionary manner in order to avoid significant adverse environmental effects.</p> <p>A document by Canada’s Privy Council Office, A Framework for the Application of Precaution in Science-based Decision Making About Risk, sets out guiding principles for the application of precaution to science-based decision making.” (Section 2.5)</p> | <p>precaution to science-based decision making has been considered and incorporated into the EA described in the EIS.</p> | | |
| IR-27 | - | CNSC | Cumulative Effects Analysis | Section 3.4.8 | <p>Context: During an outreach and engagement trip by CNSC in October 2022, an abandoned exploration camp adjacent to the proposed Wheeler River site was observed. This site has not been identified within the EIS as part of the cumulative effects assessment. As noted in section 3.4.8, KML has also raised concerns with Denison related to abandoned camps and industrial waste left with no programs for clean-up.</p> <p>Rationale: Section 9.4.3 of CNSC’s Generic Guidelines for the Preparation of an EIS states that “The applicant shall assess any residual adverse environmental effects of the Project in combination with other past, present or reasonably foreseeable projects and/or activities within the study area.”</p> | Please specify why abandoned exploration camps and industrial waste aren’t taken into consideration when completing cumulative effects assessment. | | Accepted |
| IR-28 | - | CNSC | Current use of lands and resources for traditional purposes | Section 4, IER and engagement appendices, including: Appendix 2-A Appendix 6-B Appendix 7-B Appendix 8-A Appendix 9-A Appendix 10-B Appendix 11-A Appendix 12-A Appendix 13-A Appendix 14-B | <p>Context: The summary of issues tables do not appear to include all of the key issues identified by the Indigenous Nations and communities.</p> <p>For example, some Indigenous Nations and communities have shared concerns with respect to accident prevention and overall safety on the Key Lake road (Highway 914) due to increased traffic, impacts on treaty rights and section 35 rights due to cumulative impacts, and decommissioning, that were not captured in the issues and concerns and summary tables in Section 4.3.2 and in the IER.</p> <p>The tables in the engagement appendices include a column titled “Response (From Denison)”. The “Response” column does not include responses, but instead points the reader to where this comment or concern was considered. When navigating to the sections referenced, it is often unclear how this information was considered or influenced the assessment.</p> <p>Rationale: Additional detail is required in order to ensure the key issues are all identified and to understand the status of validation for each issue raised and the response provided.</p> | <p>1. Update the summary of issues and concerns tables to include all relevant issues and concerns raised by each of the Indigenous Nations and communities to date, including concerns raised in the Indigenous Knowledge studies provided, additional engagement, and Draft EIS comments.</p> <p>2. Please include a column in the issues and concerns tables to clearly articulate the specific mitigation/monitoring measures that Denison have committed to, or any other measures, in order to address the concerns raised by each Indigenous Nation and community during the engagement process to date.</p> <p>3. Denison must demonstrate that each Indigenous Nation and community has validated that the summary of issues and concerns table reflects their understanding or agreement, and/or a path forward to complete the validation throughout the EIS and the updated IER.</p> <p>Validation must be complete by the time the technical review is complete, prior to submission of a final EIS. Should Denison not be able to fully address issues, concerns or feedback raised by any Indigenous Nation or community,</p> | <p>This response has not been accepted.</p> <p>Denison provided information about the verification process for KML with an example chart that CNSC staff deem acceptable. CNSC requires that Denison complete this process with all identified Indigenous Nations and communities.</p> <p>It will be expected that a fully updated IER and issues and concerns tables for each Nation as per the original IR, in a future version of the revised EIS for SME review and acceptance.</p> <p>For part 3 of the IR, Denison must have validation from all Nations and Communities. Validation from ERFN, YNLRO and other Nations with interest in the Project should also be obtained. Alternatively, a path forward to complete the validation can also be provided.</p> | Not Accepted |

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| | | | | | | through mitigation and monitoring measures, this should be documented, and a rationale provided. 4. Update the response column of the Engagement tables to describe how these were considered in the sections referenced. Consider renaming this column to reflect the nature of the content (i.e., how the information was considered). | | |
| IR-29 | - | CNSC | Current use of lands and resources for traditional purposes | Section 4.3.2 and IER | Context: In this section, Denison includes the engagement with BNDN and includes a summary of issues and concerns table for the Nation. Within the history of interactions (Section 4.3.3.2.1). Rationale: Denison states that they have been providing information on the Project to BNDN in 2019, 2021 and again in 2022 and that Denison and BNDN have not responded to date in order to advance further engagement and dialogue. | Please ensure updated information of any additional engagement activities that Denison has completed with BNDN related to understanding their current and traditional land use and potential interests near the proposed project is provided. | | Accepted |
| IR-30 | - | CNSC | Indigenous physical and cultural heritage | Section 4.3.2.1.3, Table 4.3.2 | Context: Concerns were raised during engagement sessions that “Elders are not being consulted as most of the engagement has been through online means and without a translator”. Rationale: There’s no indication that a translator has been employed to engage with Elders since 2021 in the engagement Table 4.3.2. | How has Denison adapted engagement with Elders from the ERFN since receiving this comment on March 31, 2021? | | Accepted |
| IR-31 | - | CNSC | Indigenous Engagement | Section 4.4.2.1.3, Key Engagement Activities (p. 4-88) | Context and Rationale: Regarding the following: “An open house for the general public was planned to be hosted in 2022 on preliminary effects and mitigation, but due to concerns identified by MN-S about hosting a public open house in a community with a significant Métis population, this meeting was postponed by Denison. Denison looks forward to rescheduling the meeting in collaboration with the MN-S.” (p. 4-88) | Please provide an update on the evolution or progress of this engagement with local communities, following collaboration with MN-S (or otherwise). | | Accepted |
| IR-32 | - | CNSC | Current use of lands and resources for traditional purposes | Section 5.3 Section 9.0 Terrestrial Environment | Context: Some sections of the EIS (such as Fish and Fish Habitat, Indigenous Lands and resource use) indicate that Indigenous and/or local knowledge was considered when defining the spatial boundaries. However, this is not included in other sections, such as Terrestrial Environment. Rationale: Section 5.2.2 of CNSC’s Generic EIS Guidelines require that spatial boundaries be defined by considering, but not limited to, the following criteria: Community and Indigenous traditional knowledge, ecological and technical considerations. | Please provide any additional details about how any comments or concerns raised were considered in defining the spatial boundaries with Indigenous Nations and communities with respect to spatial boundaries, for the Terrestrial Section and which specific Indigenous Nations and communities were engaged on these topics and how their input and knowledge was incorporated into the EIS. If already presented in the EIS text body, please indicate where this information can be found or link to Section 4 of the EIS or in the IER. | | Accepted |
| IR-33 | - | CNSC | Residual Effect Characterization | Section 5.8.1, Definitions for Residual Effects Characterization and Significance | Context: Denison uses specific criteria (Residual Effect Characteristics: Direction, magnitude, geographic extent, duration, frequency, reversibility, context and likelihood) and associated ratings (e.g., adverse/positive, low/moderate/high) for the predicted effects assessment. However, it is unclear whether an aggregation method was used in order to determine whether impacts will be significant or not significant, depending on the | If an aggregation method was used and ratings (e.g., High, medium, low) were weighted, what weightings were used, how were these calculated? Please also describe any decision rules that informed the determination of significance. | | Accepted |

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| | | | | Section 5.8.1.1, Residual Effects Characteristics Section 8, Table 8.3-9: Fish and Fish Habitat - Surface Water Quality | <p>combination of rating categories (i.e., weightings that were calculated, use of decision rules).</p> <p>For example, medium term and long term are both used to represent the same time category: “Effects are expected to last between 3 to 38 years (i.e., effects expected during Construction through to the end of post-Decommissioning).” (See table 8.4-13 on p. 8-200 compared to table 8.4-12 on p. 8-199 and table 8.5-9 on p. 8-246).</p> <p>Rationale: The Generic Guidelines state: “The method used to describe the level of the adverse effect should be transparent and reproducible.”</p> <p>In Table 8.3-11, duration was moderate, but again uses same rationale. There is no 'moderate' in Table 8.3-8, and by the same rationale, this should be medium-term to be consistent with definitions provided and summary Table 8.3-12.</p> <p>It was noted that all three tables should be deemed medium-term based on definitions of ratings outlined in Table 8.3-8. Frequency was also showing up as "continuous" and "continuously" in these tables.</p> | <p>If no aggregation was used, how did Denison ensure that results were consistent, given the varying rankings for each of the key criteria, and varying combination?</p> <p>Regarding inconsistencies in ratings, please use consistent terminology for same rating.</p> | | |
| IR-34 | - | CNSC | Cumulative Effects Analysis | Section 5.9.2.2 (p. 5-41) | <p>Context: Denison identifies the Gryphon deposit as a project that is not reasonably foreseeable. The direct quote from the EIS indicates that the “Development of the Gryphon deposit as an underground mine was evaluated at the prefeasibility level in 2018 but has not advanced to feasibility study or EA. Denison has not announced an intent to proceed with the development of the Gryphon deposit.” (p. 5-41)</p> <p>Rationale: The guidance Assessing Cumulative Environmental Effects under the CEAA, 2012 defines <i>Reasonably Foreseeable</i> as a “physical activity [that] is expected to proceed, e.g. the Proponent has publicly disclosed its intention to seek the necessary EA or other authorizations to proceed.”</p> <p>In a press release by Denison Mines (2018: Denison announces decision to advance Wheeler River Project following positive PFS results), Denison publicly disclosed intention to seek the necessary EA for Gryphon to proceed: “After careful consideration of the risks and opportunities associated with permitting and concurrent advancement of project engineering activities, the Company has decided to submit a PD and initiate the EA process in early 2019 for the Phoenix ISR operation, and to bring the Gryphon operation forward, at a later date, as required to achieve the PFS plan of Gryphon first production by 2030.”</p> <p>Further, Denison’s Wheeler River Webpage references a “start of pre-production activities for the Gryphon operation in 2026”</p> | Please update the cumulative effects assessment in the EIS to include the Gryphon deposit as a Present or Reasonably Foreseeable Project. | | Accepted |

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| IR-35 | - | CNSC | Change to an environmental component due to hazardous contaminants | Section 6, Chemicals of Potential Concern | <p>Context: The use of petroleum products (e.g., propane, gasoline, and diesel) at the Denison Mines Wheeler River site is associated with vehicles and periodic operational testing of emergency generators as well as stationary pumps for emergency power or fire water systems. Thus, the air emissions will contain acrolein.</p> <p>Rationale: This chemical of potential concern (COPC) poses potential risks to human health via inhalation, but acrolein appears to have been missed or deemed insignificant. However, its consideration in the assessment will provide information on the significance of the associated risk.</p> | Please consider acrolein in the assessment or provide a rationale for its exclusion. | <p>This response has not been accepted.</p> <p>Although the requested assessment is provided in response to IR-35, this information also needs to be reflected in a revised version of the EIS. Please provide proposed text for the revised EIS, for SME review and acceptance.</p> <p>Please also see follow-up IR-35-R1.</p> | Not Accepted |
| IR-35 | IR-35-R1 | Health Canada (HC) | Change to an environmental component due to hazardous contaminants IR-35 Response from Denison | Section 6, Chemicals of Potential Concern | <p>Context: Potential health risks from long-term exposure to acrolein were not considered in the Proponent’s response to IR-35.</p> <p>Rationale: No annual predicted concentrations for acrolein were provided in the draft EIS or in the response to IR-35. Concentrations were modelled for short-term exposure (1h and 24h) only in the draft EIS and compared to the 1-hour and 24-hour Ontario Ambient Air Quality Criteria for acrolein. It is Health Canada (HC) guidance to assess both potential short and long-term health effects. The predicted annual concentrations for acrolein should be compared against chronic reference concentrations (e.g., the USEPA Reference Concentration (RfC)¹ (0.02 µg/m³) and the Tolerable Concentration (TC) from Environment and Climate Change Canada and Health Canada’s Priority Substances List Assessment Report² (0.4 µg/m³)).</p> | Use predicted annual concentrations and available chronic reference concentrations to account for potential health risks from long-term exposure to acrolein to support the decision to screen out acrolein as a COPC from further assessment. | | Follow-Up IR |
| IR-36 | - | CNSC | Other | Section 6, Table 6.1-11 Baseline External Gamma Monitoring | <p>Context: For one of the exposures in the summary table for baseline external gamma monitoring (Table 6.1-11), the cell states "Destroyed in Field".</p> <p>Rationale: No rationale or indication as to why or how it was destroyed is provided.</p> | Please provide any additional info available as to how equipment was destroyed. | | Accepted |
| IR-37 | - | CNSC | Air Quality | Section 6.1.1.1, CALPUFF model | <p>Context: "The Saskatchewan Ministry of Environment (SK MOE) has developed the Saskatchewan Air Quality Modelling Guideline (SK MOE 2012a) to assist Proponents in conducting air dispersion modelling assessments in a consistent manner. The guideline defines the recommended approach for dispersion modelling assessments in Saskatchewan, including model selection, emission source characterization, and the determination of compliance criteria to apply."</p> <p>Rationale: Saskatchewan air quality guideline requires consultation on use of CALPUFF model, where it states" The ministry acknowledges that there will be situations where specialized air dispersion models such as CALPUFF,</p> | Please confirm and provide a summary of the consultation with the Saskatchewan MOE on the use of CALPUFF model for the Wheeler River EIS as per provincial air quality guidelines. | <p>This response has not been accepted.</p> <p>Although a summary is provided in response to IR-37, this also needs to be reflected in revised version of EIS. Please provide proposed text for the revised EIS, for SME review and acceptance.</p> | Not Accepted |

¹ https://iris.epa.gov/static/pdfs/0364_summary.pdf

² https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/hecs-sesc/pdf/pubs/contaminants/psl2-lsp2/acrolein/acrolein-eng.pdf

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| | | | | | <p>CALQ3HCR and others may be applicable. The use of specialized models requires consultation with the ministry” OR “Pre-consultation with the ministry must be undertaken prior to the facility conducting specialized modelling (p. 3).” It is not clear if Denison Mines consulted with Saskatchewan MOE on use of CALPUFF model.</p> <p>Noted that Section 6.1.4.2 is again referring to Saskatchewan MOE guidance for justification, but no indication that they consulted with them (a requirement).</p> | | | |
| IR-38 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 6.1.4.1, Potential Interactions Between the Project and Valued Component / Key Indicators | <p>Context: In this section, the Proponent identifies primary interactions between Project activities and air quality valued components and their associated key indicators. These primary interactions may result in an adverse effect on the valued component. Among the primary interactions are the use of emergency generators in a backup role should there be an interruption of the provincial electrical grid. However, it is not evident what is the anticipated frequency and duration of interruption to grid power.</p> <p>Rationale: The Proponent states in the conservative operation scenario that while the site will be powered from the provincial grid at the operations stage, the back-up power generators were assumed to be operating under emergency conditions as a worst-case scenario. ECCC acknowledges the positive impact of extending the electrical grid to the Project site with resultant reduction in generator emissions. The impact of an interruption in grid power would be greatest during the winter months when energy use would be greatest and surface-based temperature inversions, which vertically trap emissions, would be strongest.</p> | Provide an evaluation of a worst-case scenario of grid power interruptions (i.e., average aggregate length of power outages) during the winter months for this section of the electrical power grid. | | Accepted |
| IR-39 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 6.1.4.2, Potential Project-Related Effects | <p>Context: In this section, the Proponent discusses the approach taken for air dispersion numerical modelling. Using their CALMET data set, the Proponent’s CALPUFF model runs indicated exceedances for 24- hour total suspended particulates, 24-hour particulate matter (PM10), 1-hour nitrogen dioxide, and 24-hour uranium concentrations. However, there is no mention of possible diurnal and seasonal occurrences of the exceedances.</p> <p>Rationale: Adequate assessment of the modelling results requires knowledge of the temporal characteristics for the exceedances. For example, wintertime exceedances may be due to strong temperature inversions, especially during the overnight to morning hours. These strong inversions are challenging for numerical models to capture. Exceedances during warmer months may be due to specific wind directions, which transport emissions directly to downwind receptors.</p> | Provide additional information on any diurnal and seasonal influences of the modelled exceedances. | | Accepted |
| IR-40 | - | CNSC | Air Quality | Section 6.1.6.2.1, Air quality significance determination | <p>Context: Significance determination was not conducted for air quality due to interconnectedness with other assessment endpoints.</p> | Please provide additional information to demonstrate where and how these air quality assessment endpoints were factored in. | | Accepted |

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| | | | | | Rationale: It is not clear where and how these air quality assessment endpoints were factored into the assessment. | | | |
| IR-41 | - | CNSC | Air Quality | Section 6.1.6.2.2, Background concentrations | <p>Context: The EIS states that "Conservative regional background concentrations from the Saskatchewan Air Quality Modelling Guideline (SK MOE 2012a) and based on the La Loche monitoring station were used for particulate matter, NO2, SO2, and CO. The La Loche monitoring station is located near anthropogenic sources, while the Project is in a remote area removed from anthropogenic sources."</p> <p>Rationale: If La Loche monitoring station is located near anthropogenic sources and the Project is not, use of this data is not a conservative or realistic representation of background.</p> <p>For a realistic approach, background data considered should be upper 95th percentile (or max if n<10) from an area representative of project location</p> <p>For a conservative approach, background data from an area located even further from anthropogenic sources (if this exists) should be used, or an upper limit of background less than upper 95th should be applied as the background.</p> <p>Upper limit of background is used to screen out COPCs or often subtracted from total to ascertain relative contribution / impact from source, so using a higher upper limit may result in COPCs screening out or appear to have a lower relative contribution. If background was added to source, then approach used would be conservative. If this is the case, confirmation and reference to where this is discussed in methodology should be provided.</p> | Please provide additional rationale to justify the appropriateness of La Loche monitoring station concentrations as background for project location. | <p>This response has not been accepted.</p> <p>Please propose a more suitable background site to use as background subtraction. La Loche is not a suitable background site as it is potentially impacted from other industrial sources; it is expected that another background site removed from other industrial sources be identified and used.</p> | Not Accepted |
| IR-42 | - | HC | Physical stressors (noise and vibration) | Section 6.2.4.2.2, (p. 6-66) Section 6, Section 6.2.9, (p. 6-72) | <p>Nighttime noise impacts are not adequately considered for human receptors.</p> <p>Context: The EIS states in Section 6.2.9 that, “While the predicted sound levels were less than the guideline values, the increase from baseline was predicted to be noticeable” (p. 6-72). No information is provided on individual noise events occurring during the nighttime period.</p> <p>Rationale: While the increase from baseline is predicted to be noticeable, it is important to also consider that changes to the characteristics of the sound from baseline (e.g., a change in frequency, changes in sound modulation, increased impulsiveness or tonality, or a shift in noise from the daytime to being more at night) may cause noise to be even more noticeable. Consult ANSI S12.9-2005/Part 4, clause A.1.3 for further information.</p> <p>In particular, consideration should be given to potential impacts on sleep, where adverse impacts are reported to begin when sound levels inside bedrooms exceed 30 dBA for continuous noise sources and 45 dBA LAmix for discrete noise events (WHO, 1999).</p> | <p>1. Provide a description of the project- related nighttime noise sources that may impact human receptors as well as a qualitative discussion of the resulting potential impacts on perception considering not only changes in sound levels but also sound characteristics (e.g., tonality, impulsivity).</p> <p>2. Confirm whether individual nighttime noise events exceeding 45 dBA LAMax outdoors (or 30 dBA indoors) are expected to occur more than 15 times over the nighttime period at any nearby potentially noise-sensitive human receptor location(s). This may be of particular concern if some construction and/or operations activities occur during sleeping hours.</p> | | Accepted |

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| IR-43 | - | HC | Physical stressors (noise and vibration) | Section 6.2.5, (p. 6-66) Section 6.2.5, (p. 6-71) | <p>Mitigation measures for project-related noise were not identified for the Construction phase.</p> <p>Context: The mitigation measures provided in Section 6.2.5, including a complaint management system is also to be implemented as part of the EMS, are only proposed for the operations phase.</p> <p>However, construction activities are predicted to last more than one year. Construction noise will involve the use of equipment operating at the site, construction of surface facilities, drilling, and partial operation of the freeze plant. It will also include regular truck trips and air traffic for personnel changes.</p> <p>Rationale: It is unclear if listed mitigation measures also apply to the construction phase (or only to the operations phase).</p> | <p>1. Clarify whether mitigation measures and the proposed EMS apply to the Construction phase. If not, identify mitigation measures for noise impacts related to Construction phase activities, and consider applying the EMS to the Construction phase and implementing the community complaints and response procedure from the beginning of construction activities.</p> <p>2. Health Canada suggests that construction noise lasting longer than 1 year be assessed as operational noise, and that noise mitigation measures be applied also to the construction phase. Special consideration should be given to mitigation measures for construction noise that occurs at night, in order to minimize impacts on sleep (i.e., avoiding tonal or impulsive noise sources at night).</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends use of Appendix H of Health Canada (2017), which identifies additional construction noise mitigation measures that could also be considered to reduce project- related noise.</p> | | Accepted |
| IR-44 | - | HC | Physical stressors (noise and vibration) | Section 6.2.8, (p. 6-71) | <p>The noise complaints resolution and response procedure is not sufficiently described in the EIS.</p> <p>Context: Section 6.2.8 discusses Monitoring and Follow- up. The Proponent indicates: “The EMS will also include a community complaints and response procedure” (p. 6-71).</p> <p>Rationale: Details have not been provided regarding how the complaints would be received, addressed or what the timelines will be for providing a response or resolution. It is important to provide information to potentially affected communities in advance of particularly noisy activities. Community consultation and advanced notification of noisy activities has been shown to reduce complaints (see Health Canada, 2017).</p> | <p>1. Provide the details of the noise complaints resolution and response procedure as per Health Canada (2017).</p> <p>2. Consider conducting community consultations and/or implementing an advanced community notification system to pro-actively reduce the probability noise-related impacts and complaints.</p> | <p>This response has not been accepted as <i>preliminary</i> details for mitigation and monitoring plans for noise impacts and complaints resolution process were not provided.</p> <p>The response partially addresses IR-44 through the commitment to developing the complaints resolution process. However, CNSC expects that the noise complaint resolution and response procedure will be included for review in the EIS.</p> <p>Section 9 (p. 44) of the EIS Guidelines state that the EIS “shall present an outline of the preliminary environmental monitoring program, including:</p> <ul style="list-style-type: none">the description of the characteristics of the monitoring program where foreseeable (e.g., location of interventions, planned protocols, list of measured parameters, analytical methods employed, schedule, human and financial resources required),plans to engage Indigenous groups in monitoring, where appropriate.” <p>Please provide proposed text for the revised EIS, for SME review and CNSC acceptance.</p> | Not Accepted |
| IR-45 | - | HC | Change to an environmental component due to hazardous contaminants | Section 6 Air Quality Technical Supporting Document Section 6.3.1 | <p>The carcinogenic risks of diesel exhaust from the Project should be assessed.</p> <p>Context: Section 6.3.1 discusses modelled predictions of exceedances for Particulate Matter (PM). TSD p. 22 states: “concentrations of 24-hour PM2.5 are also elevated around the standby generators at the freeze plant, which emit fine particulate matter from combustion of diesel fuel”. However, diesel particulate matter is not evaluated for the whole project in the air quality model or the air quality assessment.</p> | <p>1. Evaluate the carcinogenic risk of all potential diesel exhaust from the Project based on the approach proposed by Health Canada (2022). Additional guidance (Additional Lung Cancer Mortality from PM2.5: Recommended Approach and Sample Calculation”) is provided as an appendix to this comment table.ⁱ</p> | | Accepted |

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| | | | | | <p>Rationale: Health Canada has determined that diesel exhaust is carcinogenic in humans which is consistent with the conclusion of the International Agency for Research on Cancer (IARC), and that diesel exhaust is associated with significant population health impacts in Canada.</p> <p>To characterize the carcinogenic risk of diesel exhaust from a project, HC has published a report (2022)¹ which provides a quantitative assessment of the relationship between ambient PM2.5 exposure and lung cancer risk. Specifically, this report quantifies the increase in risk of lung cancer mortality (over the baseline rate in the Canadian population) due to PM2.5 exposure.</p> <p>This quantitative assessment is considered appropriate to characterize risks from diesel PM given the contribution of diesel exhaust to ambient PM2.5 in Canada, and that the carcinogenicity of diesel exhaust has generally been evaluated based on the respirable PM fraction^{1,2,3}.</p> <p>References: [1] HC. 2022. Lung Cancer and Ambient PM2.5 in Canada: A Systematic Review and Meta-analysis. Available at: https://publications.gc.ca/site/eng/9.907038/publication.html [2] HC. 2016. Human Health Risk Assessment for Diesel Exhaust. Available at: http://publications.gc.ca/collections/collection_2016/sc-hc/H129-60-2016-eng.pdf [3] IARC. 2013. IARC monographs on the evaluation of carcinogenic risks to humans. Volume 109. Outdoor air pollution. https://publications.iarc.fr/Book-And-Report-Series/Iarc-Monographs-On-The-IdentificationOf-Carcinogenic-Hazards-To-Humans/Outdoor-Air-Pollution-2015</p> | | | |
| IR-46 | - | HC | Physical stressors (noise and vibration) | Appendix 6-A Table A-1 | <p>Low-frequency noise and associated potential human health effects were not assessed.</p> <p>Context: Some equipment that may emit low-frequency noise (LFN) have been listed in Table A-1: Assessment Scenarios and Sound Level Data (Section 6 Appendix A); however, no information describing potential impacts of this type of sound on nearby human receptors are presented.</p> <p>Rationale: Low frequency noise can be associated with the introduction of noticeable vibrations and rattles in nearby structures. Research indicates that annoyance related to noise is greater when low-frequency noise is present (ISO 1996-1:2003). As sound environments are usually characterized using A-weighted decibel levels (dBA) that reflect the frequencies most audible to the human ear, the impacts of low- frequency noise may need to be assessed separately.</p> | 1. Clarify whether any project-related activities (construction, operation and/or decommissioning) may produce LFN that could impact off-site human receptors. Evaluate LFN in the noise assessment, if and where applicable. See Appendix C of Health Canada (2017) for a discussion of LFN. | | Accepted |

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| IR-47 | - | ECCC | Air Quality | Appendix 6-A, A.1 | <p>Context and Rationale: Verification of the following calculation is required for assessing predicted emissions of dust from general construction. It appears the result of 0.70 ton/acre/month is incorrect and should instead be 0.314 ton/acre/month.</p> <p>Appendix 6-A, Appendix A, A.1 (p. A4) TSP Emission Factor for General Construction:</p> $EF (TSP) = 0.11 \frac{\text{ton}}{\text{acre}} \frac{1}{\text{month}} \times 1.2 \frac{\text{ton}}{\text{acre}} \frac{1}{\text{month}} + 0.42 \frac{\text{ton}}{\text{acre}} \frac{1}{\text{month}}$ $= 0.70 \frac{\text{ton}}{\text{acre}} \frac{1}{\text{month}}$ | Explain how the emission factor total suspended particulates (EF (TSP)) result was obtained or rectify if it is incorrect and update the draft EIS to reflect the correction. | | Accepted |
| IR-48 | - | HC | Physical stressors (noise and vibration) | Appendix 6-E, Figure 6.2.3, p. 6-57 | <p>Noise-sensitive receptors are not included on noise contour maps.</p> <p>Context: Noise-sensitive receptors are identified in the acoustic model report in Section 6 Appendix 6-E but not presented on any maps in the atmospheric and acoustic sections of the main report (Figure 6.2-3).</p> <p>Rationale: The noise assessment typically includes a map illustrating modelled noise levels from the Project at receptor locations in the study area.</p> <p>Certainty regarding the presence of human receptors in the regional study area is also recommended in order to assess cumulative impacts.</p> | 1. For more clarity, identify noise-sensitive receptors on Figure 6.2-3: Noise Assessment Study Area as well as on contour maps showing the baseline and predicted noise levels. | <p>This response has not been accepted.</p> <p>The map provided in the response did not include the contour lines requested in IR-48 to illustrate the maximum baseline and predicted noise levels. Furthermore, the map does not provide labels for receptor locations that appropriately describe the type of noise-sensitive receptor.</p> <p>HC requests that a map showing the following be provided:</p> <ol style="list-style-type: none">1. Contour lines representing the maximum baselines and predicted noise levels at the location of the receptors;2. Labels for receptor locations that are more descriptive of receptor type (e.g., hunting camp, ceremonial area). <p>It was also noted that the receptor location of Risk 2 (i.e., Trapper/Intensive Land User) in the provided map was not consistent with other receptor location maps in the Draft EIS (e.g. Section 10, Figure 10.1-7 Human Receptor Locations for the Project Human Health Risk Assessment). These differences included both the receptor location (i.e., opposite sides of McGowen Lake) and type (i.e. Trapper/Intensive Land User vs. Seasonal Resident). The receptor locations and types should be confirmed and consistently used throughout the EIS, and any discrepancies should be explained.</p> <p>Finally, a portion of Figure 8 – Adjusted Ldn (p.19 – appendix 6-E) is cut off from the page, preventing proper review. HC requests that the full/complete version adjusted to fit the page be provided.</p> | Not Accepted |
| IR-49 | - | HC | Physical stressors (noise and vibration) | Appendix 6-E, 4.0 Table A.1 | <p>The Noise Source Characterization is incomplete.</p> <p>Context: Section 3.0 of the Draft EIS Section 6 Appendix 6- E discusses Source Characterization. There is no detail regarding potential tonal or impulsive noise sources in Section 3.0.</p> | 1. Identify any tonal, regularly impulsive, highly impulsive, or high-energy impulsive noises likely to be produced during project activities that could be audible at noise sensitive receptors. Furthermore, describe the timing (e.g., hours of night-time activities), frequency and duration of noise events, and their sound characteristics, including frequency spectrum. See Health Canada (2017) for details. | | Accepted |

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| | | | | | Rationale: The draft EIS should include a description of sound source characteristics (e.g., tonal, impulsive, highly impulsive) in order to properly inform the quantitative noise assessment and which assumptions/adjustments need to be applied and to properly evaluate impacts of project noise on health of affected receptors. | | | |
| IR-50 | - | HC | Physical stressors (noise and vibration) | Appendix 6-E, 4.0 Table A.1 | <p>The description of noise modelling does not document or justify the use of sound level adjustments.</p> <p>Context: ISO Standard 9613-2 has been used for the sound level modelling; however, it is unclear if all applicable adjustments have been considered as per ISO 1996-1:2016 (Table A.1).</p> <p>Rationale: When modelling techniques are used to estimate present (baseline) or future (construction and operational) sound levels, these techniques and any accompanying assumptions, including the use of sound level adjustments, it is important to provide appropriate documentation and justification.</p> <p>Note that in situations where more than one source characteristic adjustment is applicable (e.g., impulsive or tonal), only the higher of the adjustments is used. However, all time-of-day adjustments and the quiet rural area adjustment are to be added to the highest of the applicable source adjustments.</p> | 1. Clarify whether ISO-1996-1:2016 has been considered in the modelling to account for any applicable sound level adjustments. Adjustments should be considered when calculating Ln (night- time sound level) and Ldn (day-night sound level). In addition, if applicable, adjustments can be applied depending on the noise characteristic (impulsive, highly impulsive, etc.), and because the Project location is considered to be in a quiet rural area. See: ISO 1996-1:2016 and Health Canada (2017) for details. | | Accepted |
| IR-51 | - | CNSC | Geology and Groundwater | Section 7, Figure 7.8-1 Appendix 7-C | <p>Context: Figure 7.8-1 (p. 7-107, main EIS report) shows monitoring well cluster outside of the freeze wall.</p> <p>Rationale: It is not clear what the targeted hydro-stratigraphic units of each monitoring well cluster are. In addition, it is not clear how the establishment of the freeze wall and any leakage from the brine solution will be monitored. If there is any “window” within the freeze wall (i.e., the freeze wall is not continuous), is there any way to identify that?</p> | <p>Please clarify the targeted hydro-stratigraphic units of each monitoring well cluster in Figure 7.8-1 (p. 7-107, main EIS report).</p> <p>Please clarify how the establishment of a continuous freeze wall will be monitored.</p> | | Accepted |
| IR-52 | - | ECCC | Fish and fish habitat | Section 7, Geology and Groundwater Appendix 7 | <p>Context: According to the Proponent, “an acidic or low pH mining solution will be used to leach uranium ores from the ground. Mining solution may be a mixture of sulphuric acid, hydrogen peroxide, ferric sulphate, and freshwater (from shallow groundwater well or surface waterbody) or recycled water.</p> <p>Wellfield will consist of a combination of injection and recovery wells, in the general the arrangement of one recovery well in the center surrounded by four injection wells (5-spot pattern) with about 5 to 10 m between wells. The final wellfield is expected to include approximately 300 wells over an area measuring 90 m wide x 750 m long”.</p> <p>As the components/contaminants mentioned in the description of the hydrogeologic contaminant transport processes above may be transported</p> | <p>1. Explain why 3D hydrogeology and contaminant transport numerical modelling of the injection and extraction wells was not presented.</p> <p>2. Alternatively, provide simulation results and a sensitivity analysis for the injection and extraction of the acidic solution in the mining area.</p> | <p>This response has not been accepted as the Proponent did not provide the information that would allow validation of the conclusion that hydraulic containment was successful.</p> <p>Hydraulic containment is to be utilized as a process to prevent the migration of contaminants away from injection well locations by groundwater. The Proponent indicated that tracer testing demonstrated hydraulic containment of the injected solution (as per the response to IR-6).</p> <p>Hydraulic containment is an important process as part of a multi-pronged approach to preventing the migration of contaminants to Whitefish Lake by groundwater migration. Consideration of all field test data will allow ECCC to review the Proponent’s conclusions about hydraulic containment.</p> | Not Accepted |

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| | | | | | to Whitesfish Lake through groundwater, the injection and recovery wells should be included in the model. Rationale: The hydrogeologic contaminant transport processes described above are an important part of the proposed Project and it is not clear why numerical modelling results and a sensitivity analysis for the above processes was not presented. | | Provide all field test data to allow ECCC to review the conclusion that hydraulic containment was successful. | |
| IR-53 | - | CNSC | Geology and Groundwater | Section 7.3, Table 7.3.-2 Appendix 7-C | Context: The field-based hydraulic conductivity values (referred to as K values hereafter) in Table 7.3-2 (p. 7-32, main EIS report) indicate that the K value ranges of upper and lower sandstone aquifers have a significant overlap with those of the intermediate sandstone aquitard. However, the calibrated K value in Table 2-2 (p. 2.7, Appendix 7-C)) for the intermediate sandstone aquitard is close to the lower end of the field-based K value range, while the calibrated K values for the upper and lower sandstone aquifers are close to the upper end of the field-based K value range. Rationale: It is not clear how representative the calibrated K values are of the field-based K values for each hydro-stratigraphic unit, and if the significant difference between the K values for the upper and lower sandstone aquifers and those for the intermediate sandstone aquitard is supported by the geological properties of the corresponding stratigraphy units. It is stated in the report (p. 7-36, main EIS report) that “Vertical fracture or fault zones that hydraulically connect the Local (upper) and Semi-Regional (lower) groundwater flow regimes are present throughout the Athabasca Basin”. But fractures and fault zones are not explicitly considered in the model. There is possibility that these features could increase the hydraulic connection between the upper and lower sandstone aquifer. | Please provide additional information to support the representativeness of the calibrated K values (for example, use graph to present the measured K values and the calibrated K values). | This response has not been accepted. Please include figure(s) (y axis representing depth below ground, x axis representing K, different length of vertical line segment representing different packer testing intervals, etc.) showing the field measured K values, as well as the calibrated K value for the upper sandstone aquifer, intermediate aquitard, and lower sandstone aquifer. This would help demonstrate the distribution of field measured K values and representativeness of calibrated K values. | Not Accepted |
| IR-54 | - | CNSC | Geology and Groundwater | Section 7.3.1 | Context: EIS states: “The most important associated topographic features in the region are the northwest to southeast trending drumlins and eskers....” This is not the trend shown on the provided maps, nor described elsewhere in the report, e.g., Section 7.3.2.1 Rationale: Inaccurate information in the EIS | Please update the EIS where required to accurately describe the topographical features. | | Accepted |
| IR-55 | - | NRCan | Fish and fish habitat | Section 7.3.3.1; Appendix 7-A, sections 3.4, 3.5, 3.8, 4.2; Appendix 7-C, section 2.8 | Context: According to the Proponent's conceptual hydrogeological model (EIS, sec 7.3.3, Figure 7.3-7, Table 7.3-2; Appendix 7-A, sec. 3.4, Table 3-4), the horizontal hydraulic conductivity of the Intermediate Sandstone (Iss) aquitard is 8.4 E-09 m/s based on field measurements. The Proponent further assumes a 10:1 anisotropy ratio for the unit (Appendix 7-A, sec. 3.5.1) such that its estimated vertical conductivity is 8.4 E- 10 m/s. Based on this information, structural geology and groundwater quality data, the Proponent concludes that the connectivity between the Upper sandstone | In the "Parameter Uncertainty Assessment" for the numerical groundwater flow model (Appendix 7-C, sec. 2.8), NRCan requests that the Proponent develop a calibrated numerical model with an alternate conceptualization of the Intermediate sandstone as a "leaky" aquitard with a horizontal hydraulic conductivity on the order of 1 E-07 m/s and a much lower anisotropy ratio. This should involve modifying the model lateral boundary conditions to allow for groundwater inflow/outflow across the entire thickness of the Athabasca Sandstone Group rather than just the Lower Sandstone aquifer. | This response has not been accepted. In response to IR-55, the Proponent states “The viewpoint from the third party assessment team does not align with the conceptual model proposed by the reviewer; however, an alternative calibrated groundwater flow model with a hydraulic conductivity of 1.0E-7 for the Intermediate Sandstone unit has been developed.” | Not Accepted |

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| | | | | | <p>aquifer and the Intermediate Sandstone aquifer (sic) is limited (EIS sec. 7.3.3.3; Appendix 7-A, sec. 4.4). While acknowledging the paucity of conductivity data and the Proponent's attempt to mitigate this by leveraging collateral information on fracture frequency and clay content (Appendix 7-A, sec. 3.3.1), NRCan considers that the hydraulic conductivity assigned to the Iss aquitard is unrealistically low and inconsistent with the following lines of evidence: a) The conductivity value for the Iss is based on the geometric mean of 18 field measurements, 12 of which are from the same borehole (WR-695) located in the Gryphon zone, beyond the domain of the numerical model (Appendix 7-A, Appendix C, Table C-1). If the conductivity data were weighted equally, with one value per borehole, the geometric mean would be approximately 1.5 E-07 m/s, or two orders of magnitude higher; b) The Proponent notes that vertical fracture or fault zones that hydraulically connect Upper and Lower aquifer systems are present throughout the Athabasca Basin including in the Phoenix area (EIS, sec. 7.3.3.2.2; Appendix 7-A, sec.3.8.1); c) The Proponent notes that groundwater chemistry data (major ions) corroborate the presence of structurally controlled vertical hydraulic connections between the Upper and Lower aquifer systems (EIS, sec. 7.3.3.2.2, sec. 7.3.3.3; Appendix 7-A, 4.3.3); d) Groundwater chemistry data (Appendix 7-A, sec. 4.2, Table 4-1) also indicate the presence of detectable levels of "bomb" tritium (indicating recharge waters < 50 years old) in the Lower Sandstone Aquifer (GWR-025, GWR-008, GWR-033) and in the Iss (GWR-009, GWR-034), outside the area of U mineralization. This is also evidence of vertical hydraulic connection through the Iss. In summary, whereas the Proponent conceptualizes the Iss as a very low-permeability unit with localized vertical hydraulic connection (WS Shear), NRCan interprets the Iss as a "leaky" aquitard with pervasive fracture-controlled and much higher vertical hydraulic conductivity.</p> <p>Rationale: The significance of NRCan's alternative interpretation of the Iss hydrostratigraphic unit is that deep groundwaters, including mining-impacted waters, may represent a greater proportion of baseflow discharge to Whitefish Lake than the 1% currently estimated in the Proponent's groundwater flow model (EIS, sec. 7.4.2.1, p.7-51; Appendix 7-C, sec. 2.6.3).</p> | | If the alternative model requested in IR-55 has been developed by the Proponent, NRCan requests that full details of this model be provided in an attachment. | |
| IR-56 | - | CNSC | Geology and Groundwater | Section 7.3.3.2 | <p>Context: It is stated in Section 7.3.3.2 (p. 7-37, main EIS report) that “Exploration boreholes drilled in the Phoenix area, where left unplugged, have the potential to provide preferential flow paths between the Overburden and Upper and Lower Sandstone Aquifers. Exploration holes were reportedly grouted approximately 10 to 20 m above and below the ore zone, resulting in open holes remaining throughout the overlying materials. These portions of the open holes may act as open conduits for groundwater flow through the 400 m of Athabasca Group Sandstone.”</p> <p>Rationale: It is not clear why the exploration boreholes have not been decommissioned.</p> | Please clarify why the exploration boreholes have not been decommissioned and the timeline to decommission the boreholes according to appropriate guidelines/procedures. If it is not decommissioned before the ISR operation, what is the potential impact of the unplugged boreholes on the mining solution migration? | <p>This response has not been accepted.</p> <p>Although Denison’s response is acceptable, in order for the response to be accepted the following text should be incorporated in the EIS:</p> <p>“During Operation, select exploration boreholes will be re-utilized for narrow diameter injection wells that will be developed with monitoring devices for the determination of excursions and water levels. Exploration boreholes not selected for the use of narrow injection wells will be grouted to surface to seal off any remaining conduit.”</p> | Not Accepted |

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| IR-57 | - | NRCan | Fish and fish habitat | Section 7.3.3.2 Appendix 7-A, sections 3.1.2 and 3.7 Appendix 7-C, section 2.5.2 | <p>Context: The Proponent's conceptual model of groundwater flow in the Local Study Area (EIS, sec 7.3.3, Figure 7.3-7) involves an unconfined Upper system hosted by overburden and the Upper sandstone aquifer, and a Lower confined system hosted by the Lower Sandstone Aquifer. The Intermediate Sandstone aquitard acts as a confining unit. Vertical heads gradients are directed downwards west of the Phoenix deposit and upwards beneath surface water receptors including Whitefish Lake (EIS, sec. 7.3.3.2).</p> <p>Using head data from nested monitoring wells (Appendix 7-A, sec. 3.1.2, Table 3-1) the Proponent calculates upward gradients in cluster WR-607, between the Lower Sandstone aquifer and the Upper Sandstone aquifer. In cluster LA-5, an upward gradient is calculated between the Upper Sandstone and the overburden unit (Appendix 7-A, Table 3-5). In areas west and south-west of the Phoenix deposit, groundwater is estimated to flow downward under a vertical gradient of approximately 0.015 m/m (Appendix 7-A, p.3-15).</p> <p>Rationale: In NRCan's opinion, the Proponent's interpretation of vertical head gradients in the LSA is not fully accurate. For the "Up-Gradient" monitoring well cluster, the tabulated head data (Appendix 7-A, Table 3-1) and data logger hydrographs (Appendix 7-A, Appendix B) indicate a downward gradient (0.014 m/m) from the overburden unit to the Intermediate Sandstone and an upward gradient (0.056 m/m) from the Lower Sandstone to the Intermediate Sandstone. Head data from the "NW" monitoring well cluster indicate a similar pattern of downward (0.016 m/m) and upward (0.014 m/m) gradients converging in the Intermediate Sandstone. In the "Downgradient" and "SE" monitoring well clusters, head observations and data logger hydrographs indicate downward gradients from the shallow aquifer system but essentially equal heads in the Intermediate and Lower Sandstones. This more complex picture of groundwater flow systems in the LSA does not appear to have been captured in the Proponent's conceptual model. Given the importance of the baseline hydrogeological regime for predicting the transport and fate of COPCs in the post-decommissioning period, the Proponent needs to demonstrate that the numerical groundwater flow model accounts for observed vertical head gradients.</p> | In section 2.5.2 of Appendix 7-C (Calibration Results), the Proponent should demonstrate that the numerical groundwater flow model reproduces quantitatively or at least qualitatively the vertical head gradients calculated from observations in the nested monitoring well clusters (Appendix 7-A, Table 3-1). | <p>This response has not been accepted.</p> <p>Using data provided in Attachment #57 (observed and simulated static water levels, screen mid-point elevations), NRCan was unable to reproduce the head gradient values reported by the Proponent in their table.The Proponent should check the gradient calculations.</p> | Not Accepted |
| IR-58 | - | ECCC | Fish and fish habitat | Section 7.3.2.4, Ore Deposit | <p>Context: The Proponent states that the Phoenix ore bodies are long and narrow (approximately 25 to 50 m wide) and are located within or near a graphitic pelite unit. Hydrothermal alteration associated with the ore zone is a discontinuous envelope of clay alteration and a sulphide-cemented rock zone that extends into the overlying sandstone and the underlying basement (Figure 7.3-3). This black, clay-rich zone is approximately 3 m thick on average and locally hydraulically isolates the ore zone from the overlying sandstones and underlying weathered basement rock.</p> <p>Rationale: As indicated by the Proponent, a 3 m black clay rich zone isolates</p> | <p>1. Verify that there will be no downward migration of mining solution into the paleo- weathered basement rock or that there is no flow along the unconformity surface.</p> <p>2. If downward migration of the mining solution occurs, explain how it will be mitigated.</p> | | Accepted |

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| | | | | | the ore zone from the overlying sandstones and underlying weathered basement rock. It is, however, unclear whether this discontinuous clay layer will prevent downward migration of uranium-bearing solution into the Paleo-weathered basement rock or horizontal flow along the unconformity surface to escape into the environment. Escape of uranium-bearing solution into the environment will have a negative effect on the receiving environment. | | | |
| IR-59 | - | CNSC | Fish and fish habitat | Section 7.4 Assessment of Project-related Effects, Figure 7.4-2 (p. 7-56) | Context: Figure 7.4-2: Simulated Change in Groundwater Discharge and Flow through Whitefish Lake Over the Life of the Project appears to be missing information. Rationale: Legend is included below the image, but the Legend box is blank. The green dotted line is not represented by anything in the legend. | Please update this Figure to ensure it is complete, and that features are properly indicated in the legend. | | Accepted |
| IR-60 | - | NRCan | Fish and fish habitat | Section 7.4.2.1 Appendix 7-C, section 5.2.1, Appendix B | Context: In the discussion of the limitations of the numerical groundwater flow model (Appendix 7-C, sec. 5.2.1), the Proponent invokes the well known modeling principles of "Occam's razor" and "Parsimony" which guided the parametrization of hydraulic conductivity in model layers. The Proponent states that hydrogeologic property values were applied uniformly for, among other units, the Lower Sandstone aquifer beyond the immediate area of desilicified materials. However, in the layer parametrization for the Lower Sandstone aquifer (Appendix 7-C, Appendix B, Figure B-5), NRCan notes a large zone of enhanced conductivity (1 E-05 m/s) extending south from Kratchkowsky Lake, which contrasts with the value (2 E-07 m/s) assigned elsewhere outside the desilicified zone. NRCan also notes the extremely detailed parametrization of hydraulic conductivity in the clay cap overlying the ore zone where borehole control is dense (Appendix 7-C, Appendix B, Figure B-6). Rationale: In NRCan's opinion, these model features appear to violate the principle of "Parsimony" and require greater justification supported by field observations. | NRCan requests that the Proponent provide justification based on field evidence for the multiple hydraulic conductivity zones assigned to the Lower Sandstone aquifer and the clay cap above the ore zone. | | Accepted |
| IR-61 | - | CNSC | Geology and Groundwater | Section 7.4.2 | Context: There is no discussion of potential induced seismicity from mining processes. Rationale: Induced seismicity may lead to a loss of process as identified for natural seismicity. | Please provide information on the potential mining-induced seismicity. | This response has not been accepted. CNSC staff expect a discussion of the occurrence of mining-induced seismicity in general in Saskatchewan, and the inclusion of a summary of potential sources of induced seismicity related to ISR mining (such as the response that Denison provided for IR-61) and the corresponding mitigation measures in the EIS. The paucity of records of seismicity in northern Saskatchewan (as stated in EIS Section 15.2) does not necessarily indicate a lower potential for future induced seismicity. It should be noted that earthquakes of up to magnitude (M_L) 4.4 are spatially correlated with locations of extractive industries with ongoing activity. Please provide proposed text for the revised EIS, for SME review and acceptance. | Not Accepted |

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| IR-62 | - | ECCC | Fish and fish habitat | Section 7.4.2, Potential Project-related Effects | <p>Context: The Proponent indicates that the mining area includes:</p> <ul style="list-style-type: none">the ‘active mining area’, which is the target ore zone;a zone extending between 11 and 13 m above the active mining area that represents the maximum vertical height over which the injected mining fluids will migrate upwards from the ore zone during active mining; anda zone extending 50 m vertically upwards from the active mining area (that incorporates the active mining area and the 11 to 13 m zone defined in the previous bullet) that was selected to account for potential upset conditions. <p>Rationale: It is not clear to ECCC how the Proponent would be able to limit the mining solution migration within 11 & 13 m above active mining as the maximum vertical height over which the injected mining fluid will migrate. As the mining fluid will be injected under pressure into zones with possible presence of fractures, the pressure may also cause additional fractures and given that the solution is warm/hot will possibly dissolve the other cementing material in the sandstone above, making it difficult to accurately predict where the solution will migrate to.</p> | <p>1. Explain plans to limit the upward migration of mining solution into the overlying layer to 11 and 13m above the ore zone.</p> <p>2. Explain what impacts will occur if the mining solution migrates beyond the predicted height.</p> | | Accepted |
| IR-63 | - | CNSC | Geology and groundwater | Section 7.4.2.1, Potential Effect #1: Groundwater Quantity – Construction to Decommissioning Appendix 7-C, Section 2.7, Groundwater Conditions During Mine Operations | <p>Context: The numerical groundwater model described was calibrated to observed water level and stream baseflow data. Table 7.4-3 in the EIS indicates that Denison recognizes the potential for freeze wall operation to impact groundwater quantity. To simulate this impact, the model was adapted to reduce recharge (to 50%) within the freeze wall area, reduce hydraulic conductivity associated with the vertical freeze walls, and simulate pumping within the freeze wall area. Recovery from pumping and effects on discharge to groundwater discharge to Whitefish Lake are discussed in the potential effects section.</p> <p>Rationale: Although this assessment considered drawdown of the water table and discharge to Whitefish Lake, the discussion did not address the potential effects of operating the freeze wall on the local and semi-regional groundwater regimes. What would the pathway be for groundwater to pass around the freeze wall? What is the basis for the parameters selected, e.g., 50% recharge and lower hydraulic conductivity for freeze well? These factors need to be considered when evaluating the potential impacts of freeze well operations on groundwater flow conditions and corresponding receptors.</p> | Please provide a more fulsome discussion on the impact of freeze wall operations on local and semi-regional groundwater regimes and potential receptors. Please provide the rationale for assumptions made for key model parameters (e.g., selection of 50% recharge, hydraulic conductivity value used to represent freeze wall). In addition, please discuss the potential pathways for groundwater flow around the freeze wall, complete with figures demonstrating these pathways. | | Accepted |
| IR-64 | - | ECCC CNSC | Fish and fish habitat | Section: 7.4.2.2, Potential Effect #2: Terrain Morphology and Stability – Operation | <p>Context: The Proponent stated that the geological assessment predicted maximum vertical displacement in altered sandstone immediately above the mining area (17.5 cm). A very minor change in elevation at ground surface (of less than 7.5 cm) was predicted within a discrete and localized area overlying the ore body. The modelling work is considered to provide a worst-case bounding scenario. If subsidence were to occur over the lifetime of the Project, or in the years following mining, the extent of vertical displacement</p> | <p>Explain:</p> <ul style="list-style-type: none">Will this be revisited with updated data based on extraction feasibility results?How will the surface expression of a subsidence will be limited to 7.5 cm and localized? | <p>This response has not been accepted.</p> <p>CNSC staff expect Denison to include within the EIS a summary of the results of RESPEC’s most recent numerical modelling study that suggests negligible ground subsidence associated with the proposed volumetric extraction as this is an important consideration for designing an appropriate implementation plan for subsidence control and remediation measures.</p> | Not Accepted |

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| | | | | Appendix 7-A, Appendix K (p. 12) | <p>is not expected to exceed that predicted in the modelling, which is based on an assumed volume extraction.</p> <p>Rationale: ECCC notes that the thickness of the ore zone has an average thickness of 5 m with a range of 2 to 17 m, and is 25-50 m wide and that the overburden rock above the ore zone measures about 400 m. Therefore, it is not clear how the Proponent determined that the surface expression of a subsidence on the surface if it occurs will be limited to 7.5 cm and localized. A subsidence greater than 7.5 cm, implies that the void in the ore zone will be narrower, and will affect the amount of water migrating through the zone.</p> <p>It was the recommendation of the consultant who conducted the work in Appendix K that more accurate material properties should be used for future modelling.</p> | Suggestions for mitigation and follow-up measures: ECCC recommends that the Proponent consider implementing remediation measures immediately after mining to prevent subsidence from occurring in the first place. | | |
| IR-65 | - | CNSC | Geology and Groundwater | Section 7.4.2.2 | <p>Context: It is stated the maximum subsidence is 7.5cm based on modeling with an assumed volume extraction. Has subsidence from dewatering/pumping and from lack of inflow of groundwater due to freeze wall been considered?</p> <p>Rationale: Surface facilities and wells may be impacted if there is unaccounted for subsidence.</p> | Please provide additional details for any dewatering/pumping induced subsidence. | <p>This response has not been accepted.</p> <p>CNSC staff expect Denison to include within the EIS a summary of their response to IR-65 to establish their basis for a low probability of pumping and/or dewatering subsidence. Please provide proposed text for the revised EIS, for SME review and acceptance.</p> | Not Accepted |
| IR-66 | - | CNSC | Geology and Groundwater | Section 7, Table 7.5-1, Row 1, Column 6 | <p>Context: Column 6 in Table 7.5-1 indicates the mitigation measures for a valued component. For Row 1, Geology, there is no description of mitigation measures but only that contingency plans will be developed if based on monitoring.</p> <p>Rationale: Subsidence may impact wells and surface infrastructure.</p> | Please provide additional details on monitoring and contingency plans related to the geological environment (e.g., subsidence), including triggers for implementing such plans. | <p>This response has not been accepted.</p> <p>Denison claims that the expected risk from subsidence is negligible. Granted that updated models by RESPEC indicate negligible ground subsidence, in practice, modelled and actual subsidence measurements usually vary. Therefore, CNSC staff still deem it necessary to include additional details on subsidence monitoring and contingency plans (including triggers for implementing these). Moreover, since Denison plans to survey well collar elevations notwithstanding the negligible ground subsidence modelled by RESPEC, they might as well discuss the techniques that they plan to employ. Currently, it is not clear what method they plan to utilize to potentially detect elevation changes in well collars that cannot also be used to detect subsidence of the overall terrain. Denison has discussed the limitations (i.e., resolution) of Lidar, which is a good start. However, it must be noted that vertical accuracy and precision are more important considerations than spatial resolution for evaluating the applicability of subsidence monitoring techniques for this project, especially considering the size of the study area. CNSC staff also recommend that Denison further explore the applicability of methods such as DGPS, InSAR, and UAV-based Lidar change detection for their monitoring plan.</p> | Not Accepted |

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| IR-67 | - | CNSC | Geology and groundwater | Section 7.6.2.1 (Remediation Objectives) | <p>Context: Metallurgical testing, including batch reaction, coreflood testing and column tests are mentioned frequently throughout Sections 2 and 7 of the EIS. Outside of the composition of restored solutions from coreflood tests #2B and 3C, results from these various tests are not reported in the EIS or any associated Appendices.</p> <p>Rationale: The results from metallurgical testing are important to a number of items discussed in the EIS, including (but not limited to): evolution of hydrochemistry during remediation, source of salts in Lower Sandstone Aquifer porewaters, process plans, industrial wastewater treatment, estimating composition and volume of process precipitates, and composition of mining fluids and leachate. In particular, the EIS posits that mining area decommissioning objectives are achievable based on metallurgical testing and provides these objectives in Table 2.3-3. CNSC staff need to understand the specifics of this metallurgical testing, given its importance for the development and justification for mining and remediation activities. Denison must also provide information demonstrating that the proposed restoration actions and remediation targets are As Low As Reasonably Achievable (ALARA).</p> | <p>1. Please provide a summary of the results and the analysis of results of the metallurgical tests within the EIS, or provide the technical supporting document with this information, and ensure the documentation is appropriately referenced in the EIS. This should include sample information for cores (e.g., mineralogy, location, U content, depth), test conditions (e.g., duration, # of iterations, column length, flow rate, temperature, pressure, sample frequency, influent/effluent composition), as well as results and how they are pertinent to the development of ISR activities.</p> <p>2. Please provide further clarification/justification on how results from two singular coreflood tests (i.e., Coreflood #2B and Coreflood #3C) can justify large-scale remediation activities and targets following solution mining.</p> <p>3. Please provide material demonstrating that the proposed restoration actions and remediation targets are ALARA.</p> | <p>This response has not been accepted, as this information should be provided in the EIS.</p> <p>CNSC staff request that Denison either include a high-level summary of the results of the metallurgical tests (including the data) or include appendices to the EIS that contain the data provided in attachments IR-20, IR-67, IR-69 and cite these within the EIS.</p> <p>Please provide proposed text for the revised EIS, for SME review and acceptance.</p> | Not Accepted |
| IR-68 | - | NRCan | Fish and fish habitat | Section 7.6.2.2.3 Appendix 7-C, sections 3.3, 4.1, 4.4.4 and 4.7 | <p>Context: Sources terms for the COPCs considered in 3D reactive transport modeling are given by the composition of "Restoration Solution #1", which the Proponent believes is representative of groundwater quality in the ore zone after remediation at decommissioning (Appendix 7-C, sec. 3.3, Table 3-5; sec 4.0). The Proponent considers COPC source terms as "initial conditions" for groundwater quality in the ore zone at the start of the model simulation period. During the simulation, no additional mass of COPCs is transferred to groundwater in the ore zone.</p> <p>Rationale: In NRCan's opinion, this representation of COPC sources is not conservative as it fails to account for various long-term slow mass release processes. These processes could include redissolution of secondary phases formed during ISR mining (e.g., radium-bearing gypsum or barite, jarosite, alunite) and migration of unrecovered lixiviant or restored solution from low-permeability regions or stagnant zones that were not fully swept during mining or remediation. NRCan notes that scenario #2 in the Proponent's transport prediction uncertainty analysis (Appendix 7-C, sec. 4.7) does consider an extended source release period for protons (desorption from chlorite). However, in NRCan's opinion, additional modeling scenarios should consider extended-release periods for other COPCs as well.</p> | NRCan requests that the Proponent's reactive transport prediction uncertainty analysis (Appendix 7-C, sec. 4.7) consider extended source release periods for additional COPCs. | | Accepted |
| IR-69 | - | NRCan | Fish and fish habitat | Section 7.6.2.2.3 Appendix 7-C, sections 3.1 and 3.2 | <p>Context: For hydrogeological and geochemical assessments in support of ISR projects, the Proponent identifies two aspects of primary importance (Appendix 7-C, sec. 3.1). These are a) groundwater remediation (Appendix 7-C, sec. 3.1.1); and b) the assimilative capacity of host rocks downgradient from the ore zone (Appendix 7-C, sec. 3.1.2). According to the Proponent, the objective of groundwater remediation at decommissioning is to achieve</p> | NRCan requests that the Proponent provide a detailed description of the expected mineralogical and hydrogeochemical changes occurring within the ore and barrier zones as a result of the injection of acidic lixiviant. | | Accepted |

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| | | | | | <p>water quality in the mined zone that does not pose a risk to receptors at the point of exposure. Assimilative capacity refers to the ability of groundwater-rock reactions to naturally sequester or attenuate COPCs migrating from the ore zone during the post-decommissioning period.</p> <p>Rationale: However, in NRCan's opinion, the Proponent has neglected to mention the most fundamental aspect for hydrogeological and geochemical assessments in support of ISR projects. That aspect is the choice of ISR lixiviant and its effects on the mineralogy and hydrogeochemistry of the ore zone during mining operations. The Proponent provides information on the pre-mining mineralogy (Appendix 7-C, sec. 3.2.1) and hydrogeochemistry (Appendix 7-C, sec. 3.2.2) but no information on their expected changes as a result of ISR mining. This Information is important when considering source terms in reactive transport modeling.</p> | | | |
| IR-70 | - | CNSC ECCC | Fish and fish habitat Geology and groundwater | Section 7.6.2.2.3, Evaluation of Geochemical Reactive Transport Appendix 7-C, Section 4.4.2, Sub-Domain Model Hydrogeologic Parameters | <p>Context: The EIS indicates that “changes to hydrogeological conditions within the mining area were considered during development of the 3D sub-domain model. Dissolution of ore within the active mining area is expected to enhance ... hydraulic conductivity”.</p> <p>In Section 4.7 (Prediction Uncertainty Analysis), predictive uncertainty scenarios are provided. For scenario 7, the hydraulic conductivity (K) of the ore zone was increased even further than initial model assumptions. The value used is not indicated in the text.</p> <p>Rationale: A hydraulic conductivity (K) value of 5x10-6 m/s, which is a factor of five (5) greater than the value assumed for the ore zone, was applied in the base case numerical model to account for this impact. It is unclear from the information provided in Section 7 of the EIS or associated Appendices what the basis of this five-fold increase in K value for the ore zone, and how this was judged to be conservative, or to adequately represent anticipated conditions. This parameter is important as it impacts the rate at which contaminants flow from the ore zone following mining activities. Due to of the dissolution of uranium, larger voids will likely be created, and the hydraulic conductivity may increase by more than a factor of 5 compared to pre-project material. Therefore, a variation of at least one or two orders of magnitude for hydraulic conductivity should be used in the sensitivity analysis. Having a representative, conservative value for hydraulic conductivity is essential for understanding groundwater as a pathway of contaminant transport to Whitefish Lake and potential impacts to aquatic life. The K value used in the predictive uncertainty analysis should be reported.</p> | Please provide a more fulsome discussion on the anticipated impacts of mining on permeability of the ore zone due to mining activities in the EIS or in an Appendix. The value used for scenario 7 of the prediction uncertainty analysis should be provided. The scientific rationale for the use of a K value only a factor of five greater than the value assumed for the ore zone in the 3D regional model should be provided, alternatively, provide simulation results for a more conservative scenario. Specifically, this discussion should address the potential effects of mechanical permeability enhancement with tools, dissolution of ore, gas plugging, chemical plugging, plugging due to ion exchange, and mechanical plugging. | <p>This response has not been accepted.</p> <p>In the discussion of K values for the Ore Zone in Section 2.3.1.7 of Appendix 7-C, Denison notes that available measurements are derived from permeameters and likely underestimate actual conditions because they do not account for macro-scale fracture flow in the ore zone. Section 4.4.2 of Appendix 7-C indicates that a hydraulic conductivity value of 5E-06 m/s (5 times greater than value assumed for the ore zone in the 3D regional-scale model) was assigned to represent mining post-decommissioning for the base case scenario. The description for Scenario #7 of the sensitivity analysis reads "higher hydraulic conductivity within the ore zone". In their response to IR-70, Denison states that for Scenario #7, "the hydraulic conductivity in the ore zone was raised to be a uniform value of 2E-07 m/s to represent the effective dissolution of any clay cap minerals". No information relating to permeability or hydraulic conductivity is provided in the IR-20/IR-67/IR-69 attachment outside of qualitative observations of increased permeability following leaching with lixiviant. The information provided to CNSC staff thus far indicates that hydraulic conductivity (K) values for the base case scenario was 5E-06 m/s, and 2E-07 m/s for the higher ore zone hydraulic conductivity scenario (Scenario #7). Clearly this interpretation is not logical given that 2E-07 < 5E-06. Furthermore, Denison's assertion that the post-mining conductivity of the ore zone is unimportant relative to the hydraulic conductivity of lower sediments and desilicified zone is not supported by the data presented in Table 4-6 of Appendix 7-C. The table below provides a summary of predicted groundwater concentrations for key COPCs (As, Se, U) for Scenarios 5, 6, and 7, as well as the relative percent difference to values predicted by the base case scenario. For these COPCs, it appears that increased ore zone hydraulic conductivity brings about the same order of magnitude changes as does varying K values for the lower sandstone (LSS). As such, it is important that the parameterization for Scenario #7 of the sensitivity analysis is valid - Denison is requested to provide clarification on this matter.</p> | Not Accepted |

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| | | | | | | | <p>From Table 4-6 of Appendix 7-C (p. 4.43). Relative percent difference compared to base case scenario shown in brackets. Values represent groundwater concentrations at Whitefish Lake.</p> <table><tr><th>Scenario</th><th>As, µg/L</th><th>Se, µg/L</th><th>U, µg/L</th></tr><tr><td>Base case</td><td>0.782</td><td>0.835</td><td>0.550</td></tr><tr><td>5 (highest combined K values for LSS and ISA)</td><td>0.982 (25.6%)</td><td>1.28 (53.3%)</td><td>1.54 (180%)</td></tr><tr><td>6 (highest K value for LSS)</td><td>1.10 (40.7%)</td><td>1.44 (72.4%)</td><td>1.81 (229%)</td></tr><tr><td>7 (increased ore zone K)</td><td>1.58 (102%)</td><td>1.47 (76.0%)</td><td>0.769 (39.8%)</td></tr><tr><td>Screening Criteria</td><td>5</td><td>2</td><td>15</td></tr></table> <p>The Proponent also should provide an explanation for the chosen parameter values for Scenario 7. Post-mining hydraulic conductivity (K) of the ore zone is consequential to understanding contaminant migration in groundwater.</p> <p>It should also be noted that the fate and transport simulations of the COCs are highly dependent on groundwater flow in the desilicified zone and acceptance of this IR will depend on the response to IR-89. Additional modelling has been requested in response to IR-89 that considers higher K values in the desilicified zone. Such additional modelling would assist in assessing if ore zone permeability is not important to the fate and transport of COPCs, as asserted by the Proponent.</p> | Scenario | As, µg/L | Se, µg/L | U, µg/L | Base case | 0.782 | 0.835 | 0.550 | 5 (highest combined K values for LSS and ISA) | 0.982 (25.6%) | 1.28 (53.3%) | 1.54 (180%) | 6 (highest K value for LSS) | 1.10 (40.7%) | 1.44 (72.4%) | 1.81 (229%) | 7 (increased ore zone K) | 1.58 (102%) | 1.47 (76.0%) | 0.769 (39.8%) | Screening Criteria | 5 | 2 | 15 | |
| Scenario | As, µg/L | Se, µg/L | U, µg/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Base case | 0.782 | 0.835 | 0.550 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 (highest combined K values for LSS and ISA) | 0.982 (25.6%) | 1.28 (53.3%) | 1.54 (180%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 (highest K value for LSS) | 1.10 (40.7%) | 1.44 (72.4%) | 1.81 (229%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 (increased ore zone K) | 1.58 (102%) | 1.47 (76.0%) | 0.769 (39.8%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Screening Criteria | 5 | 2 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IR-71 | - | CNSC | Geology and groundwater | Section 7.7.1, Climate Change Considerations | <p>Context: The report states that in a scenario of increased precipitation and decreased/constant evaporation, climate change may result in greater flows in the Wheeler River drainage system and increased recharge to groundwater, which would correspond to increased groundwater discharge to Whitefish Lake. Additionally, it is also stated that climate change was evaluated qualitatively.</p> <p>Rationale: It is not clear why the impacts of increased evapotranspiration associated with higher average temperatures were not considered, even though these are likely outcomes of temperature increases due to climate change in areas such as the Prairies (Climate trends and projections -</p> | Please provide a discussion on potential effects of increased evapotranspiration, as well as decreased groundwater recharge for the study area. Provide justification for performing qualitative assessment of impacts of climate change rather than a quantitative one. | <p>This response has not been accepted.</p> <p>The effect of climate change on groundwater recharge in Prairies or Canada is generally uncertain due to the large degree of uncertainty in the modelling of future recharge although future changes in temperature and precipitation are expected to alter groundwater recharge (through changes to runoff, evapotranspiration, and snow accumulation). While CNSC staff accepts the response on potential effects of increased evapotranspiration, as well as decreased groundwater recharge for the study area, no justification has been provided on why quantitative analysis was not completed to address the effect of climate change on groundwater recharge.</p> | Not Accepted | | | | | | | | | | | | | | | | | | | | | | | | |

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| | | | | | Canada.ca). It is also not clear why climate change considerations were not assessed quantitatively. | | | |
| IR-72 | - | CNSC | Geology and groundwater | Section 7.8.2, Groundwater Monitoring | <p>Context: Monitoring seems to consider COPCs from surface facilities, and excursion of pumped mine fluid in the Lower Sandstone Aquifer. There does not appear any discussion on how the proposed monitoring program considers potential excursions of brine from freeze wells.</p> <p>Rationale: It is unclear how potential excursions of brine from freeze wells will be monitored. Would this be through the fiber optic cables installed within the freeze well network? Or would it be achieved in the monitoring well clusters? If this is the case, how would an excursion of brine from a freeze well be differentiated from an excursion of mining solution?</p> | Please provide further information regarding how potential excursions of brine from freeze wells will be monitored as part of the proposed groundwater monitoring program. | <p>This response has not been accepted.</p> <p>CNSC staff request that Denison discuss the potential for excursions of brine from freeze wells and that they include a summary of plans to monitor these using key indicators of freeze wall brine migration, such as electrical conductivity (EC) and chloride (CaCl2), in the EIS (even at a high level if these are still being currently developed).</p> <p>Please provide proposed text for the revised EIS, for SME review and acceptance.</p> | Not Accepted |
| IR-73 | - | CNSC | Geology and groundwater | Section 7.8.2.2, In Situ Recovery Mining Area Appendix 7-A, Appendix C | <p>Context: The EIS recommends that a follow-up study be carried out to supplement available data on hydraulic conductivity in the Desilicified Zone (DSZ).</p> <p>Rationale: Appendix C (Summary of Hydraulic Testing Data and Conductivity Values) of Appendix 7A indicates that only n = 6 hydraulic conductivity values are available for the DSZ, one of which appears unreliable due to a problem with packer sealing. This is relatively few values compared to the Intermediate and Lower Sandstones. Additionally, limited hydraulic head data from boreholes screened in the DSZ is available (GWR-037, GWR-012 and GWR-014; See Figures 16/17 in Appendix 7-A) – most information appears to originate from open core holes. The information presented in its current form is insufficient considering the importance of this zone as a preferential pathway for contaminants following remediation activities, and the heterogeneity of the unit due to intense hydrothermal alteration and fracturing. Further information regarding hydrogeological properties and groundwater flow would aid greatly in validating and refining the numerical groundwater model.</p> | <p>As per the EIS recommendations, please provide additional information to supplement available data on hydraulic conductivity in the DSZ. Please provide the following information as part of the follow-up study:</p> <ol style="list-style-type: none">1. identification of the vertical conductivity (KV) as there is an upward flow component (isotropy was assumed in DSZ for numerical model, this assumption must be verified)2. quantification of the horizontal and vertical flow gradients in the DSZ; and3. identification and mapping of any structures with the potential to influence groundwater flow in the DSZ, such as fracture/fault zones. | | Accepted |
| IR-74 | - | CNSC | Geology and Groundwater | Section 7.8.2.3 | <p>Context: It is stated in Section 7.8.2.3 (p. 7-113, main EIS report) that, at the Post-Decommissioning Stage, “Excursion are signaled by a change in water quality that is outside of that bounded by modelling predictions”, and “The model predictions spatiotemporally bound COPC concentrations in the subsurface that do not pose a risk to the receiving environment. Water quality that is outside of this bounding is defined as representing a material increase over a meaningful period compared to the predicted values either in rate of change or magnitude of change of COPC concentrations.”</p> <p>Rationale: It is not clear in which locations (e.g., is it in the mining area, or downstream of the mining area, or anywhere else?) the water quality is used to compare with the model predictions to determine if excursion occurs.</p> | Please clarify in which locations the water quality data is used to compare with the model predictions to determine if excursion occurs. | | Accepted |

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| IR-75 | - | CNSC | Geology and Groundwater | Appendix 7-A, Appendix K | <p>Context: The geomechanical study showed that the stability of the remnant ore zone and surrounding rock mass is highly sensitive to the magnitude of the material properties. To quantify this risk, the Proponent conducted a sensitivity analysis to assess the influence that material properties have on the stability of key stratigraphic layers. The results of the sensitivity analyses suggest that small variations in the cohesion magnitude and angle of internal friction may significantly influence the stability of the altered sandstone, ore zone, and upper and lower clays.</p> <p>Rationale: By considering the potential uncertainties and risks in association with the geomechanical study and the empirically derived rock mass strength parameters and the non-site specific physical parameters of different rock formations used for the modeling, the Proponent’s consultant suggests to define a laboratory testing program to address data gaps in the current geotechnical data and increase confidence in the material properties, and use more accurate material properties to model the phased extraction of uranium-enriched rock and assess the associated risks for cavity collapse and failure in the steel casing. CNSC staff concurs with these suggestions.</p> | Please provide a plan to implement recommendations for further detailed geomechanical studies to reduce the uncertainties and risks in association with the stability and deformation analyses of ore zone rock matrix and its overlying rock mass formations and assess their impacts on the mine operation. | <p>This response has not been accepted.</p> <p>As stated in the original comment, the geomechanical study (Appendix K of Appendix 7-A of EIS, RESPEC 2021) showed that the stability of the remnant ore zone and surrounding rock mass is highly sensitive to the magnitude of the material properties. The results of the sensitivity analyses suggest that small variations in the cohesion magnitude and angle of internal friction may significantly influence the stability of the altered sandstone, ore zone, and upper and lower clays. Although the Proponent has conducted additional numerical modelling by adding the desilicified sandstone into the model with conservative mechanical properties for this zone, the mechanical properties of other materials are basically same as the original modelling (i.e., empirically derived average material properties of key stratigraphic layers). The new modelling (RESPEC 2023, i.e., Attachment IR-21) does not address the uncertainties associated with the non-site specific physical and mechanical parameters of different rock formations used for the modeling. Some mechanical parameters used appear to be inadequate, e.g., the mechanical properties of overburden and rock-mass modulus of desilicified sandstone. The use of isotropic in-situ stress state is non-conservative. No sufficient justification/rationale is provided on the excavation of 30 percent of rock by volume from the high-grade ore zone to which 50% was used in the RESPEC (2021), which could have significant impact on the modelling results. In addition, Figure 2 of Attachment IR-21 does not show the desilicified sandstone although it is stated that the desilicified sandstone is considered in the modeling. Also see CNSC’s disposition to Denison’s response to IR-83.</p> | Not Accepted |
| IR-76 | - | CNSC | Geology and Groundwater | Appendix 7-A, Appendix K (p. 12) | <p>Context: Based on the consultant’s report, the modeled vertical strain is approaching or exceeding the tensile and compressive yield limits for steel casing.</p> <p>Rationale: Failure of steel casing may result in process loss or alter groundwater flow and quality.</p> | Please provide additional details on how casing integrity will be monitored and potential effects mitigated. | <p>This response has not been accepted.</p> <p>CNSC staff request that Denison include summary of the potential for steel casing failure and plans for monitoring and mitigating its effects (such as the response to IR-76) within the EIS, for SME review and acceptance.</p> | Not Accepted |
| IR-77 | - | CNSC | Geology and Groundwater | Appendix 7-A, Appendix K Results of a Geomechanical Study Investigating the Influence of Uranium Extraction on Mining-Cavity Stability for the Wheeler River Uranium Project (Revision 1) | <p>Context: It is reported in the appendix K report, within Appendix 7-A, that both phase I scoping analysis and phase II detailed strip model were investigated by numerical modelling. The analysis discussed influence on host rock stability as a result of incremental increase in volumetric extraction and graded conservative treatment of material properties.</p> <p>Rationale: As critical components of a numerical geomechanical simulation, initial and boundary conditions are crucially important to the confidence and reliability of the modelling results. However, this information is absent from the current report. In-situ principal stresses largely affects the stability of the excavated host rock, and the vertical strain and surface subsidence. This information is also absent in current form.</p> | Please provide details on the boundary and initial conditions applied on stress loading and strain for the numerical analysis. In particular, the in-situ principal stresses, which are critical to correct understanding of the excavation disturbance to the host rock, should be provided and justified as appropriate. | | Accepted |

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| IR-78 | - | CNSC ECCC | Fish and fish habitat Geology and groundwater | Appendix 7-A, Section 3.5.2, Porosity Appendix 7-C, Section 2.3.2.1, Porosity Values | <p>Context: This section of the report outlines the estimated/assumed effective porosity values. The only reference provided is for permeameter testing on rock core samples (Scibek, 2019).</p> <p>Additionally, the report states that “As tracer test results to estimate effective porosity were unavailable at the time of modelling, effective porosity values for the sandstone bedrock and basement units were sourced from literature values”, where literature values are effective porosities from the Cigar Lake study (AECL, 1994), situated approximately 40 km NE of Wheeler River. No on-site Wheeler River field data was used to justify this value. Additionally,, in the Cigar Lake study, the authors reported that, because results from tracer tests and pumping tests were unavailable, “a practical approach was adopted, i.e., to use the porosity values obtained from laboratory measurements made on core samples, and to assume that those numbers were close to the average field kinematic (effective) porosity values”.</p> <p>Rationale: The source of reported effective porosity values is unclear from Section 3.5.2 in Appendix A (e.g. literature review, field work, laboratory work).</p> <p>In Section 2.3.2.1 of Appendix 7-C, there is a lack of clarity regarding the effective porosity data used in the numerical model. It appears that no site-specific data derived from tracer tests or pumping tests is used in the numerical model. Given that effective porosity directly correlates to seepage velocity and by extension transport time and distribution of COPCs in groundwater, it is an important parameter. Given its relative importance for contaminant fate and transport, effective porosity should be based on field measurements, or at the very least accounted for in the sensitivity analysis.</p> | <p>1. Please provide the reference for the data substantiating the assumed effective porosity values reported in Appendix 7-A and used in the numerical model in Appendix 7-C.</p> <p>2. Please provide information on how the site-specific effective porosity values from tracer tests or pumping tests, were considered in the numerical models. Section 2.2.1.4 of the EIS asserts that tracer tests were carried out in 2021 – this information should thus be available for improving/updating models. Alternatively, provide a sensitivity analysis for the effective porosity in the Desilicified Zone, or contaminant transport simulation results with more conservative effective porosity values.</p> | <p>This response has not been accepted.</p> <p>Effective porosity is an important parameter to understanding groundwater flow and contaminant transport. The Proponent states that “As tracer test results to estimate effective porosity were unavailable at the time of modelling, effective porosity values for the sandstone bedrock and basement units were sourced from literature values”, including porosities from the Cigar Lake study (AECL, 1994), situated approximately 40 km NE of Wheeler River. No on-site Wheeler River field data was used to explain this value. Additionally, in the Cigar Lake study, the authors reported that, because results from tracer tests and pumping tests were unavailable, “a practical approach was adopted, i.e., to use the porosity values obtained from laboratory measurements made on core samples, and to assume that those numbers were close to the average field kinematic (effective) porosity values”.</p> <p>In response to the IR, the Proponent explained and supported their methodology for selecting a value for effective porosity. This method included consideration of literature values and a regional analogue at Cigar Lake. ECCC notes that a tracer test was conducted, the results of which were not considered in the selection of the effective porosity parameter</p> <p>If field test data is available that is potentially relevant to determining effective porosity, it should be included in the EIS when discussing effective porosity. The field test data should also be made available for ECCC to review, to confirm the conclusions reached by the Proponent. ECCC acknowledges that other sources of information can be useful when explaining the most appropriate value for effective porosity such as literature values and regional analogues, as per the Proponent’s IR response. However, field test results should be presented in the EIS and considered as a part of such an explanation. If the Proponent feels that not utilizing field test data is the most accurate approach when selecting an effective porosity value, then this conclusion should be reached with consideration of the field test data as a part of the evaluation.</p> <p>Provide a discussion of how the effective porosity values are selected, including a discussion of how field test results were considered. This information is necessary to confirm that the selected effective porosity values are valid. This also relates to IR-52.</p> | Not Accepted |
| IR-79 | - | CNSC | Geology and groundwater | Appendix 7-A, Section 4, Groundwater Chemistry | <p>Context: Table 4-1 in Section 4 of Appendix 7-A provides groundwater monitoring results from sampling activities carried out at 26 monitoring wells in 2019, 2020, and 2021. The majority of these wells were only sampled once (n = 8) or twice (n = 17). In some cases (Lower Sandstone Aquifer/Intermediate Sandstone Aquitard), the variability of results between sampling events is quite high. Data for the Paleoweathered Zone is sparse.</p> | <p>Please provide the statistical basis (number of samples and variability) by which “baseline” is defined and the justification that the current information is sufficient to adequately characterize groundwater quality. In order to ensure sufficient baseline information is collected, further iterations of sample collection for groundwater monitoring wells in all defined hydrostratigraphic units may be required. In addition, groundwater quality downgradient from the proposed mining area should be further</p> | | Accepted |

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| | | | | | Rationale: Insufficient information is presented in the EIS and associated Appendices to concretely define baseline groundwater chemistry for the different hydrostratigraphic units. As defined in the CNSC’s Generic Guidelines for the Preparation of an EIS : “Based on the scope of the project, the EIS will present sufficiently detailed baseline information to determine the effects the project could have on the VCs and analyze those effects”. This is particularly important given certain features of the study area (i.e., presence of zones of thermal alteration/desilicification, as well as hydraulically active fractures/faults), and the need to adequately characterize baseline conditions in the Desilicified Zone downgradient from the proposed mining area. As an example, the US Nuclear Regulatory Commission (NRC) typically requires a minimum of four (4) quarterly samples from (i) surficial aquifers, (ii) production aquifers, (iii) overlying aquifers, and (iv) underlying aquifers to characterize preoperational groundwater quality (E. Striz, pers. comm.). | characterized to assess spatial influence of alteration and hydraulically active features, | | |
| IR-80 | - | CNSC | Geology and groundwater | Appendix 7-A, Section 4.3.3, Hydrochemistry by Hydrostratigraphic Unit | Context: This section provides data for groundwater samples collected during the Cigar Lake analogue study and Millennium Project for further regional context. The previous studies are heavily referenced to support interpretations made for the conceptual site model. Rationale: The Piper Plots in Figure 26 are difficult to interpret (many overlapping circles with variegated colors), and Cigar Lake samples plot predominantly as Na/K-Cl/SO4 groundwater facies. Conversely, samples collected as part of the Phoenix Project (current), plot either as Ca-HCO3 or Ca-SO4/Cl groundwater facies. No explanation is provided for the observed hydrogeochemical differences between groundwater from the Phoenix project and the Cigar Lake analogue study/Millenium Project. | Please provide additional clarity to and interpretation of Figure 26 in Appendix 7-A, including a revision to the Figure to allow for easier interpretation. This could include clear identification of end members, as well as arrows indicating proposed evolution of groundwater chemistry. Further discussion should be provided describing observed differences between groundwater chemistry at the Phoenix project compared to Millenium/Cigar Lake. | | Accepted |
| IR-81 | - | CNSC | Geology and groundwater | Appendix 7-A, Section 4.3.3, Hydrochemistry by Hydrostratigraphic Unit | Context: The report states in the description of hydrochemistry of the Lower Sandstone Aquifer that, “On the basis of groundwater chemistry and tritium values in that groundwater, the authors (of the Cigar Lake analogue study in 1994) concluded that the groundwater reflected a younger water component that had penetrated to depth along hydraulically active fractures/faults. The same conclusion is made here (in the Wheeler River EIS) for the Phoenix study area – meaning that fracture/fault conditions are such that some areas of the MFa are characterized by younger/recharge groundwaters”. Rationale: Tritium results for most wells in the Lower Sandstone Aquifer (MFa) reported in Table 4-1 of Appendix 7-A exhibit tritium concentrations <15 Bq/L for the 2020 sample, and 0.1 or <0.1 Bq/L for the 2021 sample. Tritium in modern precipitation typically varies from 1 – 3 Bq/L. Conclusions made in the text are not supported by data, especially given that tritium values are not reported in the EIS for local precipitation or surface water. This is important in reinforcing the assumption from the conceptual model | Provide a further discussion on the interpretation of tritium in groundwater, rather than echoing conclusions from the Cigar Lake analogue study. Consideration should be given to the assertion that modern meteoric water circulates at depth in the Lower Sandstone Aquifer. Collection and analysis of stable isotope (e.g., δ2H, δ18O) samples is a cost-effective solution which would greatly improve understanding of groundwater hydrology and support the development of a conceptual model. | This response has not been accepted. CNSC staff agree with the interpretations drawn from the information presented in the response to IR-81. However, it remains that the EIS does not contain an assessment of the tritium data presented, aside from the text quoted in the original IR-81 relating to Section 4.3.3 of Appendix 7-A. As such, CNSC staff request that Denison revise the EIS to include a high-level summary of the tritium data presented in the response to IR-81, being (i) the data is limited in value to conceptual model development, (ii) conclusions from tritium data at Cigar Lake at not reproducible with the current dataset, and (iii) Denison will continue to monitor tritium to further evaluate the usefulness in refining the conceptual model. Please provide proposed text for the revised EIS, for SME review and acceptance. | Not Accepted |

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| | | | | | that modern meteoric water circulates at depth in the Lower Sandstone Aquifer. | | | |
| IR-82 | - | CNSC | Geology and groundwater | Appendix 7-A, Section 4.3.3, Hydrochemistry by Hydrostratigraphic Unit Appendix 7-C, Section 3.5 | <p>Context: A. In-field measurements of Oxidation-Reduction Potential (ORP) for three (3) out of twenty-six (26) groundwater samples are presented in Table 4-1 of Appendix 7-A. Although sparse, these values are also used to characterize redox conditions for representative groundwaters in Table 3-5 of Appendix 7-C.</p> <p>B. In Section 3.5.5 of Appendix 7-C it is stated that groundwaters in the PHREEQC model were allowed to equilibrate with atmospheric concentrations of oxygen, resulting in oxidizing subsurface conditions. In Section 3.7 of Appendix 7-C it states that input files for 3D reactive transport were generated based on outcomes for PHREEQC modelling. However, in reading Section 4 of Appendix 7-C, it is unclear whether this assumption (equilibration with atmospheric oxygen) was carried forward for the 3D model.</p> <p>C. As per p. 3.49 of Appendix 7-C, “A small amount of reactive pyrite was assumed for the first 500 m of transport away from the ore zone in the model, primarily in the desilicified sediments of the Lower Sandstone Aquifer, and deeper portion of the Intermediate Sandstone Aquitard”.</p> <p>Rationale: A. Given the importance of redox conditions for U mobilization and precipitation/dissolution of minerals (e.g., pyrite/metal oxyhydroxides) and the corresponding influence on contaminant transport from both a modelling and monitoring perspective, these should be further characterized. It should also be noted that the measurement of Oxidative-Reductive Potential (ORP) in natural waters can be complex and difficult due to the variability and disequilibrium of natural systems and issues inherent to electrode calibration (e.g., Schuring et al., 2000). Measurements of redox couples (e.g., As(III)/As(V); Fe(II)/Fe(III); S(-II)/S(VI)) are typically recommended to accurately characterize redox conditions in natural waters (Schuring et al., 2000).</p> <p>B. The assumptions regarding redox conditions for the 3D solute transport model should be clarified.</p> <p>C. The amount of pyrite (e.g., % by weight) assumed for the purposes of modelling should be clarified, given the potential role of pyrite as a reducing agent in limiting the transport of COPCs.</p> <p>Reference: [1] Schuring J.; Schulz, H. D.; Fischer, W.R.; Bottcher, J.; and Duijnisveld, M.H.W. 2000. Redox: Fundamentals, Processes and Applications. Springer: Berlin.</p> | <p>1. Provide further discussions and information (i.e., ORP measurements or analytical data for redox couples) on redox conditions at the Phoenix site. Particular focus should be given to the spatial heterogeneity of redox processes. Tools such as the reference provided [2] below provide an example of simplified framework for characterizing redox conditions in aquifers.</p> <p>2. Clarify assumptions regarding initial redox conditions for the 3D solute transport model.</p> <p>3. Provide the % reactive pyrite by weight assumed for models in the text. Justification for proportions used, such as analytical data, should also be provided.</p> <p>Reference: [2] Jurgens, B.C., McMahon, P.B., Chapelle, F.H., and Eberts, S.M., 2009, An Excel workbook for identifying redox processes in ground water: U.S. Geological Survey Open-File Report 2009–1004 8 p.</p> | Please see AD-65 in the Advice to Proponent table. | Accepted |

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| IR-83 | - | CNSC | Geology and Groundwater | Appendix 7-A, Section 7.4.2.2 and Appendix K | <p>Context: Leaching of uranium from the ore zone will generate voids within the ore zone, which could fail and collapse. Failure of the voids would cause displacement in overlying rocks, which will lead to the eventual ground subsidence. Based on the developed geological model, a geomechanical study was conducted to assess potential maximum vertical displacement in the overlying rock formations and predict the ground subsidence. While a layer of altered sandstone is modeled above the ore zone, the desilicified zone, a zone that is comprised of completely to partially unconsolidated sands and has very low rock quality, high fracture intensity, and high friability, and low strength in the area overlying and east of the Phoenix deposit, appears not to have been included in the model for geomechanical modeling. The evaluated displacement/deformation in the overlying rock formation and the resulted ground subsidence would not be conservative without including the desilicified zone.</p> <p>Rationale: Stability of the ore zone rock matrix and the potential displacement/deformation in the overlying rock formations when voids in the extracted ore zone collapse are critical for protecting the overlying aquifers, preventing substantial ground subsidence, safeguarding casing integrity, and mitigating plug-off of the remaining ore as well as efficiently mining extraction. The deformed zone in the overlying rock formations will change in hydraulic conductivity that will impact on the assessment of potential effects on groundwater flow and contaminant transport in the zone. Therefore, the rock mass behavior including and above the ore zone should be adequately understood and the potential displacement/deformation should be assessed and quantified with adequately defined geological model.</p> | Please provide details whether and how the desilicified zone is considered in the geomechanical modeling of the detailed strip model. Such details should include figures and the linkage between the geomechanical model including the determination of strength parameters of the desilicified zone and the geological model including information on the core delineation of the desilicified zone. | <p>This response has not been accepted.</p> <p>As stated in the CNSC’s disposition to Denison’s response to IR-75, Figure 2 of Attachment IR-21 (RESPEC 2023) does not show the desilicified sandstone although it is stated that the desilicified sandstone is considered in the numerical modeling. Therefore, the extent of desilicified sandstone modelled is not clear. It is also not clear where the vertical plane represented by Figure 2 is cut from Figure 1. The linkage between the geomechanical model represented by Figure 2 in RESPEC (2023) and the geological model in EIS S07 is not provided.</p> <p>Please provide the requested information.</p> | Not Accepted |
| IR-84 | - | CNSC | Geology and Groundwater | Appendix 7-C | <p>Context: It is stated in Section 2.5.2.4 (p. 2.35, Appendix 7-C) that “In addition to calibrating to water level elevations targets, the model was calibrated to estimates of groundwater discharge to Whitefish Lake. A match between simulated and observed flows helps to support that groundwater recharge rates are reasonable, and to provide validation for water budget assessments. Baseflow calibration targets were developed using point streamflow measurements collected upstream and downstream of Whitefish Lake. Figure 2-10 (p. 2.26, Appendix 7-C) shows the locations of the baseflow calibration targets, and Table 2-7 (p. 2.35, Appendix 7-C) illustrates the model-simulated groundwater discharge rates in relation to the estimated range of baseflow from stream measurements. The simulated baseflow to Whitefish Lake is in good agreement with the estimated representative baseflow”.</p> <p>Rationale: It is not clear in Figure 2-10 (p. 2.26, Appendix 7-C) where the point streamflow measurements were conducted upstream and downstream of Whitefish Lake. Additionally, it is not clear how the groundwater discharge to Whitefish Lake is simulated, since the model domain does not cover the whole Whitefish Lake.</p> | <p>1. Please clarify in Figure 2-10 where the point streamflow measurements were conducted upstream and downstream of Whitefish Lake.</p> <p>2. Please clarify how the groundwater discharge to Whitefish Lake is simulated considering that the model domain does not cover the whole Whitefish Lake.</p> | <p>This response has not been accepted, as the issue has not been sufficiently clarified.</p> <p>1. In Appendix 7-C of the EIS, Figure 2-10 shows that Whitefish Lake is between SA-5 and SA-6, not SA-2 and SA-6. Additionally, under the heading "Surface Water Stations" of Table 2-7 are “SA-6 to SA-2”, not “SA-6 and SA-2”.</p> <p>2. Figure 2-10 does not show SA-7. Surface water flow direction should be illustrated to help understand the relative location of upstream and downstream. Additionally, under the heading of “feature monitored” of Table 2-7 is “flow from LA-6 to Whitefish Lake”. Figure 2-10 shows LA-2, but no LA-6.</p> | Not Accepted |

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| IR-85 | - | CNSC | Geology and Groundwater | Appendix 7-C | Context: Section 2.7.3 (Appendix 7-C) mentions Wells A, B and C, and Figure 2-17 (p. 2.43, Appendix 7-C) illustrates the predicted drawdown ranges at Well B and Well C. Rationale: It is not clear where Well A, Well B and Well C are located. | Please provide the locations of Well A, Well B and Well C illustrated in a Figure. | | Accepted |
| IR-86 | - | CNSC | Geology and Groundwater | Appendix 7-C | Context: It is stated in Section 2.7.3 (p. 2.41, Appendix 7-C) that “Both the pumping demand and the recharge changes were incorporated into a transient simulation performed using the calibrated groundwater flow model. The model simulation was started at the beginning of mine construction, with initial conditions taken from the calibrated model. The simulation period was extended for 40 years to include the entire period of construction, operation, and decommissioning, and extending through 17 years post decommissioning”. Rationale: It is not clear what is the difference between the calibrated model and transient model in terms of parameters (such as the K values for the mining zone), boundary conditions, etc. | Please clarify the parameters, boundary conditions and any other aspects as used in the transient model that are different from the calibrated model. | This response has not been accepted. The response is acceptable, but the information as explained in the response should be incorporated in the appropriate sections of Appendix 7-C. Please provide proposed text for the revised EIS, for SME review and acceptance. | Not Accepted |
| IR-87 | - | CNSC | Geology and Groundwater | Appendix 7-C | Context: In Section 2.8 (p. 2.45, Appendix 7-C) Parameter uncertainty assessment, only parameters for certain zones (part of each specific hydro-stratigraphic unit as shown in Figure 2-19, p. 2.46, Appendix 7-C) related to the pathway from the ore zone toward Whitefish Lake were allowed to vary in order to find combinations of parameter values that met statistical calibration criteria. If each hydro-stratigraphic units within the whole model domain were treated as parameter zones that can have varied hydraulic conductivity values, a different combination of parameter values could be obtained that meet statistical calibration criteria too. Rationale: The parameter values for parameter zones between the mining area and Whitefish Lake is important in determining the hydraulic connection between the mining area and Whitefish Lake. Parameter values in other parameter zones could also be important. For example, if the K values for the intermediate sandstone aquitard are significantly larger than in the current calibration results, the interaction between the upper sandstone aquifer and the lower sandstone aquifer could be more active, and the mined-out zone could be more active hydraulically and groundwater in the minded-out zone could have a shorter residence time than in the current calibrated model. Additionally, it is noted that Figure 2.19 (p. 2.46, Appendix 7-C) illustrates the parameter zone for the intermediate sandstone aquitard. However, Figure 2.20 (p. 2.49, Appendix 7-C) did not include the intermediate sandstone aquitard in the results. | It is recommended that the parameter zones in the Parameter uncertainty assessment include hydro-stratigraphic units in the whole model domain to investigate the possible combination of parameter values that could make the groundwater in the mined-out zone more active hydraulically. | | Accepted |

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| IR-88 | - | CNSC | Geology and Groundwater | Appendix 7-C | <p>Context: The conceptual hydrogeological model includes upper sandstone aquifer, intermediate sandstone aquitard, and lower sandstone aquifer. The desilicified zone above the ore zone have enhanced hydraulic conductivity. The boundary condition for the lower sandstone aquifer on the west (upstream) side was assigned to have specified head, which provide source of water for the lower sandstone aquifer.</p> <p>As a result of the conceptual model setup, the upper sandstone aquifer is hydraulically active and the groundwater residence time within the upper sandstone aquifer is relative short. In contrast, the lower sandstone aquifer (and the ore zone) is hydraulically inactive, and the groundwater residence time in the lower sandstone aquifer is relatively long (as shown in the particle tracking results in Figure 7.6-2 (p. 7-71, main EIS report), and the simulated plume for chloride in Figure 7.6-7(p. 7-86, main EIS report)).</p> <p>It is stated in Section 2.6.4 (Appendix 7-C) that “As noted above in section 2.6.3, it is estimated that 99% of the groundwater discharge to Whitefish Lake is derived from groundwater that has only flowed through shallow deposits (i.e., Overburden and Upper Sandstone Aquifers). Contribution of deep groundwater flow through the Desilicified Zone within the Intermediate Sandstone Aquitard is estimated to be < 1% of the groundwater discharging to Whitefish Lake”. This simulation result is reflective of the conceptual model.</p> <p>Section 7.3.3.3 (p. 7-42) states that “The Lower Sandstone Aquifer is characterized spatially by two types of groundwater. The first groundwater type is most like that observed in the Local Flow System. This reflects hydraulically active fractures and fault systems that allow fresh recharge water to penetrate and mix with deeper waters in the aquifer. The second type of groundwater is within the zone of thermal alteration around the ore zone”.</p> <p>The hydraulic connectivity of the ore zone with the upper sandstone aquifer has important implication on the groundwater restoration. The ore zone is not hydraulically active locally because it is enclosed by a clay zone before the mining operation. But if it is located within a hydraulically active area, or on a groundwater flow pathway that is hydraulically active, the mined-out zone (with much larger porosity and hydraulic conductivity) could become active hydraulically after mining operation is finished.</p> <p>Figure 7.6-7 (p. 7-86, main EIS report) shows that the chloride plume is most persistent within the mined-out mining area. This seems to indicate the mined-out zone is hydraulically inactive after the mining operation is finished.</p> <p>It is stated in Section 7.3.3.2 (p. 7-37, main EIS report) that “Exploration</p> | <p>It is recommended to conduct the following work to demonstrate if the mined-out zone is hydraulically active:</p> <ol style="list-style-type: none">1. Determine the groundwater residence time in the lower sandstone aquifer and compare it with the simulated residence time in the numerical model.2. Conduct additional particle tracking to demonstrate where groundwater originating from the mined-out zone flow towards (forward tracking) and where groundwater flowing towards the mined-out zone originates from. This would help determine why groundwater in the mined-out zone is not hydraulically active.3. Conduct sensitivity analysis to investigate the effect of higher K values for the intermediate sandstone aquitard and the K and porosity values of the mined-out zone on the plume migration. | <p>This response has not been accepted, as the following point was not adequately addressed:</p> <p>1. It is recommended that groundwater residence time in the lower sandstone aquifer be estimated and compared with the simulated residence time in the numerical model. Otherwise further justification should be provided why this is not possible.</p> <p>Groundwater residence time can be estimated using isotopes (the reference below is an example paper in this regard).</p> <p>Reference: Martin Kralik (2015), How to Estimate Mean Residence Times of Groundwater. Procedia Earth and Planetary Science, Volume 13, Pages 301-306.</p> | Not Accepted |

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| | | | | | <p>boreholes drilled in the Phoenix area, where left unplugged, have the potential to provide preferential flow paths between the Overburden and Upper and Lower Sandstone Aquifers. Exploration holes were reportedly grouted approximately 10 to 20 m above and below the ore zone, resulting in open holes remaining throughout the overlying materials. These portions of the open holes may act as open conduits for groundwater flow through the 400 m of Athabasca Group Sandstone.” So, there is possibility that the unplugged borehole could increase the hydraulic connection between the upper and lower sandstone aquifer.</p> <p>Rationale: It is important to understand if the larger area containing ore zone is hydraulically active. Additional confidence would be gained if there is any other evidence that support that the area containing the ore zone is not hydraulically active, and groundwater residence time in the lower sandstone aquifer surrounding the ore zone is comparable with the simulated results.</p> <p>Table 2-4 (p. 2.16, Appendix 7-C) shows the effective porosity (0.01-0.05) of the ore body. Figure B7 (p. B.8, Appendix 7-C) shows that the calibrated K values for the mined-out zone is 1x10-6 m/s. Section 3.5.2 (p. 3.24, Appendix 7-C) states that “The same average linear velocity was assumed for the mining area (source zone), following from the discussion in Section 4.4.2, where the hydraulic conductivity value in this zone following mining was set to 5x10-6 m/s, and a porosity of 0.2 is assumed for the ore zone (Table 4-2)”. It is not clear what the justification is for the selection of the porosity and K values for the mined-out area, and whether they are conservative. It is also not clear, what the potential impact on the groundwater flow and COPCs transport would be If the mined-out zones collapse.</p> | | | |
| IR-89 | - | ECCC | Fish and fish habitat | Appendix 7-C, Numerical Modelling: Post-Decommissioning Evaluation, Section 2.3.1.4, Desilicified Zone | <p>Context: The Proponent states that a hydraulic conductivity value of 5x10-6 m/s was uniformly assigned to the model layers representing the Desilicified Zone. They additionally state that this value is consistent with packer and pumping tests screened in this unit that have interpreted hydraulic conductivity values ranging from 1x10-6 to 3x10-5 m/s (Appendix C), with a geomean of 6.0x10-6 m/s.</p> <p>Considering that the Desilicified Zone is of particular interest because it is the main pathway for the COPC to reach Whitefish lake, and that hydraulic conductivities are not entirely understood, ECCC recommends that a larger range of hydraulic conductivities be simulated to understand potential effects on fish and fish habitat.</p> <p>Rationale: The Desilicified Zone is a critical layer in the hydrogeological model as it represents a key potential pathway of contaminants to Whitefish Lake. The base case hydraulic conductivity value (5x10-6 m/s) is even lower than the geometric mean, not to mention the highest value found. When simulating geochemical processes and contaminant transport within this important pathway a more conservative approach should be employed.</p> | <p>1. Provide an in-depth rationale for choosing a value of 5x10-6 m/s as the base case for the hydraulic conductivity, in both the PH REdox EQUilibrium (PHREEQC) and Finite-Element Ground Water Flow (FEFLOW) models.</p> <p>2. Provide a rationale for keeping the sensitivity analysis within one order of magnitude considering the lack of physical data on the Desilicified Zone. Alternatively, provide contaminant transport simulation results with more conservative hydraulic conductivity (e.g., more than 3x10-5 m/s) values in the Desilicified Zone.</p> <p>See also related: IR-96.</p> | <p>This response has not been accepted.</p> <p>The Proponent used calibration-constrained uncertainty analysis to establish boundaries when conducting sensitivity analysis of hydraulic conductivity in the groundwater model.</p> <p>For sensitivity analysis to adequately manage uncertainty, parameter values that are outside of those determined by calibration-constrained uncertainty analysis should be used. There always exists some degree of uncertainty in using hydrogeologic data as a complete representation of a regional groundwater system. This uncertainty can be accounted for by broadening parameter ranges in a sensitivity analysis. Limiting sensitivity analysis to calibration-constrained values implies that available field data is a perfect and complete representation of the broader groundwater system, which may not be an accurate assumption.</p> <p>Considering the limitations of available physical data in the Desilicified Zone, a more conservative sensitivity analysis is required in order to adequately assess how contaminants may flow towards Whitefish Lake.</p> | Not Accepted |

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| | | | | | Modifying this parameter will affect travel times and distribution of COPC in the subsurface. | | Please also see follow-IR-89-R1, and AD-66 in the Advice to Proponent table. | |
| IR-89 | IR-89-R1 | ECCC | Fish and fish habitat | Appendix 7-C, Numerical Modelling: Post-Decommissioning Evaluation, Section 2.3.1.4, Desilicified Zone IR-89 Response from Denison | <p>Context: The Proponent states that the range of hydraulic conductivities considered in sensitivity analysis was limited to values that fit within a calibration constrained uncertainty analysis of the model.</p> <p>Considering that the Desilicified Zone is of particular interest because it is the main pathway for the COPC to reach Whitefish lake, and that hydraulic conductivities are not entirely understood, ECCC recommends that a larger range of hydraulic conductivities be simulated to understand potential effects on the aquatic environment.</p> <p>The Proponent clarified the details of the calibration-constrained uncertainty analysis that was used for parameter bounding within the model, with hydraulic conductivity sensitivity bounds determined based on model calibration values that were supported by the available physical data.</p> <p>Rationale: ECCC agrees that calibration constrained uncertainty analysis using hydraulic head field data is useful to determine probable upper limits of K values. However, there is always some degree of uncertainty in groundwater data and models. Sources of such uncertainty may include errors, lack of complete and representative field data to determine key parameters, or any number of heterogeneities associated with groundwater systems over large scales. Such uncertainties will always exist and can be accounted for by conducting a sensitivity analysis that accounts for the lack of physical data in the Desilicified Zone by running modelling scenarios using parameters that are outside of the calibration constrained values.</p> | Expand the sensitivity analysis of hydraulic conductivity outside of calibration constrained parameters to account for the lack of physical data in the Desilicified Zone. | | Follow-Up IR |
| IR-90 | - | ECCC | Fish and fish habitat | Appendix 7-C, Section 2.4 and 2.6 | <p>Context: Hydraulic conductivities and hydraulic gradients play an important role in groundwater flow, geochemical modeling, and contaminant transport for the PHREEQC and FEFLOW models. Although there is an important vertical component to the contaminant transport, there is no distinction made between lateral and vertical hydraulic conductivities of hydraulic gradients.</p> <p>Rationale: According to the conceptual model, there is an important vertical aspect to the groundwater flow thus incorporating any vertical hydraulic gradient or hydraulic conductivity information into the calibration would increase confidence in the results.</p> <p>Providing a distinct value for vertical hydraulic conductivity will improve the accuracy of the model in regards to the transport of contaminants to Whitefish Lake through the Desilicified zone, which is important to understand potential impacts to aquatic life.</p> | <p>1. Explain if the vertical and lateral hydraulic gradients and hydraulic conductivities are assumed to be equivalent.</p> <p>2. Provide a rationale for not distinguishing between vertical and lateral hydraulic gradients.</p> <p>3. Alternatively, provide both lateral and vertical hydraulic gradient estimates and the implications on contaminant transport.</p> | | Accepted |

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| IR-91 | - | NRCan | Fish and fish habitat | Appendix 7-C, section 2.5.2 | <p>Context: The numerical model calibration quality plot (Appendix 7-C, sec. 2.5.2.1, Figure 2-13) contains a small error. The vertical (simulated heads) and horizontal (observed heads) axes do not have the same scales (499 to 521 masl versus 499 to 522 masl). Therefore, the line of ideal fit is offset.</p> <p>Rationale: As a result, NRCan notes that observed heads in the 510-512 masl range are underpredicted by the model. NRCan also notes that the calibration statistics (Appendix 7-C, sec.2.5.2.3) are highly leveraged by two data points from open boreholes south of Kratchkowsky Lake where simulated values are largely controlled by the nearby constant-head boundary in the Lower Sandstone aquifer (520 masl).</p> | The Proponent should correct the scales on the axes of Figure 2-13 in Appendix 7-C. The Proponent should also comment on the effect on calibration of the clustering of most observation wells in the ore zone. | | Accepted |
| IR-92 | - | CNSC | Geology and groundwater | Appendix 7-C, Section 3.2.1, Mineralogical Composition | <p>Context: Table 3-2 summarizes the clay content of the Athabasca Group sandstones and the Paleoweathered Zone. Although minimum, maximum and median values are provided, the number of samples and variability of the dataset are not. Rationale for incorporating illite into reactive transport modelling and excluding kaolinite/dichlorite is provided in the text.</p> <p>From p. 3.29 in Appendix 7-C: “The illite content was based on the normative clay composition determined from site-specific corehole elemental analysis (median illite by mass is 7.68%; Table 3-2) and using portable infra-red mineral analysis indicating median illite content by mass is 13.1% (data not shown)”</p> <p>From p. 3.30 in Appendix 7-C: “Using the minor amount of illite compared to the more dominant chlorite is conservative in that not all sorptive capacity of the clays is accounted for in the simulated paleoweathered zone”. This conservative assumption appears contrary to assumptions for the desilicified zone (DSZ) and Athabasca Group sandstones “Illite was used to represent the total clay content, which varies from 1.74% to 5.85% by mass in the hydrostratigraphic units within the Athabasca Group sandstones and Desilicified Zone”.</p> <p>Rationale: Information is missing in the EIS regarding the clay composition of hydrostratigraphic units. Results from infrared mineral analysis are not reported.</p> <p>The assumption for the solute transport model is that all clays in the downgradient DSZ are illite. However, clay content in the Read Formation (Lower Sandstone Aquifer) downgradient of the ore zone is low in illite (0.42%) compared to kaolinite (0.52%) and dichlorite (1.18%). A value of 3.9% illite clay by weight is used for the DSZ, but Table 3-2 indicates median content is 2.42% illite. It is not clear why illite was used to represent total clay content for the DSZ, as opposed to the conservative assumptions used for the Paleoweathered Zone, nor has any basis or justification been given.</p> | <p>1. Please provide in Table 3- the number of samples and variability of the datasets used to estimate the clay content of hydrostratigraphic units for the model. Include results from infrared mineral analysis in the text if the information is used to support assumptions for modelling.</p> <p>2. Please provide further information/discussion within the EIS relating to the assumptions of clay content in hydrostratigraphic units for modelling. Provide further justification and rationale as to why total clay content in the Athabasca Group sandstones and Desilicified Zone is assumed to be illite, and how this assumption is conservative. This discussion could include a comparison of the properties (cation exchange capacity, surface area) of illite vs. kaolinite vs. dichlorite for the anticipated range of subsurface conditions (pH, redox, U concentrations, etc.).</p> | | Accepted |

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| IR-93 | - | CNSC | Geology and Groundwater | Appendix 7-C, Table 3-10: Properties of Adsorbing Mineral Phases | <p>Context: In Appendix 7-C, section 3.5.6.2.2 Ion Exchange and Surface Complexation, the consideration of ion exchange and surface complexation and the corresponding parameters and chemical reaction are discussed.</p> <p>Rationale: The site density of sorbent Goethite was reported in Table 3-10 to be 1.6E3 mol/kg. Taking into account the specific surface area of 60 m2/g, this equals to 1600/6E4 mol/m2, or 0.0266 mol/m2, 1.6e4 sites/nm2.</p> <p>This value largely overestimates the site density of goethite, which is reported to be in the range of 2~6 sites/nm2. The reference used in the EIS report indicates the similar range of variation for this specific parameter.</p> <p>There are plenty of similar studies on SCM of iron oxides in literature. It is suggested to consult with more than one single study to enhance the reliability of model parameters.</p> <p>The overestimation of sorption site density will directly result in underestimation of the affected COPCs’ concentrations in pore fluid. This will result in underestimation of COPC transport plume in the affected underground space, and potentially the dissolved concentrations in the hydrogeological sink.</p> | Please provide additional evidence to justify the model parameter of site density for goethite, applied to the numerical model. If necessary, the reactive transport modelling should be re-run to update the contents presented in the EIS report. | | Accepted |
| IR-94 | - | CNSC | Geology and Groundwater | Appendix 7-C, Numerical modelling: post-decommissioning evaluation, Section 3.5.5, Subsurface Conditions Incorporated | <p>Context: It is reported in this section the assumed subsurface conditions that were applied in the geochemical site conceptual models. Critical phenomenon of pH tail was mentioned. Inclusion and exclusion of corresponding geochemical reactions were discussed briefly.</p> <p>Rationale: It was reported that the residual reduced minerals of uraninite and pyrite were not included in the modelling of the remediated mining area. The argument was based on consideration of the upstream groundwater, passing through the mined zone, will not be oxidizing and groundwater conditions are expected to be similar to pre-mine conditions. However, this ignores the pH tail effect that releases proton H+ sorbed to solid surface during ISR flooding. By ignoring this process, there is a potential risk of underestimating the source terms for some key COPCs. Exclusion of uraninite and pyrite in remediated mining area modelling is contradictory to pH-tail effect. The justification is not sufficient in the current form.</p> | Please provide additional evidence to justify the approach for excluding uraninite and pyrite from the analysis of remediated mining area. This may require the results from additional modelling. | | Accepted |
| IR-95 | - | CNSC | Geology and Groundwater | Appendix 7-C, Table 3-11 | <p>Context: The Table 3-11 reported the Solid-Phase Concentrations and Partitioning Constants for COPCs. Data were both measured and simulated.</p> <p>Rationale: It is unclear how the partition coefficients of various COPCs upon desilicified and paleoweathered rocks were obtained. It was not reported at what pH were these Kd analyzed. Sorption of chemicals on solid phase is known to be pH dependent. It is unclear whether pH influence was considered in the measurement and analysis of apparent partition</p> | Please justify the choice of applying a linear form partition coefficient for the modelling and assessment, and whether it provides a conservative approach to the assessment results. Clarity around the experimental conditions during the measurement of partitioning coefficient of various COPCs on the target rocks may help support this assumption. | | Accepted |

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| | | | | | <p>coefficients.</p> <p>In addition, uptake of metals on clay is highly nonlinear, and always has a maximum capacity. Even with a very strong affinity towards specific metal ions, the sorption will be saturated at elevated concentrations. Therefore, assuming a linear correlation needs to be cautious of the concentration range of target COPC species, and the applicable sorption capacity of the clay mineral.</p> <p>In the current model, only the linear form of sorption is considered, although with discussion of Kd value selection. Additional rationale is needed to justify if the applied methodology is sufficient for assessment.</p> | | | |
| IR-96 | - | CNSC | Geology and groundwater | Appendix 7-C, Section 4.4.4, Sub-Domain Model Transport Boundary Conditions | <p>Context: From the text, “Transport parameters were specified for diffusion (1x10-9 m2/s), longitudinal dispersivity (10 m along the plume trajectory), and transverse dispersivity (5 m)”. The source of this information is not provided in Appendix 7-C. It is unclear if the values used are defaults in the modelling software, from literature, from small-scale laboratory tests, or are site-specific values determined through tracer tests.</p> <p>Rationale: The use of a calibrated flow model does not imply that the solute transport model is calibrated. The transport parameters (such as effective porosity, dispersivity and reactive transport parameters) can only be calibrated by matching simulated and observed spatial and/or temporal distributions of a solute. Sensitivity analysis indicates that decreasing longitudinal and transverse dispersivities by a factor of two resulted in exceedances of groundwater criteria for both selenium (Se) and cobalt (Co). Given the clear influence of these values on contaminant transport, it is important that transfer parameter values are justified in the solute transport model. In addition, the influence of large-scale heterogeneity on dispersion and solute transport predictions should be discussed, to identify any uncertainty in the model predictions, and provide confidence that the applied model is adequately representing groundwater flow and solute transport.</p> <p>Further guidance on solute transport modelling can be found in BC MOE (2012) [1].</p> <p>Reference: [1] British Columbia Ministry of the Environment (BC MOE). 2012. Guidelines for Groundwater Modelling to Assess Impacts of Proposed Natural Resource Development Activities. Report no. 194001, 385 p.</p> | <p>1. Please provide the source of the numerical value used for diffusion and longitudinal and transverse dispersivity, and provide justification if default values by the model code were used.</p> <p>2. Please provide a discussion on the influence of large-scale heterogeneity on dispersion and solute transport predictions in the modelling report.</p> <p>See also related: IR-89.</p> | <p>This response has not been accepted.</p> <p>CNSC staff appreciate the comprehensive information provided relating to longitudinal dispersivity and variation based on scale. However, it should be noted that guidance from Gelhar et al. (1992) and the BC MOE (2012) indicate that horizontal transverse dispersivity values should be approximately 1 order of magnitude lower than longitudinal dispersivity values, and vertical transverse dispersivity values should be approximately 2 orders of magnitude lower than longitudinal dispersivity. For the model presented in the EIS, transverse dispersivity is represented by a singular value of 5 meters, with the supporting rationale that the Gelhar et al. (1992) identified 5 meters as a representative value. It is important to note that the Gelhar et al. (1992) paper considered 5 meters to be representative for horizontal transverse dispersivity and identified that vertical transverse dispersivity is smaller than horizontal transverse dispersivity. Additionally, it is important to note that Petrotek (2021) used a transverse dispersivity of 1 m in their numerical models of the ore zone aquifer. CNSC staff thus request that Denison provide further information relating to why horizontal and vertical transverse dispersivity are represented using a singular value, and how this value is considered appropriate to represent both dimensions.</p> <p>Reference: Petrotek 2021. Groundwater Model Report Phase 1, Phoenix Deposit Wheeler River Project. Prepared for Denison Mines. December 2021.</p> | Not Accepted |
| IR-97 | - | ECCC | Fish and fish habitat | Appendix 7-C, Figures 4-6, 4-7a, 4-7b, 4-8a, 4-8b, 4-9a, 4-9b | <p>Context: Appendix 7, Figures 4-6, 4-7a, 4-7b, 4-8a, 4-8b, 4-9a, 4-9b present contaminant transport simulations of chloride, selenium, cadmium, and uranium. All simulations use initial condition concentrations at t=0 (or end of mining operations. In the 3D FEFLOW contaminant transport model it is not</p> | <p>1. Explain and clarify if mining operations will mobilize contaminants beyond operations?</p> | <p>It should be noted that the fate and transport simulations of the COCs are dependent on groundwater flow. Therefore, the Proponent’s conclusions on the transport of COCs, may need to be revisited depending on how IR-89 is resolved.</p> | Accepted |

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| | | | | | clear why initial condition concentrations were chosen rather than a constant concentration boundary. It is also unclear if mining activities will cause mobilization of the contaminants beyond the end of operations. Rationale: The choice of boundary conditions may impact the predicted transport of contaminants that reach Whitefish Lake through groundwater, which may have impacts to aquatic life. | 2. Clarify if the source of contamination, (e.g., uranium, selenium) will cease after operations? 3. For the 3D model please provide the rationale for using initial concentrations rather than constant concentration boundary conditions for contaminant concentrations. | | |
| IR-98 | - | CNSC | Change to an environmental component due to hazardous contaminants | Section 8, Aquatic Environment | Context: It states in EIS in Section 8.3.7.1 (p. 8-151) that "Cameco's Key Lake Operation will overlap spatially and temporally with the Project". Rationale: It is not clear whether there is the possibility that planned Denison discharges would eventually flow into and influence a background reference lake used by Key Lake operation. | Please provide supporting information to demonstrate whether discharges from the proposed operation will not eventually flow into a reference lake used by another existing operation. | | Accepted |
| IR-99 | - | CNSC | Aquatic environment | Section 8, Water Quality, Table 8.2-13 | Context: Table 8.2-13 shows the maximum concentration of hazardous and radiological COPC's in surface water throughout the local study area. However, the concentration for all constituents is stated as mg/L. Rationale: It is unusual for radiological COPC's to be displayed in mg/L, radiological constituents are typically displayed in Bq/L | Please use Bq/L when displaying concentration of radiological COPC's. If this was a typographical error in the table, please indicate as such and revise the table to indicate values are indeed in Bq/L. Please also review other tables displaying concentrations of radiological constituents to ensure this error is not repeated in other tables. | | Accepted |
| IR-100 | - | HC | Indigenous Peoples' health / Socio-economic conditions | Section 8, (p. 8-195) Section 8.5.3, Table 8.5-2, (p. 8-226) | Mercury is excluded as a COPC in the assessment. Inadequate consideration of mercury and methylmercury in fish and other country foods, and use of incorrect Hg-related health guideline values can underestimate the risks to human health among country food consumers. Context: Section 8 states "Mercury has not been identified as a COPC for the Project as it is currently not present in the receiving environment (i.e., background condition) at detectable concentrations and will not be produced as part of the mine process; therefore, it will not be discharged to the aquatic environment. However, it is understood that potential nutrient enrichment-related effects are possible and can be linked to increases in mercury in the environment" (p. 8-195). Table 8.5-2 shows that there is mercury present in the tissues of Northern Pike and White Sucker sampled in the waterbodies within the local study area and in Russell Lake. These fish are regularly consumed by nearby communities according to the ERFN 2017 dietary survey. In Section 8.5.3, fish tissue concentrations are compared to Health Canada's human health risk- based maximum permissible mercury concentration (0.5 µg/g wet weight), which is applicable | 1. Include mercury (including methylmercury) as a COPC in the assessment given the baseline presence of mercury in sampled fish, the potential increase of methylmercury in receiving waters due to nutrient enrichment resulting from the Project, the significant fish consumption by the local population and that country foods, particularly fish, are an important source of dietary exposure to mercury. 2. Assess health risks from fish consumption by calculating hazard quotients for baseline and predicted methylmercury levels in country foods using Health Canada's pTDI for methylmercury (Health Canada, 2007). 3. Clarify whether mercury data represented throughout the EIS represents total mercury, inorganic mercury or methylmercury. Suggestions for mitigation and follow-up measures: Health Canada recommends including methylmercury in the list of COPCs to be monitored in fish throughout all project phases. See also related Advice to the Proponent: AD-31 . | This response has not been accepted. Health Canada does not support the responses to points 1 and 2 of IR-100. 1. The response to IR-100 point 1 indicates that mercury (including methylmercury) was not included as a COPC in the assessment because mercury is not associated with the local geology and therefore not expected to be released in the effluent at measurable levels, and because prediction of methylmercury production, based on a variety factors, is not practical. Health Canada continues to recommend that mercury (including methylmercury) be included in the assessment given <ol style="list-style-type: none">1) the detected presence of mercury in fish under baseline conditions, and2) the high consumption rates of fish and other country foods by Indigenous land users, particularly intensive land users such as the Trapper receptor. 2. The response to IR-100 point 2 continues to state that the HC maximum level (ML) for mercury of 0.5 µg/g (or 0.5 ppm) will be used to assess risks to human health from fish consumption during monitoring. The use of the HC ML for mercury is not appropriate in this case as it was developed for retail fish using consumption rates for the Canadian general population. Health Canada's provisional tolerable daily intake (pTDI) values of 0.20 µg/kg | Not Accepted |

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| | | | | | <p>to most species of commercially sold fish rather than country foods.</p> <p>Rationale: It is recommended that mercury be listed as a COPC considering it is in fact present in fish tissue under existing conditions, the significant consumption of fish by the local Indigenous communities, and its toxicological significance to human health.</p> <p>Further, the Health Canada provisional tolerable daily intake (pTDI) value of 0.2 µg/kg/bw/day (Health Canada, 2007) is a more appropriate reference level when evaluating consumption of mercury in fish by Indigenous people, as it allows for the consideration of food consumption patterns in the risk assessment that differ from the general population and is protective of the most sensitive sub-group (i.e., developing foetus).</p> <p>It is important to note that methylmercury, rather than inorganic mercury, is generally the predominant mercury species present in fish and is also the most toxicologically significant form. The assumption of 100% of mercury in fish and other country food items being present as methylmercury ensures that the potential health risks are not underestimated. It is unclear, however, if the mercury data presented throughout the EIS represent total mercury, inorganic mercury or methylmercury.</p> | | <p>bw/day for young children and women of childbearing age (Health Canada, 2007) are more appropriate reference levels when evaluating consumption of mercury in fish by Indigenous people, as it allows for the consideration of food consumption patterns in the risk assessment that differ from those used to develop the ML for retail fish and is protective of the most sensitive sub-group (i.e., developing fetus).</p> <p>For instance, the HC Human Health Risk Assessment of Mercury in Fish and Health Benefits of Fish Consumption (Health Canada, 2007) currently employs 40 g as an estimate of daily fish intake by adults who are at the high end of fish intake. This rate is below the rate of consumption for intensive land users for the Project, which is ~500g of fish per day, meaning that the HC ML may not be protective of all land users/receptors.</p> <p>Health Canada reiterates its recommendation to assess health risks from fish consumption by calculating hazard quotients for baseline and predicted methylmercury levels in country foods using Health Canada’s pTDI values for methylmercury (Health Canada, 2007).</p> | |
| IR-101 | - | ECCC CNSC | Fish and fish habitat | Section 8.1.1.3, Section 8.2.1.3 Aquatic Environment | <p>Context: In Section 8.1.1.3 Spatial and Temporal Boundaries the Project Area, Local Study Area (LSA) and Regional Study Area (RSA) are established as they pertain to surface water quantity. The same is done in Section 8.2.1.3 for surface water quality. In Section 8.1.1.3 Figure 8.1-4, the locations of the Project Area, LSA, RSA and surface water features and monitoring stations are provided.</p> <p>However, the locations of wetlands located near the Project area and within the LSA and RSA have not been provided. The location of wetlands within or near the Project footprint, as well as the other wetlands existing within the LSA can be confirmed from Part II_S9 Terrestrial Environment, Section 9.2.3.3 Figure 9.2.-8, including the wetland classifications. There appears to be at least one shallow open water wetland and several bogs located within the Project Area. There is no consideration of wetlands or potential effects to wetland hydrology, surface water or sediment quality throughout the aquatic environment assessments. There is no baseline information regarding wetlands and their status as fish habitat and ecological function, or assessment of potential effects to flow rates, water levels, water quality, sediment quality, or biota.</p> <p>Rationale: There is currently not enough information provided for ECCC to provide advice on the potential risks of the proposed Project to wetland hydrology, surface water and sediment quality within the LSA. This pathway of effects is important to assess in terms of potential effects to wetland habitat availability and quality due to changes in flow rates, water levels,</p> | <p>1. Provide baseline information regarding wetland characterization within the Project Area and LSA, including: locations, wetland type, size, water surface elevation, depth, water flow pathways, and the presence of wildlife receptors including presence of fish/fish habitat within the Aquatic Environment section of the draft EIS. If this information is available in annexes or baseline studies, summarize it within the main body of the Aquatic Environment section of the draft EIS with references to respective documents for review.</p> <p>2. Provide baseline information on wetland surface water and sediment quality characterization for wetlands within the Project footprint.</p> <p>3. Provide an assessment of potential effects to wetlands within the LSA and potential effects to ecological receptors during all phases of the proposed Project.</p> <p>4. Provide further information on mitigation measures and monitoring that would be applied for the protection of wetlands.</p> | <p>This response has not been accepted for the following reasons:</p> <p>1. The response (#1(d)) by the proponent states that “Surface elevations for the wetland have been assessed and the information is summarized below and in the Attachment IR-101 Figure 1 Elevations of wetland features in the LSA” but it is not indicated that this information will be placed in the EIS. CNSC staff requests proponent to include the information provided in response #1(d) and Attachment IR-101 Figure 1 (Elevations of Wetland Features in the LSA) and Attachment IR-101 Figure 2: (Denison Wheeler River Project SSA and Wetland Feature Distribution) in the EIS.</p> <p>2. The Proponent stated in response #2 (a) and (b) that “surface water quality and sediment quality in wetlands were not specifically sampled in the wetland complexes adjacent to the Project footprint during the original baseline assessment.” CNSC staff requests the proponent to provide justification why they have relied on measurements upstream and downstream of the wetlands over direct measurements in the wetland areas. It is recommended to conduct direct measurements in the wetland areas.</p> <p>3. The information provided did not satisfy the IR. Additional information regarding the potential impacts to wetlands due to changes in surface water quality and sediment quality should be included within Section 8.3 of the main EIS. This is needed to fully understand the scope of potential effects to the aquatic environment.</p> | Not Accepted |

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| | | | | | water quality, sediment transport, sediment quality and potential effects to terrestrial and aquatic receptors. It is necessary to evaluate if changes in groundwater and surface water runoff flows and routing will affect water levels and habitat availability within wetlands. Potential effects from COPCs and radionuclides to surface water and sediment, or potential effects to ecological receptors within wetlands have not been evaluated. | | <p>a. Update Section 8.3 to include additional information on predicted water and sediment quality impacts to wetlands from the Proponent’s response to directly consider wetlands as fish and fish habitat for the purpose of assessing water quality impacts.</p> <p>b. Update Section 8.3 to provide an assessment of potential effects to wetlands from water and sediment quality changes within the LSA.</p> <p>4. It is stated in response #4 that “[...] Updated baseline information on wetland depths and water-levels may be useful in providing a frame of comparative reference to potential changes during the operation, decommissioning and post-decommissioning phases of the project” and CNSC staff agrees with the proponent and recommend collection of monitoring information on the wetland areas.</p> | |
| IR-102 | - | ECCC CNSC | Fish and fish habitat | Section 8.1.3.1 Appendix 8-C, including Appendix II, Table 1 (p. 2) | <p>Context: Only one measured-results dataset for baseline stream flow exists that is relevant to the Project data from the Water Survey of Canada (WSC) station for Wheeler River (06DA005), and the Proponent used constructed records. The Proponent states that data from 06DA005 was used to extend local hydrometric station records and calculate baseline water quantity metrics. However, this was done through a complex combination of daily data correlation or monthly unit area runoff relationship, with or without offset, where some stations were based off constructed records instead of the real long-term dataset at 06DA005 (see Section 8.1.3.1 and Appendix II of Appendix 8-C, Table 1, p.2 (PDF p. 569)). Appendix 8-C references previous reports in its own appendices, but no equations are shown and there is no description of the accuracy of the fit, or explanation for not referring back to the one dataset (WSC station). Subsequent statistics calculated from these constructed records (e.g., 7Q10 needed for SK water licenses) would be affected by this uncertainty.</p> <p>Rationale: Fish habitat can be altered by changes to depositional and erosional patterns in streams. Confidence in the Proponent’s estimate of baseline water quantity, and by extension Project effects to fish habitat, cannot be established without a complete description of the method applied, as well as a discussion of its accuracy.</p> | <p>1. Provide more information on the extension of Project hydrometric station data using WSC station 06DA005.</p> <p>2. Discuss the accuracy of any correlations/relationships and justify any deviations from simple unit area runoff relationships in the estimation of baseline water quantity values for the Project hydrometric stations. Constructing records from records that are themselves constructed is not recommended.</p> <p>3. If baseline water quantity metrics need to be revised, discuss (if any) resulting changes to the effects assessment.</p> | <p>This response has not been accepted for the following reasons:</p> <p>1. Given the limitation of data availability extension of flow records based on the nearest active WSC hydrometric station (Wheeler River (06DA005)) is acceptable although other methods are not shown to be explored by the proponent including rainfall-runoff modelling techniques (such model can be calibrated at 06DA005 thus computed flow at subbasins or sub watershed can be estimated with good degree of confidence), drainage area ratio method, etc. CNSC staff recommends proponent to consider aforementioned methods or similar or provide justification why other methods were not considered.</p> <p>2. In Attachment IR-102 Figure 1 to 7 show the plots of measured versus the estimated daily flows using the relationship developed for extension of daily flows at SA-1, SA-2, SA-3, SA-4, SA-5, SA-6, SB-3, LA-1 and LA-5. CNSC staff however finds it difficult to determine the predictive accuracy of the relationships based on visual comparisons. Therefore, CNSC staff requests that the proponent provide quantitative measures of prediction accuracy, for example in the form of Root Mean Square Error, correlation coefficient, etc., for the Equations presented in Table 1 of Attachment IR-102.</p> <p>In addition, CNSC staff requests that the proponent provide clarification on whether the current relationships are only limited to baseline characterization or will also be considered for estimation of design flows at SA-4 and SA-5 for culvert/crossing design for the access road.</p> <p>3. Response to third part of the IR to be re-assessed when proponent addresses the above two comments ([1] and [2]).</p> | Not Accepted |

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| IR-103 | - | ECCC CNSC | Fish and fish habitat | Section 8.1.3.4 Climate Change Influenced Extreme Events | <p>Context: The Proponent notes that Intensity duration frequency (IDF) curves are used to estimate the size of water management structures around a site and that the IDF curves are often specific to climate monitoring stations.</p> <p>The Proponent used the IDF_CC Tool 5.0 developed by the Institute for Catastrophic Loss Reduction (2021) which generates Intensity Duration Frequency (IDF) curves at ungauged locations in order to estimate future IDF curve values under influences of climate change. This tool generates sub-daily values at ungauged locations by interpolation and distance weighing from gauged locations.</p> <p>Rationale: IDF trends exhibit random behavior at some locations and correlated behavior at other locations. The choice of gauged locations will infer the statistics for the ungauged locations, including the IDF trends. Without identification of the gauged locations, it is not possible to assess if the modelled data is realistic or not. If the modelled data is not accurate the design of water management structures on the site may not be sufficient resulting in the potential for impacts to the Project from flooding or extreme weather events.</p> | Provide the gauged stations used to generate the sub daily duration values found in Table 8.1-6: Baseline of Intensity Duration Frequency data. | <p>This response has not been accepted.</p> <p>In the Context and Rationale of AD-15 in the Annex 1 – Denison Response, ECCC recommends that the Proponent consult CSA PLUS 4013:19 (2019) <i>Technical guide: Development, interpretation and use of rainfall intensity-duration-frequency (IDF) information: Guideline for Canadian water resources practitioners</i> regarding the consideration of future changes in short-duration precipitation extremes. In IR-103, ECCC indicated that in order to assess the accuracy of the Intensity duration frequency (IDF) curves, ECCC required that the Proponent provide the gauged stations generating the values for the modelled data. The Proponent provided the closest gauged stations, however, the future short duration precipitation values were based on statistical relationships fitted between local scale observed extreme precipitation and modelled simulations extremes.</p> <p>Additionally, on page 15-19 of the draft EIS states that: “Denison will apply adaptive management that includes monitoring climate factors so that they can proactively mitigate or prevent adverse climate effects on the Project.” Denison did not provide details on how climate factors will be considered within their adaptive management plans.</p> <p>Rationale: Estimates of future short duration precipitation that are based on statistical relationships fitted between local scale observed extreme precipitation and modelled simulations extremes, such as the approach used by the Proponent, are unlikely to provide reliable projections. This is because the amount of information regarding changes in local-scale observed extreme precipitation contained in short records is not sufficient to constrain a regression (model the statistical relationship) between local and larger scale simulations (Li et al., 2019; ECCC 2022). An alternative approach is to base future projections on a comprehensive assessment that integrates climate science understanding and model projections over a large region. The recent Canadian Standards Association (CSA 2019) guidance on IDF for Canadian Water Resources practitioners provides such an assessment. In terms of adaptive management, the Proponent should clearly outline what climate factors will be monitored to mitigate or prevent adverse climate-related effects. This should include information on when and how the climate factors would be monitored and under what circumstances particular adaptive management approaches would be applied.</p> <p>In order to assess the Proponent’s adaptive management strategies for future extreme precipitation events, ECCC requests that the Proponent consult the CSA (2019) guidance when using future IDF projections in the Project design and provide revised estimates of the potential future changes in short-duration precipitation extremes over the Project’s duration.</p> <p>1. Provide revised estimates of the potential future changes in short-</p> | Not Accepted |

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| | | | | | | | <p>duration precipitation extremes over the Project’s duration as relevant to the Project design.</p> <p>2. Demonstrate how the CSA (2019) guidance will be incorporated in the Project design when developing and considering future IDF projections and estimates of the potential future changes in short-duration precipitation extremes.</p> <p>References CSA Group. (2019). Technical guide: Development, interpretation and use of rainfall intensity- duration-frequency (IDF) information: Guideline for Canadian water resources practitioners. <i>CSA PLUS 4013 :19</i>. https://www.csagroup.org/store/product/2703080/ ECCC (2022). Draft Technical guide related to the Strategic Assessment of Climate Change: Assessing climate change resilience. https://www.strategicassessmentclimatechange.ca/28896/widgets/117114/documents/77106 Li, C., Zwiers, F., Zhang, X., & Li, G. (2019). How much information is required to well constrain local estimates of future precipitation extremes? <i>Earth’s Future</i>, 11-24.</p> | |
| IR-104 | - | ECCC | Fish and fish habitat | <p>Section 8.1.3.4.2 Probable Maximum Precipitation (PMP) Events</p> <p>Appendix 8C</p> | <p>Context and Rationale: The Proponent notes: “The probable maximum precipitation (PMP) event is a design standard value for an extreme rainfall event. The PMP event does not have an estimated return period but is instead based on the theoretical maximum amount of water that a storm could produce based on the maximum persisting dew point.”</p> <p>The Proponent provides a PMP value of 489.3 mm, which is based on data and methodologies available in 1999, taken from the Atmospheric Environment Branch Report (1999), Report Number AHSD-R99-01. The Proponent references Appendix 8C for details. Appendix 8C contains no supplementary information other than what is already provided in Section 8.1.3.4.2.</p> <p>The assumptions and methodologies presented in the report are the results of time series analyses available in 1999. As time series evolve so do the derived statistics. In order to assess potential flood risks and impacts to the Project from flooding, data that is current and representative of the changing climate is needed. The Proponent should explain why they’ve used data from 1999 rather than using up to date data, describe what alternative methods for determining PMP they have considered, and describe how they will support their use of 489.3 mm as a PMP, or describe how they will generate a refreshed PMP. The main factor that influences the statistical data output is the length of the time series hence the reason to keep the statistical data. The PMP values can be substantially (>10%) different if two decades of data is used in the statistical analysis.</p> | <p>1. Provide a revised PMP value (using up to date data) or justify the use of a PMP that is based on data and methodologies from 1999 as opposed to a more recent time series analysis.</p> <p>2. Describe the alternative methods for determining PMP values that were considered. Include descriptions of both “statistical” outcomes and “rational” outcomes as applicable.</p> <p>Technical Discussion Required: Yes</p> | <p>This response to part 1. has not been accepted.</p> <p>There are an additional 24 years of meteorological datasets since the 1999 study thus all historical rainfall extremes including those since 1999 study should be considered to estimate up to date PMP at the Project site The proponent’s justification on whether the 1999 or 1994 PMP estimates are current and conservative should be substantiated based on meteorological data analysis. An estimation of updated PMP is achievable by the proponent as meteorological data is freely available and accessible from ECCC and the proponent should provide a revised PMP.</p> <p>The Proponent should also clarify how recent the data used to calculate the PMP or the time series is and explain the use of an older data set that will not produce as accurate of a PMP value as a more recent data set would produce, even when estimates are conservative.</p> <p>Specifically, a. Explain the rationale for the use of the data set which was used to derive the PMP. B. Clarify if the PMP and/or the time series was calculated using more recent data.</p> <p>This will allow for an accurate evaluation of the validity of results derived from the data sets selected by the Proponent.</p> <p>.</p> | Not Accepted |

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| IR-105 | - | Directorate of Fisheries and Oceans (DFO) | Fish and fish habitat | Section 8.1.4.1, Potential interactions between project and valued component/key indicators Surface Water Quantity Section 8.1.4.2.2, Surface Water Taking 8.3.4.1, Potential interactions between project and valued component/key indicators | Context: Table 8.1-8 and Table 8.3-6 in the EIS indicates a potential for freeze wall operation to influence groundwater interactions and surface water quantity and as a result, impact fish and fish habitat. Section 8.1.4.2.2 references Section 7 Geology and Groundwater for details on potential impacts. In addition, IR-63 notes the groundwater model does not describe the pathway in which groundwater would pass around the freeze wall during operation and any resulting potential effects on groundwater discharge to Whitefish Lake. Rationale: As per IR-63, the groundwater model analysis is insufficient to make conclusions on the potential effects of the freeze wall on groundwater discharge into Whitefish Lake. DFO requires this information to fully understand if altered groundwater regimes will result in changes to Whitefish Lake water levels and any potential impacts to fish and fish habitat as a result of changing water levels. | 1. Provide a more fulsome analysis of the potential impact of freeze wall operations on local and semi-regional groundwater regimes, and subsequently to fish and fish habitat within Whitefish Lake. The analysis should provide a rationale of how the scope of the groundwater model is relevant to and able to detect changes at the scale of fish and fish habitat. 2. If impacts to fish and fish habitat in Whitefish Lake are predicted to occur due to changes in the groundwater regime, describe any mitigation measures that could be used to avoid these impacts. 3. If impacts are predicted that cannot be avoided, characterize residual effects on fish and fish habitat. | | Accepted |
| IR-106 | - | CNSC | Change to an environmental component due to hazardous contaminants | Section 8.1.4.2.3, Surface Water Discharge | Context: It is stated in this section under construction that all site contact water will be held in the Clean Waste Rock Pond. Rationale: It is unclear from this section what will happen to the contact water held in the Clean Waste Rock Pond, and whether it will be removed from site or released at a later time. What is the contingency plan if more contact water is produced during construction than the Clean Waste Rock Pond has capacity for. | Please indicate what will happen to the contact water stored in the Clean Waste Rock Pond during construction activities, will it be released after the wastewater treatment plant is installed? Further, please describe the contingency plan if contact water produced exceeds estimates and will exceed the volume of the clean waste rock pond? | | Accepted |
| IR-107 | - | CNSC ECCC | Aquatic environment | Section 8.2.3.3, Existing Surface Water Quality | Context: Under the methodology and metrics section (8.2.3.1) it is stated baseline water quality was sampled in 2016, 2018, and 2019. Looking at the data in Appendix A of Appendix 8D it seems that some waterbodies have little data available for baseline characterization. For example, Whitefish Lake only has 3 and 5 samples taken between its two sample stations, with sampling frequency seeming intermittent. Rationale: The amount of data available for baseline water quality characterization does not seem sufficient to adequately characterize the baseline and the variation it would experience. An effective baseline characterization is vital to ensure water quality is indeed not being affected by the Project. In addition, it is not clear if data quality objectives were applied to determine baseline information was adequate. To meet CEAA 2012 requirements, and CNSC expectations outlined in REGDOC 2.9.1, Environmental Principles Assessments and Protection Measures, the applicant is required to complete a characterization of the baseline environment. | Please clarify which data quality objectives were used for the baseline characterization data. Please provide justification whether the number of datapoints collected with inconsistent frequency in baseline surface water characterization is sufficient to meet data quality objectives and to adequately characterize the baseline, and whether Denison is confident that the data collected is enough for a robust water quality baseline characterization. Suggestions for mitigation and follow-up measures: CNSC recommends that additional water samples are collected and analyzed at a consistent frequency to ensure a robust baseline | This response has not been accepted. From the baseline water quality data table (Table A-1 of Appendix 8D) it remains unclear that water quality was sampled on a monthly basis in 2016, 2018, and 2019, mainly due to Table A-1 referring to specific sampling dates, instead of an mean value of 12 samples/year. It is also unclear which federal requirements Denison is referring to using in their response. Staff are supportive of continued baseline monitoring to maintain an accurate dataset of baseline conditions. CNSC and ECCC staff have the following expectations: 1. Provide the monthly monitoring data referenced in the response or indicate where it can be found within the EIS and its appendices. 2. Confirm which federal requirements were used when assessing potential impacts through EA. 3. Confirm which data quality objectives were used to establish the baseline, provide references if available | Not Accepted |

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| | | | | | <p>As described in REGDOC 2.9.1 Appendix B.2, Characterization of the Baseline Environment for Environmental Assessment Under CEAA 2012, the “baseline information should be sufficient to support the use of an aquatic dispersion model to conduct the site-specific ERA and to support an assessment of the effects of the environment on the facility or activity”</p> <p>In addition, the “applicant or licensee should include an assessment of any limitations or gaps in the quality and extent of baseline data and methods, as well as the method(s) by which they have been addressed.”</p> | | <p>4. Incorporate the additional available baseline data collected into the analysis and conclusions of the finalized EIS and ERA to increase the robustness of the established baseline.</p> | |
| IR-108 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.3.3 Aquatic Environment | <p>Context: Tables 8.2-2 and 8.2-3 provide summaries of the baseline surface water quality in the LSA. No justifications for the selection of water quality guidelines have been provided. COPCs that require calculations based on other parameters such as hardness, pH, or temperature to derive guidelines (i.e., ammonia, cobalt, zinc, etc.) should be indicated within the table, with a note specifying the parameter values used in the calculations, so that thresholds may be confirmed. No baseline data for un-ionized ammonia has been provided, which is a Schedule 4 substance requiring monitoring under the MDMER. For cobalt, manganese, and vanadium, Federal Environmental Quality Guidelines (FEQGs) and/or CCME Canadian Water Quality Guidelines (CWQGs) for the Protection of Aquatic Life have not been included. A guideline of 26 mg/L has been provided for molybdenum as a Saskatchewan Environmental Quality Guidelines (SEQG), however the actual SEQG is 31 mg/L and the CCME CWQG is 0.073 mg/L.</p> <p>Rationale: In order to assess potential changes to surface water quality from Project related activities, ECCC requires that data on all parameters that require MDMER effluent and receiving environment monitoring be provided for assessment, including accurate water quality guidelines where available.</p> | <p>1. Update Tables 8.2-2 and 8.2-3 to include all COPCs that require effluent characterization and receiving environment monitoring under the MDMER.</p> <p>2. Update Tables 8.2-2 and 8.2-3 to include missing or corrected water quality guidance thresholds, and information on values used to derive thresholds for COPCs that are dependent on general parameters.</p> | <p>This response has not been accepted.</p> <p>There are incorrect guidelines remaining in the updated tables, and the supporting information on parameter values used to derive benchmarks has not been provided. This information is required to understand potential changes to surface water quality from Project related activities and facilitate threshold confirmation. Use of the incorrect threshold could allow for effluent to be discharged at concentrations exceeding MDMER limits.</p> <p>See also follow-up IR-108-R1.</p> | Not Accepted |
| IR-108 | IR-108-R1 | ECCC | Change to an environmental component due to | Section 8.2.3.3 Aquatic Environment IR-108 Response from Denison | <p>Context: Incorrect benchmark environmental quality guidelines and guidelines that cannot be verified remain within the updated Tables 8.2-2 and 8.2-3 provided in the Proponent’s response. The Proponent provided an Aluminum Saskatchewan Environmental Quality Guidelines (SEQG) value of 0.005 mg/L in both tables. This is incorrect and appears to be the guideline for irrigation, not the guideline for protection of aquatic biota. The Proponent provided a Molybdenum SEQG of 26 mg/L in both tables. This value is incorrect. The correct SEQG for Molybdenum is 31 mg/L and the Canadian Water Quality Guideline (CWQG) is 0.073 mg/L. The Proponent provided a Nitrate SEQG of 13.29 mg/L in both tables. This value is incorrect. The correct SEQG for Nitrate is 3 mg/L and the CWQG is 13 mg/L.</p> <p>Rationale: In order to verify the benchmark environmental quality guidelines that are calculated based on environmental modifying factors such as pH, hardness and dissolved organic carbon (DOC), the specific concentrations of these environmental modifying parameters used in the calculations must be</p> | <p>1. Update Tables 8.2-2 and 8.2-3 to include footnotes with the concentrations of environmental modifying parameters such as pH, hardness and DOC used to derive guidelines for Aluminum, Cadmium, Copper, Lead, Manganese, Nickel and Zinc.</p> <p>2. Update Tables 8.2-2 and 8.2-3 to include the correct benchmark guideline value for Aluminum, Molybdenum and Nitrate. Include the concentrations of environmental modifying parameters needed for deriving guidelines. If the most stringent guideline value is not selected for use, provide a rationale for use of the chosen guideline.</p> <p>3. Update Tables 8.2-2 and 8.2-3 to include the calculated guideline value for manganese and the environmental modifying parameter concentrations used to calculate the guideline. A benchmark environmental quality guideline has not been provided for Manganese, however a chronic CWQG guideline exists that can be derived based on environmental modifying parameter concentrations.</p> | | Follow-Up IR |

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| | | | | | provided. Additionally, incorrect benchmarks for Aluminum, Molybdenum, and Nitrate remain within the updated tables provided by the Proponent. No benchmark was provided for Manganese. It is not clear if Total Chromium or Hexavalent Chromium was measured as the table does not specify, and the benchmark provided was for Hexavalent Chromium. This information is required to understand potential changes to surface water quality from Project related activities and facilitate threshold confirmation. Use of the incorrect threshold could allow for effluent to be discharged at the wrong concentration. | Update Tables 8.2-2 and 8.2-3 to specify if Total Chromium or Hexavalent Chromium was measured. See also related IR-115-R1. | | |
| IR-109 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.1.1 Aquatic Environment | <p>Context: In this section it is stated “Treated water from the IWWTP will be pumped to the three Effluent Monitoring and Release Ponds (each 3,300 m3). These ponds will be designed to hold effluent for 72 hours for testing before discharge to the environment” (p. 8-75). It is unclear what procedure will be followed if effluent in monitoring ponds does not meet discharge requirements following testing.</p> <p>Additionally, it is also stated that “Treated water in the Effluent Monitoring and Release Ponds will be monitored prior to release to a surface waterbody or injected into groundwater via deep well injection.” However, the MDMER pursuant to the Fisheries Act requires all mine effluent and seep. From the mine site that contain deleterious substances be discharged through a final discharge point.</p> <p>Rationale: In order to fully understand effluent management, more information is required regarding the procedure for managing effluent in monitoring ponds that does not meet discharge requirements. It is unclear how effluent that does not meet discharge requirements will be managed if it needs re-treatment and re-testing prior to discharge.</p> <p>ECCC reminds the Proponent that Project effluent from all final discharge points must meet federal legislation requirements.</p> | Provide further information regarding management of effluent in monitoring ponds that does not meet the requirements for discharge under the MDMER. | <p>This response has not been accepted.</p> <p>There are statements made throughout the EIS that “Treated water in the Effluent Monitoring and Release Ponds will be monitored prior to release to a surface waterbody or injected into groundwater via deep well injection.” However, the Proponent has confirmed that all treated effluent will be discharged to Whitefish Lake through a final discharge point to ensure it meets <i>Metal and Diamond Mining Effluent Regulations</i> (MDMER) requirements.</p> <p>It is not clear why the above statement regarding effluent release to groundwater via deep well injection has been included in the EIS when this is not part of the confirmed effluent discharge management plan. The Proponent should update the EIS to remove text regarding effluent release to groundwater via deep well injection or provide explanation as to why this information has not been excluded from the EIS to clarify if this is an intentional part of the Project design or if this was an accidental inclusion.</p> <p>The Proponent should update the EIS to remove text regarding effluent release to groundwater via deep well injection or provide additional explanation.</p> <p>Please provide proposed text for the revised EIS, for SME review and acceptance.</p> | Not Accepted |
| IR-110 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.1.1 Aquatic Environment Appendix 8-E, Section 2.1 | <p>Context: It is stated that the diffuser at the final effluent discharge point will be located in approximately 3m of water. However, in Figure 8.2-5 displaying the location of the proposed diffuser and lake bathymetry, the diffuser location seems to be located in 2-2.5m of water. A similar image in Figure 1 Section 2.0 of Appendix 8-E also indicates that the diffuser seems to be located in 2-2.5m of water. Additionally, while thermal effects are unlikely, this cannot be confirmed until a more detailed diffuser design is provided for review.</p> <p>Updated Rationale: The Proponent should confirm the location and depth of the proposed diffuser in order to confirm that modelling predictions for effluent discharged into the receiving environment are accurate.</p> | <p>Provide confirmation of the diffuser depth and location.</p> <p>ECCC requests the opportunity to review the finalized diffuser design once it is available.</p> | <p>This response has not been accepted.</p> <p>ECCC requests confirmation that the finalized diffuser design will be available for review once it is completed as reviewing it will be necessary to confirm the location and depth of the proposed diffuser and modelling predictions for effluent discharged into the receiving environment.</p> | Not Accepted |

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| | | | | | A review of the final discharge design is necessary to confirm the location and depth of the proposed diffuser and modelling predictions for effluent discharged into the receiving environment. | | | |
| IR-111 | - | CNSC | Fish and fish habitat | Section 8.2.4.2.2, Controlled Discharge | <p>Context: This section of the EIS indicated that the scenario was assessed using a conservative assumption of a continuous freshwater withdrawal rate of 40.5 m3/hr, and a continuous effluent discharge rate of 81.0 m3/hr.</p> <p>Rationale: The withdrawal rate assessed is half of the effluent rate, it is unclear from the text where the other half of the volume of effluent is coming from, if not drawn from the lake.</p> | Please clarify where the other half of the total volume of effluent discharged is from in the water balance between water intake and effluent. | | Accepted |
| IR-112 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.2.2, Aquatic Environment Appendix 8-E, Section 1.2.1 Appendix 10-A (ERA), Section 3.1 | <p>Context: This section of the EIS states that, “for the purpose of assessing the scenario of greatest potential effects, the Project was assessed as having a continuous freshwater withdrawal rate of 40.5 m³/hr and a continuous effluent discharge rate of 81.0 m³/hr.” (p. 8-21)</p> <p>However, several sentences later it is stated that, “The approach to assessing Project-related effects on the Surface Water Quality VC was conservative for the following reasons: The assessment was based on a continuous (year-round) discharge rate at an expected average effluent discharge of 0.0101 m3/s (or 36.5 m3/hr) throughout Construction, Operation, and Decommissioning...”</p> <p>This is a continuous theme throughout Section 8, Aquatic Environment, where the discharge rate for the surface water quality assessment changes between 36.5 m3/hr and 81.0 m3/hr. However, in Appendix 10-A (ERA) the 36.5 m3/hr discharge rate is the only value used for the near and far-field modelling.</p> <p>It should be made clear in the main body of the draft EIS that the average effluent discharge rate of 36.5 m3/hr has been used as the input for the near- and far-field modelling for effluent, surface water and sediment quality predictions. The maximum upper bound discharge rate is 81 m3/hr; however, modelling for effluent, surface water and sediment quality was not completed for this discharge rate.</p> <p>Rationale: It remains unclear throughout the draft EIS that all predictions of COPC concentrations in effluent, and receiving environment surface water and sediment are based upon the effluent discharge rate of 36.5 m3/hr, and not the maximum upper bound discharge rate of 81 m3/hr. All conclusions about risk to the environment and aquatic and terrestrial biota must make this clear. If the Proponent wishes to make conclusions based on the maximum upper bound discharge rate of 81 m3/hr, modelling needs to be conducted using this rate of discharge.</p> | <p>1. Confirm that the surface water quantity, quality, and aquatic biota risk assessments and modelling, were conducted using the discharge rate for 36.5 m3/hr within the draft EIS.</p> <p>2. Revise any statements or conclusions in the draft EIS to improve clarity about the usage of the maximum upper bound discharge rate of 81 m3/hr. Remove statements regarding use of the discharge rate of 81 m3/hr during modelling and risk assessments to the receiving environment as needed.</p> | | Accepted |

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| IR-113 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.2.3 and Section 8.4.7.6, Aquatic Environment | <p>Context: No quantitative assessment of climate change has been conducted. Representative concentration pathways (RPC) projections for climate change have not been integrated with near-and far-field modelling to assess impacts to surface water quality or sediment quality in the future.</p> <p>Rationale: Changes in air and water temperatures, precipitation, snow melt, ice formation, etc., due to climate change can all influence COPC concentrations in surface water and sediment. It is not possible to assess the potential impacts from climate change on predicted surface water and sediment COPC concentrations with the current information.</p> | Provide a quantitative analysis of the potential impacts of predicted COPCs from mine effluent to surface water and sediment quality with climate change scenarios for the Project lifespan incorporated into modelling. Include modelling predictions regarding the influence of changes to air and water temperatures, precipitation, snow melt, ice formation, etc., on COPC concentrations in surface water and sediment. | <p>This response has not been accepted.</p> <p>Based on the information provided it is not possible to assess the resiliency of the Project to potential adverse effects from climate change and potential impacts to surface water and sediment quality. The Proponent should review the guidance documents available on the Strategic Assessment of Climate Change (SACC) website with regards to climate change resilience and provide a quantitative analysis of the potential impacts of predicted COPCs from mine effluent to surface water and sediment quality with climate change scenarios for the Project lifespan incorporated into modelling.</p> <p>Include modelling predictions regarding the influence of changes to air and water temperatures, precipitation, lake levels, flow rates, etc., on COPC concentrations in surface water and sediment. The Proponent should refer to the SACC website for guidance on conducting this quantitative analysis.</p> <p>See also follow-up IR-113-R1.</p> | Not Accepted |
| IR-113 | IR-113-R1 | ECCC | Fish and fish habitat | Section 8.2.4.2.3 and Section 8.4.7.6, Aquatic Environment IR-113 Response from Denison | <p>Context: The Proponent states the following, “The PMP is very conservative (e.g., assumes effectively a full year of precipitation in one event) under both existing and future conditions (climate change)”. This statement suggests that the PMP value utilized considers future climate changes such as possible changes in the frequency or intensity of extreme precipitation events.</p> <p>Rationale: As noted by the Proponent, increases in extreme rainfall are anticipated with a warmer climate. For precipitation extremes across Canada, the relative change in event frequency is expected to be larger for more extreme and rarer events. Given that the extreme precipitation is expected to intensify in the future (Kunkel et al. 2013), the Proponent should consider how these potential changes will influence design values such as PMP.</p> | <p>Clarify if climate change has been considered in the PMP value provided. If it has not been considered, discuss how potential increases in PMP have been and/or need to be considered in the Project design.</p> <p><u>Reference</u> Kunkel, K., Karl, T. R., Easterling, D. R., Redmond, K., Young, J., Yin, X., & Hennon, P. (2020). Probable maximum precipitation and climate change. <i>Geophysical Research Letters</i>, 1402-1408.</p> | | Follow-Up IR |
| IR-114 | - | ECCC CNSC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.2.3 and Section 8.2.4.2.4 | <p>Context: Tables 8.2-9, 8.2-10 and 8.2-13 demonstrate predicted maximum effluent concentrations of COPCs and maximum predicted receiving environment concentrations in the near- and far-field. General parameters such as temperature, pH, conductivity, etc. that would require Project thresholds and monitoring under the MDMER have not been provided in this table. Lead, nickel, TSS and un-ionized ammonia were not provided, despite all being Schedule 4 substances with maximum monthly concentrations under the MDMER. Aluminum, iron, nitrate, thallium, and manganese have not been provided despite being required parameters under Schedule 5 Section 4 of the MDMER for effluent characterization.</p> <p>For zinc, it is unclear how guidelines have been calculated when CCME thresholds can only be derived with hardness values <250 mg/L. Additionally, water quality thresholds appear to have been calculated using estimated effluent concentrations rather than receiving environment</p> | <p>1. Update all tables to include all COPCs with required monitoring under the MDMER including acute and chronic thresholds.</p> <p>2. Ensure all selected water quality thresholds are derived using baseline receiving environment concentrations and use water quality guidelines that are protective of aquatic biota.</p> <p>3. Provide baseline data on the concentrations of methylmercury in surface water, sediment and fish tissues (i.e., large-bodied sports fish and small-bodied forage fish) in the LSA and RSA receiving environment to establish a baseline prior to potential Project impacts.</p> <p>4. Provide an assessment of risk from methylmercury to ecological receptors due to changes in sulphate concentrations in effluent, and potential deposition of mercury from Project related atmospheric emissions in the receiving environment.</p> | <p>This response has not been accepted.</p> <p>The Proponent has not updated all tables to include missing data for mercury, aluminum, total suspended solids, iron, thallium, manganese, nitrate, and phosphorous, all of which are COPCs with monitoring requirements under the MDMER.</p> <p>The Proponent has not updated tables to include predictions of total hardness concentration in effluent and the receiving environment or acute water quality thresholds, and water quality thresholds have not been derived using baseline receiving environment concentrations.</p> <p>All water quality thresholds should be derived from receiving environment parameters to determine if any baseline receiving environment and effluent COPCs exceed water quality thresholds.</p> | Not Accepted |

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| | | | | | <p>baseline concentrations.</p> <p>Mercury has been identified as a COPC of interest to Indigenous groups for the proposed Project. Table 8.2-8 indicates that background concentrations of mercury in LA-5 are low, and predicted effluent concentrations are also low. However, no information has been provided on background methylmercury concentrations or expected atmospheric deposition of mercury from Project related emissions. Predicted effluent concentrations of 3915 mg/L of sulphate are quite high, and sulphate is known to increase mercury methylation rates in aquatic environments.</p> <p>Rationale: A review of all modelling results for all COPCs under the MDMER will assist ECCC in understanding the potential risks to the receiving environment. ECCC recommends the use of the most stringent guidelines for the protection of aquatic biota. All water quality thresholds should be derived from receiving environment parameters to determine any baseline receiving environment and effluent COPC exceedances of water quality thresholds.</p> <p>Increased sulphate availability can lead to increased methylation rates of mercury and methylmercury in sediment and surface water. Methylmercury is a toxin that can bioaccumulate within the food chain and present risks to aquatic biota and wildlife consuming aquatic biota. Potential changes to methylmercury concentrations in water quality, sediment and fish tissues should be assessed due to the proposed sulphate loadings in effluent.</p> <p>Additionally, in accordance with the MDMERs, Denison will be required to demonstrate that their effluent quality meets the limits in the MDMER. Denison is expected to provide the predicted effluent quality for lead, nickel, and un-ionized ammonia to demonstrate compliance with the MDMERs.</p> | | <p>Please:</p> <ol style="list-style-type: none">1. Update all tables to include missing data for mercury, aluminum, total suspended solids, iron, thallium, manganese, nitrate and phosphorus.2. Update tables to include predictions of total hardness concentrations (in mg/L CaCO₃) in effluent and the receiving environment.3. Update tables to include acute water quality thresholds to ensure COPCs do not have the potential to be acutely lethal at the end-of-pipe.4. Ensure that all selected water quality thresholds are derived using baseline receiving environment concentrations and use water quality guidelines that are protective of aquatic biota. | |
| IR-115 | - | ECCC | Fish and fish habitat | Section 8.2.4.2.3 Aquatic Environment Appendix 10-A (ERA), Section 3.1.1.1 | <p>Context: Table 8.2-8 demonstrates baseline concentrations of COPCs in LA-5 South Whitefish Lake, their respective water quality guidelines from applicable sources, and proposed Project thresholds. General parameters such as temperature, pH, conductivity, etc. that would require Project thresholds and monitoring under the MDMER have not been provided in this table. Lead, nickel, Total Suspended Solids (TSS) and un-ionized ammonia were not provided, despite all being Schedule 4 substances with maximum monthly concentrations under the MDMER. Aluminum, iron, nitrate, thallium, and manganese have not been provided despite being required parameters under Schedule 5 Section 4 of the MDMER for effluent characterization. Water quality thresholds appear to have been calculated using estimated effluent concentrations rather than receiving environment baseline concentrations. The water quality objective selected for molybdenum is the 31 mg/L SEQG rather than the CCME guideline of 0.073 mg/L.</p> <p>Rationale: ECCC recommends the use of guidelines that will ensure the</p> | <ol style="list-style-type: none">1. Update Table 8.2-8 to include all COPCs with required monitoring under the MDMER.2. Ensure all selected water quality thresholds are derived using baseline receiving environment concentrations and are at levels protective of aquatic life.3. Provide additional information to justify the use of the selected water quality guideline for molybdenum. | <p>This response has not been accepted.</p> <p>Items 1. and 3. in the Proponent’s response adequately responded to the IR. However, the water quality thresholds in item two have not been derived using baseline receiving environment concentrations and not all COPCs which require monitoring under the MDMER have been included in the updated table. Additionally, the Proponent did not account for changes in baseline hardness concentrations in the receiving environment due to the deposition of effluent. Water hardness is an environmental modifying factor which can influence the toxicity of COPCs in the aquatic environment, therefore requiring the mentioned COPCs as well as background concentrations of total hardness in the receiving environment to accurately determine potential effects of COPCs upon the receiving aquatic environment. The Proponent should also provide rationale to support that all selected water quality thresholds are derived using baseline receiving environment concentrations and are at levels protective of aquatic life.</p> | Not Accepted |

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| | | | | | protection of aquatic biota. All water quality thresholds should be derived from receiving environment parameters to determine any baseline receiving environment and effluent COPC exceedances of water quality thresholds. | | See also follow-up IR-115-R1. | |
| IR-115 | IR-115-R1 | ECCC | Fish and fish habitat | Section 8.2.4.2.3 Aquatic Environment Appendix 10-A (ERA), Section 3.1.1.1 IR-115 Response from Denison | <p>Context: In the Proponent’s response to item two, it is mentioned that the derived water quality thresholds used in Table 8.2-8 and in the assessment (Section 8.2.4.2.3, Aquatic Environment; Appendix 10-A (ERA), Section 3.1.1.1) are based on hardness concentrations found in effluent. The Proponent mentions that hardness derived from IWWTP discharge will consider IWWTP discharge on the receiving environment and provide “a reasonable estimate of expected hardness in effluent”. However, this does not consider induced hardness (i.e., hardness concentration increases in the receiving environment over the lifecycle of the Project) from effluent contributions as a Project effect; the receiving environment baseline concentrations of hardness have been altered due to inputs from Project effluent. Providing only one estimate of expected effluent hardness in the receiving environment is not an appropriate means of conducting the effects assessment.</p> <p>Additionally, the following COPCs have not been included in the updated table provided in the Proponent’s response: un-ionized ammonia, aluminum, iron, manganese, thallium and total dissolved solids (TDS). It is noted that these COPCs are also subject to monitoring requirements under the <i>Metal and Diamond Mining Effluent Regulations</i> (MDMER).</p> <p>Rationale: Background concentrations of un- ionized ammonia, aluminum, iron, thallium, manganese and TDS are required to determine potential effects to the environment. The Proponent will also require this information to satisfy their obligations under the MDMER.</p> <p>The purpose of the surface water quality assessment is to determine if changes to the receiving environment over the project lifecycle will have significant adverse effects on biota. Changes from baseline in hardness concentrations in the receiving environment due to the deposition of effluent is a Project related effect and therefore providing a single baseline water quality threshold which is applicable only to one set of conditions is not an appropriate method to evaluate impacts across a shifting hardness baseline.</p> <p>Water hardness is an environmental modifying factor, various concentrations of hardness influence the toxicity of other COPCs in the aquatic environment. Using water quality thresholds that have been derived from high effluent hardness concentrations will not be protective of aquatic biota, particularly in the early stages of the project lifecycle when receiving environment water quality will be similar to baseline water quality.</p> | <p>1. Update Table 8.2-8 to include the following COPCs: un-ionized ammonia, aluminum, iron, manganese, thallium and total dissolved solids (TDS).</p> <p>2. Update Table 8.2-8 to include background concentrations of total hardness (in mg/L CaCO₃) in the receiving environment.</p> <p>3. Provide rationale that all selected water quality thresholds are derived using baseline receiving environment concentrations and are at levels protective of aquatic life.</p> <p>See also related IR-108-R1</p> | | Follow-Up IR |

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| IR-116 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.2.5, Section 8.4.4.2.5 and Section 8.5.4.2.3 | <p>Context: Tables 8.2-14, 8.4-9 and 8.5-5 demonstrate predicted mass flux (in mg/s) of COPCs in groundwater during the future centuries scenario. The table does not provide any information on actual surface water concentrations of COPCs or accumulation in concentrations over time. It is not possible to determine what the COPC concentrations in surface water and sediment will be during the future centuries scenario with the current information.</p> <p>Additionally, only a subset of parameters have been provided in this table based on parameters that were elevated in effluent after treatment. Groundwater may have a variety of different COPCs with elevated concentrations as it will migrate directly from the ore body area and not receive treatment.</p> <p>Rationale: It is not possible for ECCC to assess the predicted concentrations of COPCs in surface water and sediment, and therefore risk to aquatic biota during the future centuries scenario with the provided information.</p> | <p>1. Provide the predicted water and sediment quality concentrations of COPCs in the receiving environment for the future centuries scenario.</p> <p>2. Include data for a greater suite of COPCs that were assessed as having potential to be at elevated concentrations in groundwater.</p> | | Accepted |
| IR-117 | - | CNSC | Human health with respect to hazardous contaminants | Section 8.2.4, Table 8.2-9 | <p>Context: CNSC staff note that some of the effluent quality predictions in the EIS are quite high for a uranium mine and mill facility compared to the existing facilities.</p> <p>For example, the upper bound effluent quality of molybdenum is 2.5 mg/L. In 2021, the highest monthly mean concentration at the existing uranium mine and mill facilities is 0.213 mg/L.</p> <p>Also, the upper bound effluent quality of copper is 0.022 mg/L. In 2021, the highest monthly mean concentration at the existing uranium mine and mill facilities is 0.002 mg/L.</p> <p>Rationale: Surface water quality models should be based on the anticipated effluent quality. From discussions with Denison, it appears that the effluent quality predictions may change based on the results of more bench scale tests that are still being conducted and continued optimization of the design of the water treatment plant.</p> | <p>Please provide the anticipated effluent quality of the constituents of potential concern during normal operations.</p> <p>Once Denison has refined the effluent quality predictions, Denison is expected to update the inputs into the surface water quality model.</p> | | Accepted |
| IR-118 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.6.1, Section 8.4.6.1 and Section 8.5.6.1, Aquatic Environment | <p>Context: It is unclear if Tables 8.2-16, 8.4-12, 8.5-7 and 8.5-8 take into consideration potential effects from groundwater seepages of COPCS to surface water and sediment quality in the future centuries scenario. No information regarding the future centuries scenario has been provided in the rationale summary for ratings.</p> <p>Rationale: Groundwater seepage of COPCs may have future impacts to surface water quality, sediment quality and aquatic receptors; however, the extent of residual effects is unclear without further information.</p> | <p>Provide further information regarding how groundwater seep. Of COPCs may have future impacts to surface water quality, sediment quality, and aquatic receptors, and any residual effects that may persist.</p> | | Accepted |

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| IR-119 | - | CNSC | Fish and fish habitat | Section 8.3.1.2, Table 8.3-1, Sediment quality | <p>Context: Sediment quality isn’t considered a key indicator for fish and fish habitat, but the accumulation of contaminants in sediment porewater without habitat alteration is similar to the key indicator 'change in surface water quality from baseline conditions' that is considered.</p> <p>Rationale: It is not clear whether sediment was just considered for physical disturbance, and why chemical changes are missing from key indicator list for fish and fish habitat.</p> | Please provide the rationale for exclusion of sediment quality from the key indicator list for fish and fish habitat. | | Accepted |
| IR-120 | - | CNSC | Aquatic species | Section 8.3.3 and 8.5, Aquatic Environment | <p>Context: Although downstream impacts are not predicted by Denison it is important from an ecosystem perspective to establish baseline locations to monitor for potential cumulative effects to the aquatic environment due to the Key Lake and Wheeler River Operations to ensure the aquatic environment is being protected from cumulative impacts.</p> <p>Denison should consider adding a far-field exposure location and collecting baseline aquatic ecosystem baseline data in Russell Lake including:</p> <ul style="list-style-type: none">• Water quality/chemistry• Sediment chemistry/quality• Benthic invertebrate chemistry /community• Large-bodied fish tissue/chemistry <p>Rationale: Russell Lake is identified as part of the RSA for the aquatic environment, but it appears that no detailed aquatic baseline data was completed in far-field location in Russell Lake. In addition, several Indigenous Nations and communities and local resource users have indicated that Russell Lake is an important body of water both culturally for traditional use and was once used as commercial fishery.</p> | <p>If Denison has not collected baseline aquatic studies in the far-field downstream receiving environment of Russell Lake, please provide a rationale for why.</p> <p>If a far-field Russell Lake location was sampled as part of baseline data collection, more information about the process and results with regards to sampling at Russell Lake should be included in the EIS. This information would be valuable to help determine potential cumulative effects downstream in the Russell Lake drainage system (due to the Key Lake Operation) which has been identified as a key concern and area of interest by several Indigenous Nations and communities.</p> | Response is accepted, but also see AD-51 in the Advice to Proponent table. | Accepted |
| IR-121 | - | CNSC | Fish and fish habitat | Section 8.3.3.1, Methodology and Metrics | <p>Context: In the description of methodology for fish communities and spawning surveys, there’s no mention that could be found for an any evaluation of fish condition, other than sexual condition.</p> <p>Rationale: Exposure to other pre-existing stressors could result in abnormal conditions or deformation(s) in existing population, but the extent of existing conditions should be evaluated to ascertain whether the rate is increasing as a result of proposed activities once in operation.</p> | Please provide reference to where fish condition is considered or provide a justification for its exclusion. | Response is accepted, but also see AD-52 in the Advice to Proponent table. | Accepted |
| IR-122 | - | CNSC | Fish and fish habitat | Section 8.3.8, Monitoring and Follow-up | <p>Context: Section 8.3.8 of the EIS states: “Changes in fish communities/populations will be assessed through comparison of Construction, Operation, and Decommissioning results to pre-development.”</p> <p>Rationale: Tracking changes in fish communities / populations in reference lakes over time should be conducted, as reference lakes can be used to differentiate natural temporal variation with potential project impacts.</p> | Please include reference lakes, and if it is provided, please reference where in the EIS these are discussed. If there are no reference lakes, these should be included in the monitoring program. | Response is accepted, but also see AD-53 in the Advice to Proponent table. | Accepted |

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| IR-123 | - | ECCC | Change to an environmental component due to radiological contaminants | Section 8.4.3.2.3, Aquatic Environment Appendix 8-D, Table 3-5 | <p>Context: Table 8.4-3 provides a summary of the baseline concentrations of COPCs in sediments in the LSA. Sediment quality thresholds and justification for the selection of those thresholds have not been provided. Table 3-5 in Appendix 8-D does provide benchmarks but the selection of benchmarks is not discussed, and the most stringent guidelines are not used for some COPCs. Additionally, there is no data provided for sediment concentrations of mercury, which is a COPC that requires surface water quality monitoring and effluent characterization under the MDMER.</p> <p>Rationale: Further information should be provided regarding any exceedances of sediment quality thresholds in baseline concentrations of COPCs, which should be recommended for further assessment of risk due to effluent discharges.</p> | <p>1. Provide sediment quality thresholds and justification for the selection of those thresholds for comparison against measured baseline COPC concentrations in the LSA.</p> <p>2. Provide data on baseline concentrations of mercury in sediment.</p> <p>3. Identify any COPCs with baseline concentrations that exceed sediment quality thresholds in the LSA.</p> | | Accepted |
| IR-124 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.4.4.2.3, Aquatic Environment | <p>Context: Table 8.4-7 provides maximum concentrations of surface water COPCs in sediment. The following COPCs, which are required to evaluate the risk from effluent to sediment quality, were not evaluated:</p> <ol style="list-style-type: none">1. COPCs that have monitoring requirements in receiving environment surface water and effluent under the MDMER,2. COPCs that exceed water quality guidelines in effluent, and,3. COPCs that have baseline concentrations that exceed sediment quality thresholds in the receiving environment. <p>Rationale: Due to the lack of information on COPCs with baseline concentrations that exceed sediment quality guidelines, and COPCs that require monitoring under the MDMER, a determination on risk to sediment quality and aquatic biota cannot be made.</p> | <p>1. Provide the information on baseline exceedances of COPCs in sediment.</p> <p>2. Provide an assessment of risk for any COPCs that have baseline exceedances of sediment quality thresholds in the receiving environment.</p> <p>3. Provide an assessment of risk from any COPCs that require monitoring in the receiving environment and effluent under the MDMER. Please include any COPCs in effluent that will exceed water quality guidelines.</p> | <p>This response has not been accepted.</p> <p>An updated risk assessment for COPCs that requires monitoring under the MDMER with effluent concentrations that exceed guidelines has not been completed. This information is necessary to facilitate the determination on risk to sediment quality and aquatic biota.</p> <p>See also follow-up IR-124-R1.</p> | Not Accepted |
| IR-124 | IR-124-R1 | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.4.4.2.3, Aquatic Environment IR-124 Response from Denison | <p>Context: In the Proponent’s response it is stated, “Schedule 5 parameters will be monitored as per the MDMER once under this regulation (i.e., meeting regulated criteria of discharge to the environment [50 m3/day). Please refer to Table 8.2-13 of attachment IR-114. In these cases, COPCs including Schedule 4 parameters were below screening criteria.”</p> <p>If concentrations of Schedule 5 parameters in effluent exceed water quality thresholds, these parameters are necessary for ECCC to examine in the risk assessment to determine the potential for effluent to be acutely lethal and for adverse effects to aquatic biota. These parameters will also be required to be characterized under Section 4, 5 and 7 of the MDMER. As per CSA N288.6-22 Section 7.2.5.2.1, “Screening of environmental concentrations of chemical and radiochemical substances released to the environment should be performed to identify COPCs for further evaluation in the risk assessment. Both measured concentrations and concentrations calculated from release rates may be used in the screening analysis. The screening concentrations should be compared to screening criteria, and chemicals that exceed screening criteria should be identified as COPCs.”</p> | Provide an assessment of risk from any MDMER Schedule 5 parameters that are required to be characterized in effluent and in surface water quality in the receiving environment and that have effluent concentrations that will exceed water quality guidelines derived from environmental baseline conditions. | | Follow-Up IR |

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| | | | | | <p>As per CSA N288.6-22 Section 7.2.5.4.2, “If COPCs exceed the screening level for one medium, they should be carried forward into the EcoRA for all media that are likely to contribute to exposure. For example, for a given COPC, if a water screening benchmark is exceeded, the same COPC should be carried forward for sediment if its concentration was above the detection limit.”</p> <p>Additionally, updated Table 8.2-13 of attachment IR-114 has been found to be insufficient due to maximum concentrations in surface water for mercury, aluminum, total suspended solids, iron, thallium, manganese, nitrate and phosphorus being absent and the use of incorrect water quality thresholds.</p> <p>Rationale: Due to the lack of information on COPCs with concentrations that exceed water quality thresholds in effluent, a determination on risk to sediment quality and aquatic biota cannot be made.</p> | | | |
| IR-125 | - | CNSC | Fish and fish habitat | Section 8.5, Aquatic Environment and Fish health | <p>Context: Indigenous Knowledge studies and information collected in relation to the Project clearly identified the importance of water quality and fish health to local Indigenous peoples and is discussed throughout the Draft EIS. For example:</p> <ul style="list-style-type: none">“Russell is one lake where I commercially fish. How will this effluent impact the water quality, fish health? Will I be able to sell fish from here? If there is going to water” pollution, I just want to know” (19-LK-ERFNTrip-134.255) ““How are you going to protect the water quality? We are concerned about mercury in fish, other animals, etc. Is there mercury or arsenic in the uranium solution?” (p. 8-53) <p>Rationale: Several Indigenous Nations and communities and local resources users have indicated Russell Lake is an important body of water both culturally for traditional use and was used as commercial fishery in the past and from an aquatic ecosystem perspective.</p> | <p>One of the many mitigation measures mentioned throughout the aquatic environment section states:</p> <p>“Denison will work with the associated communities to develop and implement the Project-specific monitoring programs and a framework to share the results for the purpose of assessing the performance of the water management system.” (p.10-32)</p> <p>Has Denison considered the collection of additional baseline fish tissue species that are of importance to Indigenous Nations and communities and local cabin owners from Russell Lake? Assuming the species would be walleye (commercially and recreationally) and lake white whitefish that is traditionally an important species consumed.</p> <p>Please provide more information on the engagement to date on the development of the Surface Water Management Program and Monitoring program that Denison is developing and engagement to date with interested Indigenous Nations and communities in the region on fish and fish health.</p> | Response is accepted, but also see AD-51 in the Advice to Proponent table. | Accepted |
| IR-126 | - | ECCC | Aquatic species | Section 8.5.3 Appendix 10-A (ERA), Section 5.3.1.1.8 | <p>Context: The Proponent has used the US Environmental Protection Agency (US EPA) guidelines for the assessment of selenium fish tissue concentrations in Section 8.5.3 of the draft EIS and in the Environmental Risk Assessment (ERA) in Appendix 10-A (ERA) of Section 10.</p> <p>Rationale: ECCC’s Federal Environmental Quality Guidelines of 6.7 ug/g dry weight fish whole body tissue for selenium should be used, as it is more protective than the US EPA guidelines.</p> | Update the selenium fish tissue assessment in the draft EIS and the Wheeler River ERA (Appendix 10-A (ERA) in Section 10) as needed using ECCC’s FEQG. | <p>This response has not been accepted.</p> <p>The selenium fish tissue assessment has not been updated to reflect the ECCC Federal Environmental Quality Guidelines (FEQG). A predicted effluent concentration of 0.042 mg/L of selenium has been provided for the Project (updated Tables 8.2-9 and 8.2-10 Attachment IR-114 Denison’s Response). ECCC acknowledges that the Proponent prefers the use of the US EPA guidelines due to the ability to perform fish tissue muscle TRV, however, Environmental Effects Monitoring (EEM) would require a study on fish tissue selenium whole- body or egg-ovary concentrations. The current baseline data will not be comparable to future EEM studies using fish tissue muscle concentrations of selenium and US EPA guideline methodology. There is</p> | Not Accepted |

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| | | | | | | | <p>currently EEM guidance under development for conducting selenium fish tissue sampling in fish populations that will utilize the FEQG which applies to fish tissue egg-ovary and whole-body concentrations of selenium. Additionally, the Proponent has made a commitment to utilize the most stringent guidelines available.</p> <p>Based on the Project’s proposed effluent concentrations of selenium, fish tissue sampling will be required as part of the EEM monitoring for the Project. The ECCC FEQG is the guideline applied to these studies, and the current use of this guideline will facilitate the comparison to future monitoring studies.</p> <p>Furthermore, the Proponent has not provided sufficient explanation in their response for the use of the less stringent US EPA guideline compared to the more conservative FEQG.</p> <p>The Proponent should explain their use of the US EPA guidelines over the ECCC FEQG or update the selenium fish tissue assessment in the draft EIS and the Wheeler River ERA as needed using ECCC’s FEQG.</p> <p>As noted in IR-126, please update the selenium fish tissue assessment in the draft EIS and the Wheeler River ERA (Appendix 10- A (ERA) in Section 10) as needed using ECCC’s FEQG. If the FEQG will not be used, provide further rationalization for the use of the US EPA guidelines when creating the study on fish tissue selenium concentration in the EEM.</p> | |
| IR-127 | - | CNSC | Aquatic environment | Appendix 8-E, Section 1.2.1, Hydrological Inputs | <p>Context: Within this section it states that the 7Q10 low flow rate used in the mixing assessment “was provided verbally to Ecometrix by NewFields Canada during a project meeting on 26 April 2022”</p> <p>Rationale: The statement that this value was provided verbally is not an infallible method of communicating data, as the value could have been misheard, misremembered, or recorded improperly.</p> | Please verify that the 7Q10 value used in the assessment is the correct value determined by NewFields. | | Accepted |
| IR-128 | - | CNSC | Current use of lands and resources for traditional purposes | Section 9 Various pages in section 11.1, Land and Indigenous Resource Use Section 12 Section 14 | <p>Context: The increased road traffic (14-18 trucks per day during construction/operations) may have indirect impact on ungulates, furbearers and wood land caribou presence/absence for traditional and subsistence hunting have been raised to CNSC staff when meeting with Indigenous Nations and communities and are presented in the EIS.</p> <p>Rationale: The increased traffic and therefore dispersal of game (moose, woodland caribou) due to increased traffic has been raised as a concern with respect to increased mortality on wildlife and decreased ability to practice traditional rights.</p> | <p>How have the potential residual impacts with respect to increased traffic and noise (due to current and future operations) been communicated to Indigenous Nations and communities who use the road #914 for cultural and traditional activities (such as moose harvesting, berry picking and small game and birds)?</p> <p>Please provide any additional information on the engagement that has taken place to date with Indigenous Nations and communities with respect to concerns and potential impacts on current use of lands and resources due to increased road traffic, and any mitigation measures proposed by Indigenous Nations and communities to minimize the potential impacts.</p> | Response is accepted, but also see AD-54 in the Advice to Proponent table. | Accepted |

| Original IR# | Follow-Up IR # | SME | Project Effects Link | Reference to EIS, appendices, or supporting documentation | Context and Rationale | Information Requirement (IR) | Rationale for Status | Status |
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| IR-129 | - | CNSC | Current use of lands and resources for traditional purposes | Section 9 Section 10 Section 11, including Section 11.1.4.3.1 (p. 11-46) Section 12 Section 16 | <p>Context: ERFN indicated they are concerned about declining moose populations from an influx of hunters; more people may be accessing the area year after year, and worried populations may be affected by the Project (21-EN-ERFN-473.13).</p> <p>Further, the EIS highlights that: “Vehicle collisions are the most likely source of direct mortality for moose. Effective mitigation measures (e.g., breaks in snowbanks; speed limits; and exclusion fencing around contaminated waste pads and ponds) will be implemented to reduce moose mortality.” (p. 11-46)</p> <p>Rationale: The Technical Guidance for Assessing the Current Use of Lands and Resources for Traditional Purposes under CEEA 2012 notes: “The views of affected Aboriginal groups on mitigation be considered and included in the EIS. This could assist in ensuring that the environmental effects on the current use of land and resources for traditional purposes are at an acceptable level for the community.”</p> <p>Sources for indirect moose mortality (e.g., increased hunter access, changes to health due to sensory disturbances, changes to predator-prey dynamics) may result in mortality outside the Wildlife LSA. The residual effect of change in moose mortality is likely to occur. Although mitigation measures are expected to reduce, but not fully eliminate, the residual effect on moose.</p> <p>The potential residual impact on the moose and other large game populations in the broader regional study area may potentially impact Indigenous treaty rights, culture, and community well-being if the harvesting of moose and large game declines due to increased traffic, noise, and vehicle mortality or increased outside hunting pressure.</p> | <p>Please provide additional information on the discussions Denison has had with Indigenous Nations and communities on how to mitigate any residual project impacts on their traditional harvesting activities of large game such as moose.</p> <p>More information is required to determine if Denison has engaged directly with ERFN/KML and other Indigenous Nations who utilize the area to harvest moose to determine current baseline harvest numbers that provide subsistence, continued cultural identity and community well-being, as well as discussions on how the Project could potentially impact moose populations and the harvesting of moose for traditional practices.</p> | Response is accepted, but also see AD-62 in the Advice to Proponent table. | Accepted |
| IR-130 | - | H. Mulye | Physical stressors (noise and vibration) on wildlife | Section 9, Terrestrial Environment | <p>Context: Sensory disturbances such as noise have been identified as stressors for selected wildlife (Ungulates, Furbearers, and Woodland Caribou), birds and amphibians in the Project area. However, there is no consideration of impacts from vibrations on these species. Also, impacts of noise and vibration on reptiles have not been assessed in the Project area.</p> <p>Rationale: While noise has been qualitatively assessed for selected wildlife, birds, and amphibians, there is no consideration of project-related vibrations as a sensory disturbance/physical stressor. Sensitive terrestrial species (specifically, herpetofauna, amphibians, invertebrates, and caribou) can be impacted by vibrations emanating from the operation of heavy machinery, blasting activities, and other anthropogenic activities at the Project site.</p> <p>Also, impacts of physical stressors (noise and vibration) on reptiles were not assessed. These species should be included in this assessment due to their sensitivity to noise and vibrations.</p> | <p>Please provide a discussion of impacts of physical stressors (specifically vibrations) on wildlife, birds, and amphibians in the Project area. Specific mitigation measures and/or monitoring for impacts from project-related vibrations should be considered, as appropriate.</p> <p>Also, include reptiles in the assessment of project-related noise and vibrations as sensory disturbance/physical stressor, or a justification for their exclusion.</p> | <p>This response has not been accepted.</p> <p>Denison has agreed to update the final EIS (Sections 9.3 and 9.4) to include vibration as a physical stressor to fauna in the project area.</p> <p>Please provide proposed text for the revised EIS, for SME review and acceptance.</p> | Not Accepted |

| Original IR# | Follow-Up IR # | SME | Project Effects Link | Reference to EIS, appendices, or supporting documentation | Context and Rationale | Information Requirement (IR) | Rationale for Status | Status |
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| IR-131 | - | ECCC | Migratory birds, Wildlife and Wildlife Habitat | Section 9, Terrestrial Environment | <p>Context and Rationale: As per the requirement outlined in Section 79 of the Species at Risk Act (SARA): <i>The person must identify the adverse effects of the project on the listed wildlife species and its critical habitat and, if the project is carried out, must ensure that measures are taken to avoid or lessen those effects and to monitor them. The measures must be taken in a way that is consistent with any applicable recovery strategy and action plans. This is accomplished by ensuring that the Proponent has identified, avoided, lessened and will monitor effects to species at risk.</i></p> <p>As per the CNSC’s Generic Guidelines for the Preparation of an EIS pursuant to the Canadian Environmental Assessment Act, 2012: “<i>The EIS will then describe mitigation measures that are specific to each environmental effect identified. Measures will be written as specific commitments that clearly describe how the Proponent intends to implement them and the environmental outcome the mitigation is designed to address. The EIS will describe mitigation measures in relation to species and/or critical habitat listed under the Species at Risk Act (SARA). These mitigation measures will be consistent with any SARA permit, applicable recovery strategy and/or action plan</i>”.</p> <p>The draft EIS neither lists the adverse effects to all listed schedule 1 SARA species, nor outlines the measures that will be taken to avoid or lessen these effects. The Proponent references that additional species-specific mitigations will be detailed in environmental management plans but has not provided those plans for review.</p> | Identify all species at risk listed on Schedule 1 of the Species at Risk Act and their critical habitat that are likely to be affected by the Project and describe how they may be adversely affected by the Project. Describe what measures will be taken to avoid or lessen the effects of each Project activity and stage, and how these effects will be monitored to ensure they are avoided or minimized. | | Accepted |
| IR-132 | - | ECCC | Wildlife and Wildlife habitat | Section 9, Terrestrial Environment | <p>Context and Rationale: ECCC has identified that three species at risk arthropods (yellow banded bumble bee, transverse lady beetle, and nine-spotted lady beetle) have ranges overlapping the Project area and these were not mentioned in the draft EIS.</p> | 1.Conduct an effects assessment for arthropod species at risk. 2. Explain what mitigation measures will be used to minimize potential effects. | | Accepted |
| IR-133 | - | ECCC | | Section 9, Terrestrial Environment | <p>Context and Rationale: There is potential for some species at risk (e.g., myotis species, barn or bank swallows, common nighthawk) to be attracted to and use mine infrastructure (buildings, roads etc.) once constructed for nesting, roosting, or foraging.</p> <p>Details on mitigation measures and adaptive management with respect to attraction to Project components should be identified to assess residual and cumulative impacts to species at risk.</p> | For all Project phases, describe the mitigation measures and adaptive management to prevent and minimize effects on species at risk that may utilize mine infrastructure. | | Accepted |
| IR-134 | - | ECCC | Wildlife and Wildlife habitat | Section 9, Terrestrial Environment | <p>Context and Rationale: The draft EIS states in multiple places that vegetation clearing may occur year-round.</p> <p>In order to correspond with the timing of emergence from hibernation, tree clearing should not be conducted during the bat roosting period. If maternity roost trees are removed after pregnant females have established a roost</p> | Provide important roosting dates for bat species at risk in the Project area. | <p>The Proponent provided a complete response regarding the roosting dates for bat species at risk, however follow-up IRs are required.</p> <p>See follow-up IR-134-R1.</p> | Accepted |

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| | | | | | area, there is a higher likelihood of abortion than there would be otherwise. Species-specific mitigations are required to protect bat SAR. | | | |
| IR-134 | IR-134-R1 | ECCC | Wildlife and Wildlife habitat | Section 9, Terrestrial Environment | <p>Context: The Proponent has committed to conduct pre-construction and pre-clearing surveys for multiple species, however the timing and methods for the surveys were not provided. Knowing the survey methodology for pre-construction and pre-clearing for little brown myotis and northern myotis is important for assessing cumulative impacts, effectiveness of adaptive management strategies as well as determining how bat species were considered in the EIS.</p> <p>Rationale: ECCC can determine whether the methodology the Proponent will use to collect data is appropriate and if the methodology would contribute to a more complete understanding cumulative effects and adaptive management strategies.</p> <p>A clear outline of how timing has been considered and incorporated into the methodologies is required to understand how sensitive periods for bats, such as roosting, have been considered in the EIS. An understanding of the methodologies and how these sensitive periods are being considered is required to evaluate the effectiveness of mitigation strategies and adaptive management strategies which are being developed by the Proponent.</p> | The information provided by the Proponent regarding the roosting dates and potential habitat for bats is complete, however, the information related to the pre-construction and pre-clearing surveys is missing details on important habitat features for bat species at risk. As two Species at Risk Act (SARA) schedule 1 listed bat species, little brown myotis (<i>Myotis lucifugus</i>) and northern myotis (<i>Myotis septentrionalis</i>) have been identified in the Project area, effects need to be identified, avoided, lessened and monitored. | | Follow-up IR |
| IR-135 | - | ECCC | Migratory birds, Wildlife and Wildlife Habitat | Section 9, Terrestrial Environment | <p>Context and Rationale: The mitigation measures for birds and wildlife presented in the draft EIS are very general. Additional detail is required for a complete assessment of residual and cumulative Project effects to birds and wildlife.</p> <p>The Proponent has committed to providing a number of plans including, a Decommissioning Plan, a Spill Response Plan, a Waste Management Plan, a Surface Water Monitoring Plan, a Remediation and Closure Plan, a Radiation Protection Plan, a Soil and Vegetation Monitoring Plan, a Wildlife Monitoring Plan, and a Woodland Caribou Management Plan. In order to assess potential affects to migratory birds and wildlife from Project related activities, ECCC requires details on species-specific mitigation measures, and monitoring plans.</p> | <p>The following information should be included in the various plans and should be provided for review during the environmental assessment:</p> <p>1. For all Project phases, describe the species-specific mitigation measures and responses to prevent and minimize effects on migratory birds or species at risk (SAR) birds and mammals that may utilize mine infrastructure.</p> <p>2. Explain how light pollution will be managed and what specific mitigation measures will be used to minimize effects to migratory birds and SAR birds and mammals.</p> <p>3. Provide details on what methods will be used for erosion control and how they will prevent sediment from entering waters frequented by migratory birds or SAR. Explain what actions will be taken if the erosion control measures are not successful.</p> <p>4. Provide details on noise and other sensory disturbance monitoring and mitigations if noise levels surpass thresholds.</p> <p>5. Describe time windows and species- specific mitigations related to maintenance activities such as vegetation management, road or building repair and stream crossing replacements.</p> | | Accepted |

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| IR-136 | - | CNSC | Soil Salvage Monitoring | Section 9.1.8.2 | <p>Context: The Proponent plans to salvage and stockpile soil and organic matter/peat in order to use it in reclamation activities during decommissioning. Periodic monitoring of the stockpiles is proposed to be conducted to verify that soil and organic matter/peat are delineated, stripped, handled, and stockpiled as recommended, and to evaluate the stability of salvaged soil, e.g., in relation to potential erosion and/or degradation. It is unclear whether monitoring includes soil quality in terms of concentrations of COPCs.</p> <p>Rationale: It is expected that project-related activities (road and airport traffic, drilling) can result in open-source (i.e., fugitive) dust and process-source dust (incl. radionuclides), which can accumulate and result in changes in soil quality of the stockpiled soil and organic matter/peat as described in Sections 9.1.4.2.2 and 9.1.4.2.3).</p> | Please clarify if COPC concentrations monitoring is planned to be performed for stockpiled soil and organic matter/peat. | | Accepted |
| IR-137 | - | ECCC | Migratory birds, Wildlife and Wildlife Habitat, Vegetation and Wetlands | Section 9.2.1.3, Spatial and Temporal Boundaries for Vegetation and Ecosystems, Listed Plant Species and Wetlands Section 9.3.1.3.1, Spatial Boundaries for Ungulates, Furbearers and Woodland Caribou 9.4.1.3.1, Spatial Boundaries for Raptors, Migratory Breeding Birds, and Bird Species at Risk | <p>Context and Rationale: The CNSC’s Generic Guidelines for the Preparation of an EIS Pursuant to the Canadian Environmental Assessment Act, 2012 states that: “The EIS will describe the spatial boundaries, including local and regional study areas, for each VC to be used to assess the potential adverse environmental effects of the Project and provide a rationale for each boundary.</p> <p>Spatial boundaries will be defined taking into account the appropriate scale and spatial extent of potential environmental effects, community knowledge and Indigenous knowledge, current or traditional land and resource use by Indigenous groups, ecological, technical, social and cultural considerations.”</p> <p>The information provided in the EIS does not enable a biologically relevant assessment of the Project’s effects.</p> <p>The Proponent did not provide rationale for the selection of study areas for individual vegetation, wildlife or migratory bird valued components (VC). Different VCs may have different spatial boundaries for the LSA and/or RSA. For wildlife and bird VCs, the LSA is defined as a 1.7-km buffer from the Project area, and the RSA is defined as a 6.6-km buffer around the LSA. There is no information on how the spatial boundaries were derived.</p> <p>Specific to Woodland Caribou, boreal population (hereafter referred to as boreal caribou):</p> <p><u>Project Footprint:</u> In a scientific assessment of critical habitat (Environment Canada, 2011) [1] ECCC demonstrated that the application of a 500-m buffer to mapped anthropogenic features best represents the combined effects of increased predation and avoidance on caribou population trends at the national scale. Adding a 500-m buffer to the Project footprint is required to represent functional habitat loss.</p> | <p>Provide a biologically relevant rationale for the delineated study boundaries (LSA and RSA) for all different valued components. Include the following information:</p> <ul style="list-style-type: none">Descriptions of how the RSA and LSA boundaries were derived for all VCs. <p>Specific to boreal caribou:</p> <p><u>Project Footprint:</u></p> <ul style="list-style-type: none">Include a 500-m buffer of area of maximum physical disturbance to represent functional habitat loss for boreal caribou <p><u>LSA:</u></p> <ul style="list-style-type: none">Include a description of how the LSA takes into account boreal caribou avoidance of disturbed areas, predator access to undisturbed areas, reduction in connectivity and sensory disturbance to individuals. <p><u>RSA:</u></p> <ul style="list-style-type: none">Include a description of how the RSA used in the draft EIS is an accurate representation of the SK1 boreal caribou range; orRe-do the assessment with the RSA at the scale of the range <p>See also related IRs: IR-154 and IR-156.</p> | <p>This response has not been accepted.</p> <p>A biologically relevant explanation for the chosen RSA for caribou was not provided. It is not clear if the RSA is representative of the SK1 range for factors such as variability and biophysical features. Describe how the RSA used in the draft EIS is an accurate representation of the SK1 boreal caribou range. This clarification is necessary to ensure the RSA is representative of the entire SK1 Caribou range, including the natural variability of the landscape, and to assess any project effects that may be affected by an inaccurate RSA. It is also required to verify the Proponent’s assessment of cumulative impacts to caribou.</p> <p>See also AD-56 in the Advice to Proponent table.</p> | Not Accepted |

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| | | | | | <p>The draft EIS does not appear to use a buffer for their Project area. The draft EIS (Section 9.3.1.3.1) states: “Project Area: the area within which the Project and all components/activities are located (i.e., the area of maximum physical disturbance). The Project Area covers 169.6 ha and is not VC-specific, but consistent throughout the EA.” (p. 9-168)</p> <p><u>LSA</u>: The defined LSA for boreal caribou has to consider avoidance of disturbed areas, predator access to undisturbed areas, reduction in connectivity and sensory disturbance. This required information is not detailed in the draft EIS.</p> <p>Adverse effects of Projects including predator and prey access to undisturbed areas, reduction in connectivity, and sensory disturbance to individual boreal caribou can vary and extend several kilometers depending on Project activities and ecological context. At minimum, the LSA should capture the above- mentioned effects. For boreal caribou, the Project footprint should be defined as the immediate area to be cleared, plus a 500-m buffer to represent functional habitat loss. Following this guidance, the LSA should be defined as a buffer of the Project footprint with the 500-m buffer.</p> <p><u>RSA</u>: The Amended Recovery Strategy for Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada states: <i>Mitigation of adverse effects from individual projects/activities will require a coordinated approach and management of cumulative effects within and among ranges. A cumulative effects assessment is essential to position the proposed project/activity in the context of all current and future development activities. The cumulative effects assessment will:</i></p> <ul style="list-style-type: none">• <i>Assess the impact of all disturbances (anthropogenic and natural) at the range-scale;</i>• <i>Monitor habitat conditions, including the amount of current disturbed and undisturbed habitat, and amount of habitat being restored;</i>• <i>Account for planned disturbances; and</i>• <i>Assess the distribution of disturbance in large ranges for risk of range retraction in parts of the range.</i> <p>The proposed Project’s cumulative effects for boreal caribou are possible at the scale of the SK1 boreal caribou range. The RSA used for boreal caribou for this Project is only 40,173.6 ha, compared to the SK1 range, which is 18,034,870 ha. As such, it is too small to capture cumulative effects to this species and does not follow the Scientific Assessment to Support the Identification of Critical Habitat for Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada (Environment Canada, 2011) or the Amended Recovery Strategy for Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada.</p> | | | |

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| | | | | | Reference: [1] Scientific Assessment to Support the Identification of Critical Habitat for Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada (Environment Canada, 2011). | | | |
| IR-138 | - | CNSC | COPC in Lichen | Section 9.2.4.2.2 Appendix 10-A (ERA) | Context: A quantitative assessment using modelling dispersion and uptake of COPCs in the environment was completed for the Project as part of the ERA, to support conclusions drawn in the EIS. In Appendix 10-A (ERA), COPCs in plant tissue was estimated for lichen. Table 5-5 of the ERA (p. 5.24) named “Complete Exposure Pathways for All Selected Ecological Receptors to be Assessed using the IMPACT Model” lists the exposure pathway for lichen as direct contact on soil. Rationale: Airborne COPC can deposition on lichen and subsequently enter the food chain; therefore, the “contact with air” pathway should be considered. In fact, lichen species are frequently used to monitor the deposition and accumulation of airborne contaminants (e.g., dust, metals). It is also noted that based on sampling results of the 2017 baseline studies, lichen frequently contain higher concentrations of COPC than blueberry (compare Table 9.2-6 and Table 9.2-7 in the EIS), especially at sampling sites with elevated concentrations (e.g., RSV9 and RSV10). | Please include the exposure pathway of direct deposition (dry and wet) of airborne contaminants on lichen in the quantitative ERA, or justify why this exposure pathway was not considered. See also related: IR-189. | | Accepted |
| IR-139 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 9.2.5.2.7, Waste and Hazardous Materials Management | Context: In this section, the Proponent outlines various measures to mitigate air emissions, including implementation of the air quality programs within the Environmental Management System, regular maintenance and inspection of equipment, and elimination of unnecessary idling of equipment. However, the intention to use industry-standard emission control systems has not been substantiated. Rationale: For the protection of air quality, it is important to specify the emission standards that equipment will have (e.g., Tier 3 or Tier 4 engines). Vehicles and equipment with Tier 4 engines have much lower emissions of contaminants than those with Tier 3 engines. If non-Tier 4 engines are used, ECCC recommends that best management practices are followed, including proper maintenance of the engine and anti-idling measures. | Confirm if vehicles and equipment will be equipped with Tier 4 engines where feasible. | Response is accepted, but also see AD-55 in the Advice to Proponent table. | Accepted |
| IR-140 | - | CNSC | Change in the Areal Extent of Wetlands | Section 9.2.6.4 | Context: Predicted residual effects on the areal extent of wetlands include the direct effect of loss of wetlands and several indirect effects of alteration of wetlands. As stated in the EIS, wetlands can exhibit low resilience and high susceptibility to disturbance. At the same time, wetlands tend to support a high species diversity, and are considered to have a moderate to high potential to support listed plant species. Lastly, wetlands are rare on the landscape compared to terrestrial ecosites (see Table 9.2-5). Rationale: Several wetland ecosites (BS19/24, BS25, BS27) occur only in small areas (< 30 ha) in the RSA but are predicted to experience disturbance of 6-64%, most notably the ecosite BS19/24 where 0.8 of 1.2 ha are | 1. Please provide a discussion on the ecological impact of disturbance to rare wetland ecosites. 2. Please provide information on whether adequate other habitat is available for species impacted in these disturbed sites in close proximity, taking into account the home ranges of susceptible species. 3. Please provide additional information on whether wetland connectivity is maintained through the landscape within the LSA/RSA. See also related: IR-141. | | Accepted |

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| | | | | | predicted to be disturbed. It is noted that wetlands are scattered throughout the landscape as shown in Figure 9.2-8. More information is requested regarding the ecological impact of this disturbance. | Suggestions for mitigation and follow-up measures: CNSC recommends that Denison conduct monitoring of species present in wetlands before and after disturbance, with a focus on listed plant species. | | |
| IR-141 | - | ECCC | Wetlands | Section 9.2.6.4.1 | <p>Context and Rationale: The Proponent states that: “Direct loss of wetlands has been mitigated by reducing the size of the Project Area to the extent practicable during Project design.</p> <p>However, up to 0.5 ha (less than 0.1%) of all wetlands within the Terrestrial RSA are anticipated to be removed from the Project Area during Construction (Table 9.2-16).”</p> <p>Information is not provided on whether wetlands in the terrestrial RSA are considered ecologically, economically or socially important to the region. Information on the regional importance of the wetlands that will be lost is needed in order to assess effects, including a wetland compensation plan if the wetlands are considered regionally important.</p> | <p>1. Provide information that accounts for whether wetlands are considered ecologically, economically and socially important to the region.</p> <p>2. If the above is affirmative provide a wetland compensation plan to offset the loss. Consistent with the Operational Framework For Use of Conservation Allowance [1] a minimum ratio of 2:1 should be the starting point when determining the amount to be offset.</p> <p>[1] Available at : https://publications.gc.ca/site/eng/9.696852/publication.html</p> <p>See also related: IR-138.</p> | | Accepted |
| IR-142 | - | ECCC CNSC | Wildlife and Wildlife habitat | Section 9.3.3.2.1 Scientific Literature Review – Wolverine Section 9.3.5 Mitigation Measures Section 9.3.6 Residual Effects Evaluation | <p>Context: The Proponent did not conduct any field work to identify potential wolverine dens in the Project area and therefore did not present any mitigations for the potential impacts to wolverine dens.</p> <p>In Section 9.3.3.2.1, the Proponent states: “Denning females are sensitive to disturbance during denning season in February to April and may abandon their dens and, in some cases, their litter, which may decrease their reproductive success. “</p> <p>In Section 9.3.6, the Proponent states: “In the Project Area, 145.0 ha or 100% of available wolverine habitat is assumed to be removed and will not be available to wolverine for the duration of the Project (Table 9.3-13). Similarly, 145.0 ha (3.4%) of available wolverine habitat within the Wildlife LSA is anticipated to be removed, all from the Project Area, during site clearing in Construction. In the Terrestrial RSA, up to 0.5% (145.0 ha; from the Project Area) of available wolverine habitat is anticipated to be removed during site clearing in Construction.”</p> <p>The residual effect assessment estimates that 8.2% of available wolverine habitat within the Terrestrial RSA may be altered or lost (Table 9.3-20).</p> <p>Rationale: As Wolverine is a Species at Risk Act Schedule 1 listed species, effects need to be identified, avoided, lessened and monitored. Mitigations, such as setback distances, should be used to protect important habitat features, such as dens.</p> | <p>1. Please provide additional information on whether the lost and/or altered wolverine habitat overlaps with wolverine home ranges.</p> <p>2. Describe any important wolverine habitat feature (i.e., dens) that may be lost as a result of the Project.</p> <p>3. Assess the need for pre- construction/pre-clearing surveys to identify any wolverine denning sites.</p> <p>4. Please provide additional information on whether the remaining, available, undisturbed wolverine habitat size is suitable to maintain populations.</p> | <p>The information provided by the Proponent is complete, however, a follow up IR regarding survey methods for all pre-construction and pre-clearing surveys is required.</p> <p>See follow-up IR-142-159-167.</p> | Accepted |

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| | | | | | Wolverine occupy large home ranges and, therefore, need vast tracts of undisturbed land to maintain viable populations. The species avoids most human footprint types and linear features. | | | |
| IR-142 IR-159 IR-167 | IR-142-159-167-R1 | ECCC | Wildlife and Wildlife Habitat | Reference to EIS: Section 9.3.3.3, Baseline Studies Section 9.3.5 Mitigation Measures IR 142, 159, and 167 Responses from Denison | Context: The Proponent has committed to conduct pre-construction and pre-clearing surveys for multiple species, however the timing and methods for the surveys were not provided. Rationale: Knowing the survey methodology for pre-construction and pre-clearing surveys across multiple species is important because the Proponent is intending to collect data so that ECCC can determine whether the methodology used to collect the data is appropriate and if the methodology would contribute to understanding cumulative effects and adaptive management. Understanding how timing has been considered and incorporated into the methodologies is required to understand how sensitive periods, such as nesting, breeding, foraging and migration, have been considered in the EIS. An understanding of the methodologies and how these sensitive periods are being considered is required to evaluate the effectiveness of mitigation strategies and adaptive management being developed by the Proponent for each species mentioned in IR-142, IR-159 and IR-167. | Provide survey methodology and timing for all preconstruction and pre-clearing surveys, including avian and species at risk surveys (caribou, wolverine). | | Follow-Up IR |
| IR-143 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.3.3, Baseline Studies | Context and Rationale: The baseline caribou data is insufficient to understand potential Project impacts to this species. Presence/absence detection was provided by camera traps, incidental observations, winter track and pellet survey. Additional information and analyses on caribou use of the landscape during all life stages of the Project area is required to assess impacts and to determine significance of impact from the Project to caribou. | Provide details on the baseline caribou data including: <ul style="list-style-type: none">• Revision of map 9.3-8 to include all observations, categorized by type, season and year (see also IR-145); and• Description of seasonal use of the LSA, RSA and caribou range.• Description of Project areas used by caribou.• Description of future studies planned to assess habitat use by caribou. Include specific details on how many additional years of aerial surveys will be completed to assess the caribou baseline conditions. Utilizing additional data noted above and specified in IR-145, explain how caribou use of the area could be affected by the Project throughout all seasons and life stages (e.g., calving, post-calving, rutting, wintering). See also related: IR-152. | This response has not been accepted. The information provided by the Proponent is insufficient to understand potential Project impacts and appropriate mitigation that would be required. Information on important habitat features and how caribou are using the landscape is required to complete an accurate assessment of the Project impacts to caribou habitat and habitat use. In the absence of this information, ECCC will assume a conservative estimate that all habitat features are high value and are used for important life functions. Although the Proponent provided a map showing telemetry points (provided by the Province of Saskatchewan), this map doesn’t have sufficient detail to assess habitat use and important biophysical features of the Project area. These details are necessary to assess habitat use and important biophysical features of the Project area. See follow-up IR-143-144-R1 and IR-143-145-R1. | Not Accepted |
| IR-144 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.3.3, Baseline Studies – map 9.3-8 | Context and Rationale: The mapping of caribou observations during baseline studies provided in Figure 9.3-8, “Caribou Sign Observations in the Wildlife Study Areas,” is insufficient to enable conclusions to be drawn. ECCC is not able to review the spatial aspect of caribou observations without a map of all available observations. Additional information is available, as | Update map 9.3-8 to show all caribou observations during baseline studies, broken down by type of observation (camera, incidental, pellet, track) and season/year when the observation was made. Include additional data from the Province of Saskatchewan (see also IR-145) to help characterize caribou use on a spatial map. | This response has not been accepted. The information provided by the Proponent is insufficient to understand potential Project impacts to this species and characterize the risk to determine impacts from the Project to caribou and appropriate level of | Not Accepted |

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| | | | | | <p>stated in Section 9.3.3.3.3:</p> <p><i>“A total of 200 observations were made between 2017 and 2019 and recorded as either caribou sign (i.e., tracks, pellets, and evidence of feeding activity based on ground feeding craters and arboreal feeding evidence) or photographs (collected through the wildlife camera study) to document caribou presence in the LSA and RSA. Most observations occurred in the Terrestrial RSA, with observations concentrated in the north and southeast portions.</i></p> <p><i>Three observations occurred in the southeast portion of the Wildlife LSA, and no caribou sign was observed in the Project Area. Figure 9.3-8 provides an overview of some caribou sign observed during the baseline studies.”</i></p> | | <p>offsetting mitigation that would be required. The revised map 9.3-8 shows seasonal use, however, it is challenging to see the overlapping features. The map does not allow the reader to get a good understanding of the seasonality of the data. Due to the fact that caribou use different habitat types in differing ways over the course of a year, seasonality of the data will allow for a deeper understanding of habitat use.</p> <p>The scale provided on the current map does not allow for a proper assessment of seasonal use, including differentiation of habitat use.</p> <p>Individual maps by season and survey type with larger scale insets that show areas with overlapping points would help to clarify the map and allow for a greater understanding of spatial and temporal features of caribou habitat.</p> <p>See follow-up IR-143-144-R1.</p> | |
| IR-145 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.3.3, Woodland Caribou | <p>Context and Rationale: The Proponent has not provided sufficient information on how caribou use the landscape, including identification of areas for different life stages of caribou (calving, post-calving, rutting and wintering).</p> <p>The University of Saskatchewan published a report entitled Population and habitat ecology of boreal caribou and their predators in the Saskatchewan Boreal Shield. This report contains information on habitat types that are used during different life stages. Additionally, Appendix H of the Amended Recovery Strategy for the Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada 20202 [1] details habitat characteristics required by boreal caribou to carry out life processes necessary for survival and recovery.</p> <p>The scientific literature review (Section 9.3.3.3.1) on Woodland Caribou states: “While calving areas have not been documented within the SK1 range, it is recognized that caribou may use open fen and treed bog habitat types for calving during the spring/summer period. In Saskatchewan, caribou habitat used during the calving season in the SK2 range demonstrated a strong selection for treed muskegs, but avoidance of jack pine, mixed hardwood stands, and roads (Dyke 2008).”</p> <p>ECCC is not able to verify the Proponent’s effects assessment without sufficient information on important habitat or biophysical attributes for caribou within the study areas.</p> <p>[1] https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/recovery-strategies/woodland-caribou-boreal-2020.html#toc0</p> | <p>1. Provide, based off existing literature or available data and the Amended Recovery Strategy for Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada:</p> <ul style="list-style-type: none">information on known important habitat features or biophysical attributes in Project areas for different caribou life stages (calving, post-calving, rutting, wintering),a map(s) of the type and spatial extent of important caribou habitat features or biophysical attributes of the study areas as defined in Appendix H of the Recovery Strategy,<ul style="list-style-type: none">mapping should be at the RSA/LSA level as well as larger-scale mapping at the scale of the Project footprint. <p>2. Assess the potential direct and indirect effects based on additional information on caribou from bullet A above.</p> <p>See also related IRs: IR-143 and IR-152.</p> <p>Suggestions for mitigation and follow-up measures: ECCC recommends that the Proponent contact the Province of Saskatchewan to enquire about obtaining caribou telemetry data in the Project area. The data can be analyzed to determine important habitat features in the Project area.</p> | <p>This response has not been accepted.</p> <p>The map provided by the Proponent lacks spatial and temporal details needed to complete an assessment of habitat importance to caribou relative to the Project. The Proponent did not provide information or mapping on known important habitat features, habitat quality or biophysical attributes and mapping was not provided at the different scales as requested in the IR.</p> <p>ECCC recommends that the Proponent provide mapping of important caribou habitat features, such as those used for calving, wintering, and movement to assess how caribou utilize the landscape and assess potential impacts to caribou due to impacts to these areas. Knowing detailed data on caribou habitat use will contribute to identifying mitigation measures and potential offsetting.</p> <p>In the absence of telemetry data, mapping of habitat quality, based on a combination of known ecosites and known important biophysical features will provide a reasonable alternative, where known important caribou habitat features cannot be mapped.</p> <p>The provision of information on habitat use and biophysical features will facilitate the verification of the Proponent’s effects assessment.</p> <p>See follow-up IR-143-145-R1.</p> | Not Accepted |

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| IR-143 IR-144 | IR-143- 144-R1 | ECCC | Wildlife and Wildlife Habitat | Section 9.3.3.3, Baseline Studies IR-143 and 144 Responses from Denison | <p>Context: In the IR-143 response, the Proponent states: “As described in the EIS, caribou may use open fen and treed bog habitat types for calving during the spring/summer period. Information from Indigenous Knowledge (IK) was included in the EIS, including potential calving areas in the Terrestrial RSA.” The Proponent provided a revised Map 9.3-8 to display these features.</p> <p>Rationale: While the revised Map 9.3-8 shows seasonal use, it is challenging to see the overlapping spatial and temporal features. The map is not adequate for fully understanding the seasonality of the data. The scale provided does not allow for a proper assessment of seasonal use, including differentiation of habitat use such as calving, movement or wintering habitats.</p> <p>Some habitats, based on use, may be more used for more critical functions than others and this information cannot be adequately assessed based on the information provided.</p> | Provide individual maps by season and survey type or with larger scale insets that show areas with overlapping spatial and temporal features. | | Follow-Up IR |
| IR-143 IR-145 | IR-143- 145-R1 | ECCC | Wildlife and Wildlife Habitat | Section 9.3.3.3, Baseline Studies IR-143 and 145 Responses from Denison | <p>Context: Information presented on boreal caribou in the study areas in the Proponent’s response is insufficient to:</p> <ul style="list-style-type: none">• characterize and determine the risk of Project impacts,• and• calculate the appropriate level of offsetting required. <p>Information on important habitat features and how caribou are using the landscape is required to complete an assessment of the Project impacts.</p> <p>Although the Proponent provided a map showing telemetry points (provided by the Province of Saskatchewan), the map lacked sufficient detail to assess habitat use and important biophysical features of the Project area.</p> <p>The IR-145 response states: “Available habitat was determined as the ecosites in which caribou / caribou sign were detected most frequently during the baseline studies, and the EIS used a precautionary approach by assuming caribou use of these areas during all seasons and life stages.” As a part of the analysis, calving areas are particularly important to delineate if information is available as a key part of all life stages.</p> <p>In the draft EIS, the habitat types that are considered non-habitat for caribou are open bogs (BS20), leatherleaf shrubby fens (BS22), graminoid fens (BS24), open fens (BS25), rush sandy shorelines (BS26), sedge sandy shorelines (BS27) and waterbodies.</p> <p>Rationale: Woodland caribou are known to use treed bog and open fen (Section 9.3.3.3.1 of the draft EIS), however open fens and bogs are excluded from the identified available Woodland Caribou habitat, based on</p> | <p>1. Provide maps at the Project Development Area (PDA)/Local Study Area (LSA)/Regional Study Area (RSA) scale showing caribou habitat quality.</p> <p>2. Provide maps at the PDA/LSA/RSA scale showing areas with the appropriate biophysical attributes for calving and other life stages, such as important wintering habitats and movement corridors.</p> <p>Indicate the source of telemetry data (i.e., University of Saskatchewan and/or the Province of Saskatchewan).</p> | | Follow-Up IR |

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| | | | | | not detecting presence or not detecting presence as frequently. Mapping of important caribou habitat features is required to assess important potential impacts to caribou. In the absence of telemetry data, mapping of habitat quality, based on a combination of known ecosites and known important biophysical features will provide a reasonable alternative where known important caribou habitat features cannot be mapped. | | | |
| IR-146 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.3.3.1, Woodland Caribou, Scientific Literature Review - Predation | Context and Rationale: The information on impacts of predation and apparent competition for caribou in relation to the proposed Project are insufficient. In the section on caribou predators (9.3.3.3.1), the Proponent provided details on densities of wolves and their overlap with caribou and speaks of apparent competition. The Proponent did not examine other predators, such as black bear. The analysis on impacts of predation and apparent competition is insufficient since known predators have been omitted without explanation from the assessment of effects. ECCC is not able to verify the Proponent’s effects assessment since important species have not been considered in the assessment. | Provide further information and analyses on all potential predators of caribou, including impacts from apparent competition. | | Accepted |
| IR-147 | - | ECCC | SAR – Boreal Caribou | Section 9.3.4.2.1, Alteration and/or Loss of Habitat | Context and Rationale: The process of in-situ recovery mining will likely create changes to the surface topography and potential ground subsidence as well as changes to groundwater elevations. These changes can affect the plant communities and ecosite types. In Section 9.3.4.2.1 the Proponent states that: “Following decommissioning and reclamation, wildlife habitat is expected to recover to baseline conditions.” A more thorough explanation regarding post-decommissioning landscape is required to assess Project impacts. | 1. Provide further rationale and/or analysis regarding the return of wildlife habitat to baseline conditions post- decommissioning. Incorporate other environmental impacts including: <ul style="list-style-type: none">Ground subsidence and impacts on wildlife habitatChanges to aquifers and impacts on wildlife habitat 2. Describe reclamation activities/measures, including temporal information that will be implemented to help in the recovery to baseline conditions. | | Accepted |
| IR-148 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.4.2.1, Alteration and/or Loss of Habitat | Context and Rationale: ECCC analyzes disturbance for caribou at the range level, in this case within the SK1 range. However, the Proponent did not provide an adequate assessment of total disturbance at the range level. The draft EIS (Section 9.3.4.2.1 p. 9-211) reads: “The SK1 Boreal Shield Woodland Caribou Management Unit has relatively low levels of anthropogenic disturbance and was exposed to large fire disturbances in the past 40 years (ECCC 2019). Environment and Climate Change Canada (2019) identified this caribou population as being self-sustaining at a threshold of 40% undisturbed habitat with the total anthropogenic disturbance not exceeding 5% of their habitat. The current anthropogenic disturbance levels (without areas burnt by past forest fires) for the study areas are below this threshold (with the exception of the already disturbed Project Area) and are estimated | Provide the following in order to support analysis of habitat disturbance: <ol style="list-style-type: none">Calculation of total disturbance including natural and anthropogenic disturbance at the range level.Description of effects on existing habitat at the scale of the range (for < 40% undisturbed habitat in the SK1). Include:<ul style="list-style-type: none">an account (and GIS file if available) of existing habitat affected, using the following formula: (Project footprint + 500m buffer) – overlapping (permanent alteration(s) + 500m buffer)A map of the SK1 range showing all disturbed and undisturbed habitat, including predicted disturbance (direct and indirect) resulting from the Project. | This response has not been accepted, due to outstanding information related to #2. ECCC’s role is to provide advice to the CNSC under the Species at Risk Act and/or the Migratory Birds Convention Act to support compliance with these pieces of legislation in their decision making. Having access to project study area shapefiles allows ECCC to do their due diligence in validating any overlapping Critical Habitat, important habitat features, species at risk ranges, migratory birds ranges and other potentially important local or landscape characteristics. Obtaining project shapefiles from proponents is standard practice for our analysis of environmental impacts of projects. | Not Accepted |

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| | | | | | <p>as: 24.8 ha (14.6%) for the Project Area, 168 ha (3.5%) for the Wildlife LSA, and 599 ha (1.5%) for the Terrestrial RSA.”</p> <p>Analysis of habitat disturbance should be calculated at the range level in order to assess impacts and determine significance.</p> <p>Analysis should be consistent with the methodology described in the document Scientific Assessment to Support the Identification of Critical Habitat for Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada (Environment Canada, 2011) [1].</p> <p>[1]https://publications.gc.ca/site/eng/401605/publication.html, p. 28/41</p> | <p>4. Description of whether the Project is expected to compromise the ability of the range to be restored to the undisturbed habitat threshold, and provide a rationale for the conclusion.</p> <p>See also related: IR-154.</p> | <p>ECCC requested for more detailed mapping at the level of the project footprint in order to be able to have higher confidence in our analysis relative to potential effects on caribou Critical Habitat. However, as the requested mapping was not provided by the Proponent, ECCC is required to make assumptions that could impact our determination of potential effects and possible offsetting requirements to mitigate impacts to caribou Critical Habitat (as per the Federal Recovery Strategy for Woodland Caribou). We are aware that the project footprint may change, which may result in changes to the final recommended offset amount. We are prepared to work with a draft file with the understanding that it is still being finalized. The fact that the landscape may change over time based on data available does not negate the fact that baseline analysis is still required to determine impacts on caribou, and we still require the study area shapefiles to continue with our general analysis of the study area, given the limited data that was provided by the proponent.</p> <p>Please provide the requested shape files.</p> | |
| IR-149 | - | ECCC CNSC | Wildlife and Wildlife habitat | Section 9.3.5.2, Additional Wildlife-specific Mitigation Measures | <p>Context: The EIS describes that ongoing research is performed to inform the development of a Woodland Caribou Management Plan. This includes studies on the effectiveness of linear disruption features on predator/prey movements, and a field program for long-term reclamation planning. Moreover, it is stated that the Plan will include a detailed assessment of the need for habitat offsets.</p> <p>The draft EIS Section 9.3.5.2 states: “A wildlife monitoring plan and a Woodland Caribou Management Plan will be developed to address wildlife-specific mitigation measures based on proven and accepted mitigation following standard industry guidelines and BMPs. The plans will provide guidance to avoid or minimize potential adverse effects of the Project on wildlife and wildlife habitat, including monitoring and follow-up programs, as appropriate. It will be in place during all phases of the Project and will be subject to ongoing review and revision as required. If monitoring identifies a need for additional or revised mitigation measures, a process of adaptive management (as described in the plan) will be triggered.”</p> <p>Rationale: The draft EIS does not present sufficient species-specific mitigation measures for boreal caribou. ECCC is not able to assess potential residual impacts to caribou without specific mitigations.</p> <p>Since the Woodland Caribou Management Plan is still under development, it is difficult to judge whether the measures will be adequate to mitigate and/or offset potential project effects on Woodland caribou and its critical habitat.</p> | <p>Provide the Woodland Caribou Management Plan, to demonstrate effective mitigation of potential project effects, along with wildlife-specific mitigation measures for review.</p> <p>The Plan should be informed by and consistent with the Boreal Caribou Recovery Strategy and demonstrate that avoidance and minimization measures will be applied to mitigate for predicted Project effects to boreal caribou and its critical habitat prior to considering offsetting measures. That is, the Plan should follow the mitigation hierarchy and information should be provided as outlined below:</p> <ol style="list-style-type: none">1. AVOID: Describe all measures that will be taken to avoid effects to boreal caribou and avoid the destruction or alteration boreal caribou critical habitat.2. MINIMIZE: Describe all measures that will be taken to minimize the effects to boreal caribou and minimize the destruction of boreal caribou critical habitat.3. RESTORE ON-SITE: describe the measures that will be taken to restore disturbed areas of the Project, related to construction, operation and maintenance, on boreal caribou critical habitat, remaining after considering the avoidance and minimization measures.4. Characterize the risk of the adverse effects that are likely to result from the Project on boreal caribou and its critical habitat after avoidance minimization, and onsite restoration measures have been considered.5. OFFSET: Describe the measures that will be implemented outside the Designated Project area to mitigate adverse effects, destruction or alteration of boreal caribou critical habitat by the Designated Project during construction and operation. | <p>This response has not been accepted.</p> <p>The Conceptual Caribou Management Plan does not provide sufficient detail to understand if using the restoration trials as an offset will produce satisfactory habitat compensation to address the Project effects to caribou.</p> <p>Additional clarity on the Proponent’s role in the Developing Eco-restoration Together program is required, such as how the outcomes of these programs will result in mitigation measures and offsetting requirements. Additional clarity on the scope of the program should also be provided so that ECCC can understand the objectives and deliverables of the program.</p> <p>See follow-up IR-149-R1A, IR-149-R1B and AD-71 in the Advice to Proponent table.</p> | Not Accepted |

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| | | | | | | <p>6. Characterize the risk of the adverse effects that are likely to result from the Project on boreal caribou and its critical habitat after avoidance, minimization, onsite restoration, and offset measures have been considered.</p> <p>Describe all relevant uncertainties on the effectiveness of the measures to address adverse effects on boreal caribou and the rationale for the selected measure, in light of the mitigation hierarchy.</p> <p>See also related IRs: IR-157.</p> | | |
| IR-149 | IR-149-R1A | ECCC | Wildlife and Wildlife Habitat | <p>Section 9.3.5.2, Additional Wildlife specific Mitigation Measures Proponent response to IR-149</p> <p>IR-149 Response by Denison</p> | <p>Context: Much of the information presented in the Conceptual Caribou Management Plan is qualitative in nature and does not present specific details regarding a quantitative assessment of impacts following measures to avoid, minimize, and restore on-site and then assess residual effects and determine the offset required to counterbalance the remaining impacts. This is required to understand if offsetting is sufficient to address impacts to caribou. The Proponent also does not provide details on methods that will be used for pre- disturbance wildlife clearance surveys. ECCC is aware that that the Proponent will be participating in restoration trials as part of the ‘Developing Eco-restoration Together’ program.</p> <p>Rationale: ECCC requires the quantitative details on the assessment of impacts to be included within the Conceptual Caribou Management Plan to adequately assess how the Proponent has applied the mitigation hierarchy. Details on the methods that will be used for pre- disturbance wildlife clearance surveys will also be required to verify that the Proponent has adequately considered how they have avoided, mitigated, or restored impacts to caribou.</p> <p>While ECCC understands that the Proponent will be participating in restoration trials as part of the ‘Developing Eco-restoration Together’ program, however, more clarity on the Proponent’s role in the program and the scope of the program is required. Details such as how the outcomes of these programs will result in mitigation measures and offsetting requirements and additional clarity on the scope of the program should also be provided so that ECCC can understand the objectives and deliverables of the program.</p> | <p>1. Provide a quantitative assessment of impacts following measures to avoid, minimize and restore on-site and then assess residual effects and determine the offset required to counterbalance the remaining impacts.</p> <p>2. Provide details on methods to be used for pre- disturbance wildlife clearance surveys.</p> <p>3. Provide details on the Proponent’s role in the Developing Eco-restoration Together program and how that work may be used in offsetting requirements.</p> <p>4. Provide the scope (i.e., quantitative habitat amount) of the Eco-restoration Together program.</p> | | Follow-Up IR |
| IR-149 | IR-149-R1B | ECCC | Wildlife and Wildlife Habitat | <p>Section 9.3.5.2, Additional Wildlife specific Mitigation Measures Proponent response to IR-149</p> <p>IR-149 Response by Denison</p> | <p>Context: Section 4.2.2 of the Conceptual Caribou Mitigation plan states: “locating excessive noise generating activities such as the concrete batching operation as far away from sensitive wildlife locations as possible;”. However, no specific mitigation measures are mentioned for impacts to caribou due to noise generated from the Project air strip.</p> <p>Rationale: Noise from the air traffic using the air strip will also generate excessive noise that can impact caribou. Additional information on the timing and frequency of air traffic, as well as specific mitigations related to</p> | <p>1. Provide additional information on the timing and frequency of air traffic using the Project air strip.</p> <p>2. Provide specific mitigations related to impacts from air traffic, including mitigations related to frequency and timing of flights.</p> | | Follow-Up IR |

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| | | | | | impacts from air traffic, including mitigations related to frequency and timing of flights, will be necessary to evaluate impacts to caribou due to air strip noise. | | | |
| IR-150 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.5.2.1, Best Management Practices for working in Boreal Woodland Caribou Range in Saskatchewan | <p>Context and Rationale: In the draft EIS Section 9.3.5.2.1, the Proponent states: “Denison proactively initiated research to provide field-based findings on the effectiveness of linear disruption features on predator/prey movements.”</p> <p>“Results will help the development of proactive and meaningful restoration strategies as an ongoing part of the overall Project (Omnia 2022). Additionally, the 2023 field program will support a program that uses the results from the 2021/2022 Caribou Trail Study in long-term reclamation planning. The program will be led by the University of Saskatchewan and is funded by Denison, an Indigenous-owned environmental company, the Northwest Communities Environmental Services (Métis owned), Mitacs, and the Natural Science and Engineering Research Council of Canada through an alliance grant. The Caribou Trail Study and the reclamation plan will culminate with the development of a Woodland Caribou Management Plan.”</p> <p>ECCC is available to support the Proponent through review of study programs should those programs be made available during the review process.</p> <p>ECCC requests to see the 2021/2022 study to further our review of caribou use in the Project area.</p> | Provide the report for 2021/2022 Caribou Trail study for long-term reclamation planning for ECCC review. | | Accepted |
| IR-151 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.6.4 | <p>Context and Rationale: In the analysis of residual and cumulative effects for woodland caribou, information and analyses on impacts to connectivity and movement across the landscape is lacking.</p> | <p>1. Using available reports and data, provide an analysis of impacts to landscape connectivity for woodland caribou at the LSA and Range scales.</p> <p>2. Determine whether the Project is expected to result in a reduction of connectivity within or between the ranges and provide a rationale for the conclusion. Describe how movement corridor(s) may be affected by Project activities and infrastructure.</p> | <p>This response has not been accepted.</p> <p>There is insufficient information to support the Proponent’s conclusion that there are no impacts to landscape connectivity. Additional information on habitat quality, caribou use of the landscape for different life stages, and important habitat features within the study area is required to understand effects of the Project on habitat connectivity.</p> <p>Provide maps of caribou habitat quality and an assessment of Project impacts to high quality habitat including habitat that may be associated with landscape connectivity.</p> | Not Accepted |
| IR-152 | - | CNSC | Woodland Caribou Residual Effects Evaluation | Section 9.3.6.4, Appendix 9-B | <p>Context: Baseline studies for Woodland caribou include:</p> <ul style="list-style-type: none">• Winter Track Count Survey to assess presence, abundance, feeding activity, and ecosite affiliation;• Pellet Group/Browse Availability Survey to detect presence and abundance of caribou, and frequency of occurrence and abundance of lichen;• Covert Camera Survey to determine presence and use of linear features (roads, trails, and hand-cut lines). | <p>Please provide a summary of available baseline data on habitat use during all seasons and life stages, in particular sensitive stages such as calving, and how habitat use during all seasons and life stages was considered in the residual effect analysis.</p> <p>See also IR-145 and IR-143.</p> | | Accepted |

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| | | | | | <p>The Saskatchewan Conservation Strategy for Boreal Woodland caribou [1] states that caribou are very susceptible to predation during the calf-rearing period, and populations are extremely sensitive to even minor changes in mortality rates.</p> <p>Rationale: It is unclear if, or how, any data on seasonal and spatial use of habitat was considered in the residual effect analysis, for example summer/winter home ranges, sensitive life stages including calving (e.g., location of calving sites). It should be noted that the English River First Nation have identified caribou calving areas in the vicinity of the Project footprint.</p> <p>Reference: [1] Saskatchewan Ministry of Environment. 2013. Conservation Strategy For Boreal Woodland Caribou (Rangifer tarandus caribou) in Saskatchewan. Saskatchewan Ministry of Environment. Fish and Wildlife Technical Report 2014.</p> | | | |
| IR-153 | - | CNSC | Woodland Caribou Residual Effects Evaluation | Section 9.3.6.4.1 | <p>Context: According to ECCC (2020), forest fires can directly alter habitat, making it unsuitable for boreal caribou (e.g., through loss of mature conifer stands, loss of lichens and other forage plants, barriers to movement). Boreal caribou generally do not return to burned areas for several decades until the forest is old enough to support lichens and other food sources, although they may make limited use of burned areas to feed on new growth.</p> <p>The residual effects evaluation of alteration and/or habitat loss lists ecosites BS3 and BS7 (regenerating forest types) as available habitat in Table 9.3-22, which represent 43.5% of the Regional Study Area.</p> <p>Rationale: It is unclear whether the ecosites BS3 and BS7 (regenerating forest types) represent suitable habitat for Woodland caribou year-round. More information is required on the habitat quality (e.g., time since last forest fire) and suitability for different life stages of caribou.</p> <p>For conservatism, it is recommended to perform a second residual effect analysis not including regenerating forest ecosites.</p> | <p>1.Please provide further information on the suitability of ecosites BS3 and BS7 for Woodland caribou in different life stages.</p> <p>2. Please provide the results of a residual effect analysis not including ecosites BS3 and BS7 for conservatism.</p> <p>3. If 2 leads to habitat fragmentation, consider connectivity of habitat patches in the residual effect analysis.</p> | | Accepted |
| IR-154 | - | CNSC | Woodland Caribou Alteration and/or Loss of Habitat | Section 9.3.6.4.1 | <p>Context: Lichen, the primary food source for Woodland caribou (up to 70% of the year-round diet), can be exposed to airborne contaminants and dust deposition at distances of 1–40 km (e.g., increased metal concentrations or dust were detected in lichen at distances of 1–40 km from a mine site [1, 2]).</p> <p>Rationale: Further information is requested on how the potential for contamination of the food source “lichen” is reflected in the applied buffers of direct and indirect disturbance for woodland caribou.</p> | <p>1. Please provide additional justification for how the potential for contamination of the food source “lichen” is reflected in the applied buffers for sensory disturbance.</p> <p>See also related IRs: IR-137, IR-148 and IR-156.</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends the following:</p> | | Accepted |

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| | | | | | References: [1] Watkinson et al. (2021). Effects of dust deposition from diamond mining on subarctic plant communities and barren-ground caribou forage. Journal of Environmental Quality 50(4): 990-1003. Doi: 10.1002/jeq2.20251. [2] Chen et al. (2017). Does dust from arctic mines affect caribou forage? Journal of Environmental Protection 8(3): 258-276. Doi: 10.4236/jep.2017.83020. | <ul style="list-style-type: none">COPC in Lichen monitoring is recommended in transects from the Project site to assess COPC concentrations and confirm whether the chosen buffer is conservative. | | |
| IR-155 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.6.4.1, Alteration and/or Loss of Habitat | <p>Context and Rationale: In Section 9.3.6.4.1 of the draft EIS, the Proponent presents figure 9.3-14 and table 9.3-22, which “depicts available woodland caribou habitat in the Project study areas” and provide a summary of available Woodland Caribou Habitat in the Project Area, Wildlife Local Study Area, and the Terrestrial Regional Study Area.</p> <p>The Proponent does not provide a biologically relevant explanation on the ecosites that are considered available woodland caribou habitat.</p> <p>According to the amended recovery strategy for Caribou, all habitat within SK1 range has been designated as critical habitat. To align with best current knowledge and the amended recovery strategy, the map and table should show the biophysical attributes, as outlined in Appendix H of the recovery strategy.</p> | <p>1. Provide a biologically relevant explanation about how available caribou habitat was determined or determine available habitat based on new data from the province of Saskatchewan (See IR-145).</p> <p>2. Consider referencing Appendix H of the Amended Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada 2020 to define important biophysical features.</p> | <p>This response has not been accepted.</p> <p>The Proponent’s response to IR-155 states “Available woodland caribou habitat was identified in the draft EIS to comprise the ecosites with observations of caribou and caribou sign during the baseline studies. This was done without seasonal differentiation because it was assumed that caribou may use these ecosites during all seasons and life stages.” The methodology used to determine available caribou habitat does not accurately represent use of the documented habitat.</p> <p>The trail camera and pellet survey methods used do not satisfy the IR as they may lead to an underestimation of available caribou habitat.</p> <p>Trail camera and pellet surveys are not normally used to determine available habitat, as they only show presence. Using observations within ecosites to determine what is available habitat for caribou may lead to an underestimation of available habitat. Some smaller or rare ecosites may not have been sampled, leading to their exclusion as available habitat.</p> <p>Additionally, trail cameras were only placed on linear features, which are not representative of the whole landscape. Survey locations and camera trap placement may not provide an accurate representation of the study area or the SK1 range.</p> <p>To adequately determine available caribou habitat, ECCC requires a new habitat-based analysis that captures important biophysical features outlined in Appendix H of the Amended Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada 2020.</p> | Not Accepted |
| IR-156 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.6.4.1 Section 9.3.7.3.1 | <p>Context and Rationale: In Section 9.3.6.4.1 of the draft EIS, the Proponent identified that 142 ha of available caribou habitat within the Project footprint will be directly impacted or lost, while an additional 1,165 ha will be indirectly impacted by Project activities such as sensory disturbance. They assessed the residual and cumulative effect of alteration to habitat for woodland caribou as not significant: “The residual effect of alteration and/or loss of available woodland caribou habitat is not expected to result in a change that will alter caribou habitat integrity to the point where it would not be able to sustain the regional woodland caribou population. Therefore,</p> | <p>Provide a revised assessment of residual and cumulative effects, taking into consideration that the disturbance within the SK1 range is above the disturbance management threshold required for survival and recovery of the species.</p> <p>See also related IRs: IR-137 and IR-154.</p> | <p>This response has not been accepted.</p> <p>Based on the Amended Recovery Strategy for the Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada 2020, the SK1 range is currently at its disturbance threshold. All remaining habitat in this range is considered to be critical habitat.</p> <p>As the development of this Project will result in loss of critical habitat for boreal caribou, the Project will have an impact on boreal caribou.</p> | Not Accepted |

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| | | | | | <p>the effect is assessed as not significant.”</p> <p>Section 9.3.7.3.1 of the draft EIS states: “It is not expected that the cumulative effects of alteration and/or loss of habitat will alter the integrity of woodland caribou habitat within the Terrestrial RSA to the point where it is not sustainable or available to contribute to ecological functions. Therefore, the cumulative effects resulting from the Project’s residual effect interacting with residual effects from other projects and activities is predicted to be not significant.”</p> <p>For the residual effect of alteration and/or loss of available caribou habitat (Section 9.3.6.4.1, Table 9.3-24), the Proponent assessed the magnitude as low, the geographic extent as local, the duration as long-term, the frequency as frequent, the reversibility as fully reversible, the context as high and the likelihood as likely. The rationale provided by the Proponent is insufficient to determine the accuracy of these assessments, given the lack of data and the small size of the assessment area. ECCC does not support the residual effects assessment of low magnitude, given the uncertainties related to seasonal use by caribou in the Project area and the current level of disturbance in the SK1 range.</p> <p>For the cumulative effect of alteration and/or loss of available caribou habitat (Section 9.3.7.3.3 , Table 9.3-30), the Proponent assessed the magnitude as moderate, the geographic extent as beyond the RSA, the duration as long-term, the frequency as frequent, the reversibility as fully reversible, the context as high, the likelihood as likely, the significance as not significant and the level of confidence as moderate. The rationale provided by the Proponent is insufficient to determine the accuracy of these assessments, given the lack to data presented for caribou and the small size of the RSA, compared to the SK1 region. ECCC does not support the conclusion of the cumulative effects assessments or for the level of confidence.</p> <p>The Amended Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada 2020 states that the range is currently at the 60% disturbance management threshold. Therefore, any activity likely to result in the alteration or destruction of critical habitat may impact on the species survival and recovery. In addition, the Proponent’s assessment was based on information that was lacking data on calving, wintering and rutting areas, and connectivity and caribou movements. The absence of considerations of the regional context of disturbance does not provide a conclusion based on best available information.</p> | | <p>The assessment does not contain adequate information on habitat quality or representativeness of the RSA to the SK1 range. The Proponent did not consider disturbance in the regional context, therefore their conclusions are not based on the best available information. Considerations of disturbance in a regional context is required to accurately represent residual and cumulative effects to caribou within the SK1 range.</p> <p>The Proponent has not provided sufficient information to support their conclusion of a “not significant” impact to boreal caribou as the Recovery Strategy wasn’t fully considered. Since all remaining habitat in this range is critical habitat, the Project will negatively affect critical habitat necessary for the survival and recovery of the species. The Proponent should provide a revised assessment of residual and cumulative effects, taking into consideration the Recovery Strategy and that the disturbance within the SK1 range is at the disturbance management threshold, and Projects impacts to critical habitat.</p> | |
| IR-157 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.9 Ungulates, Furbearer and | Context and Rationale: The Proponent has committed to developing a Woodland Caribou Management Plan, which will include a “detailed assessment for the need for habitat offsets.” The Woodland Caribou | Provide the Woodland Caribou Management Plan for review. The plan should clearly demonstrate efforts to avoid and minimize any Project effects and restore on-site any disturbed areas prior to the consideration of | This response has not been accepted. | Not Accepted |

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| | | | | Woodland Caribou Summary | <p>Management Plan will support ECCC’s review of the Proponent’s assessment of residual effects following mitigation and offsetting.</p> <p>This plan should consider ECCC’s Operational Framework for Use of Conservation Allowances (ECCC, 2012). ECCC is available to assist the Proponent in the determination of appropriate offsets that would balance against Project adverse effects after the application of measures to avoid, minimize and restore on-site are adopted.</p> <p>Based on the Amended Recovery Strategy for the Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada 2020, anthropogenic impacts to local caribou populations experience a lag effect, which occurs over extended periods. This lag effect needs to be adequately considered when proposing offsets.</p> <p>ECCC is available to assist the Proponent in understanding how critical habitat is described in the Recovery Strategy and the determination of appropriate offsets that would balance against Project effects based on the predicted impacts to caribou habitat.</p> | <p>offsetting. Details on how severity of disturbance and vulnerability of the species were considered should be explained.</p> <p>See also related: IR-149.</p> <p>Suggestions for mitigation and follow-up measures: ECCC notes that the Woodland Caribou Management Plan should clearly explain efforts to address Project effects, including any contribution to cumulative adverse effects, after it has been determined that all options in the previous steps of the mitigation hierarchy (i.e., avoidance, and minimization,) have been fully considered and applied.</p> <p>In the Woodland Caribou Management Plan, provide details on how the factors outlined in the Operational Framework for Use of Conservation Allowances (ECCC, 2012) were considered in determining the offsetting amounts, including the severity of disturbance and vulnerability of the caribou population. Important factors including time lag (the amount of time from restoration work to when the habitat would be considered caribou habitat) would also need to be considered.</p> <p>ECCC typically recommends a minimum offset multiplier of 4:1 (offset outcome: area disturbed). This is a benchmark ratio applied to a project that is in the lower end of the risk spectrum, such as one with a low severity impact adversely affecting a low vulnerability ecological component. In general, the minimum 4:1 multiplier accounts for time-lags to restoration, uncertainty in outcomes, a precautionary approach, and the adverse impact itself in its specific context. Offset multipliers are variable and determined by project-specific circumstances and associated risks and uncertainties.</p> | <p>The Proponent provided a conceptual Woodland Caribou Monitoring Plan, however, this plan does not include an assessment of the Proponent’s determination of the required amount of habitat offset.</p> <p>ECCC currently recommends a minimum offset multiplier of 4:1 (offset outcome: residual adverse effect) for a project that has a low severity impact of adversely affecting a low vulnerability ecological component. This is a benchmark ratio applied to a project that is in the lower end of the risk spectrum; for example, for a project with a low severity impact adversely affecting a low vulnerability ecological component. In general, the minimum 4:1 multiplier accounts for time-lags to restoration, uncertainty in outcomes, a precautionary approach, and the adverse impact itself in its specific context.</p> <p>Offset multipliers are variable and determined by project-specific circumstances and associated risks and uncertainties.</p> <p>The Proponent provided a conceptual Woodland Caribou Monitoring Plan, however, this plan does not include an assessment of the Proponent’s determination of the required amount of habitat offset.</p> <p>ECCC currently recommends a minimum offset multiplier of 4:1 (offset outcome: residual adverse effect) for a project that has a low severity impact of adversely affecting a low vulnerability ecological component. This is a benchmark ratio applied to a project that is in the lower end of the risk spectrum; for example, for a project with a low severity impact adversely affecting a low vulnerability ecological component. In general, the minimum 4:1 multiplier accounts for time-lags to restoration, uncertainty in outcomes, a precautionary approach, and the adverse impact itself in its specific context.</p> <p>Offset multipliers are variable and determined by project-specific circumstances and associated risks and uncertainties.</p> <p>Based on the Amended Recovery Strategy for the Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada 2020, anthropogenic impacts to local caribou populations experience a lag effect, which occurs over extended periods. This lag effect needs to be adequately considered when proposing offsets.</p> <p>In the absence of sufficient data or information required to validate the level of risk that this Project is likely to have on the species recovery, the implementation of the mitigation hierarchy and offsetting measures to address Project adverse effects, ECCC’s views are based on the precautionary approach.</p> | |

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| | | | | | | | <p>Thus, ECCC preliminary analysis regarding the likelihood of this Project having an adverse effect on boreal caribou recovery is identified as moderate to high, resulting in a precautionary offsetting requirement that should be in terms of amount, much greater than 4:1. The assumptions of ECCC’s risk assessment include:</p> <ul style="list-style-type: none">• The biophysical attributes required for boreal caribou recovery (i.e. habitat for calving, post-calving, rutting, winter and travel) are present within the study area and will be directly or functionally lost,• Sensory disturbance arising from project activities (e.g. air traffic) will cause functional habitat loss for boreal caribou within important habitat areas required for different life stages. <p>Additionally, lack of information supporting the Proponent’s offsetting plans creates uncertainty and thereby warrants a higher offset ratio.</p> <p>ECCC is available to provide information to the Proponent on how critical habitat is described in the Recovery Strategy and the determination of appropriate offsets that would balance against Project effects based on the predicted impacts to caribou habitat.</p> | |
| IR-158 | - | ECCC | Migratory birds | Section 9.4.1.2, Key Indicators and Measurable Parameters | <p>Context and Rationale: In Section 9.4.1.2 the Proponent outlined key indicators for “Migratory Breeding Birds” which includes Waterbirds and Waterfowl, Upland Game Birds and Migratory Songbirds. These are broad categories, which do not allow for assessment of the variation in habitat requirements or ecology of individual species or guilds.</p> <p>Updated Rationale: The Proponent should identify additional focal species that can serve as indicator species by representing anticipated impacts to a broader guild of species. Indicator species should be demonstrably sensitive to the potential effect of interest, and suitable for inferring effects on other species.</p> <p>Species may be grouped into guilds for assessment based on similarities in ecology or vulnerability to Project effects, such as species at elevated risk of collision with vehicle traffic.</p> <p>By identifying focal species or guilds for each key indicator species within the Migratory Breeding Birds Valued Components (VCs), ECCC would be able to accurately review the Proponent’s assessment of impacts and mitigation measures in order to assess the accuracy of the Proponent’s conclusions and provide expert advice on the mitigation measures.</p> | Identify focal species/guilds for each key indicator species within the Migratory Breeding Birds valued components. Provide an updated analysis of Project effects on migratory birds. | <p>This response has not been accepted.</p> <p>The Proponent did not identify focal species for each key indicator species within the Migratory Breeding Birds valued components. This information is needed to accurately review the Proponent’s assessment of impacts and mitigation measures in order to assess the accuracy of the Proponent’s conclusions and provide expert advice on the mitigation measures.</p> | Not Accepted |
| IR-159 | - | ECCC | Migratory birds | 9.4.3.2.3 Baseline Studies – Migratory Songbirds | <p>Context and Rationale: Information presented in the draft EIS is insufficient to accurately predict Project impacts to breeding birds. The Proponent collected a single year of breeding songbird point counts and aerial waterfowl surveys (including avian species at risk). A single year of surveys in</p> | Supplement breeding bird point count data and aerial waterfowl data collected during 2017 with additional pre-construction field data or existing post-2017 data/modelling to provide a comprehensive baseline that can be used to verify Project impacts during construction and operational phases. | <p>This response has not been accepted.</p> | Not Accepted |

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| | | | | Appendix 9-B, Section 2.10.2, Results | <p>which birds may be unusually scarce or abundant could severely compromise interpretation of post-construction monitoring data.</p> <p>Additionally, data presented in the draft EIS is from 2017 and ECCC advises that more recent data is needed for a comprehensive baseline to verify Project impacts.</p> <p>Data from the Saskatchewan Conservation Data Centre (HABISask), the Saskatchewan Breeding Bird Atlas and the Boreal avian Modelling project contain information on avian densities and avian species at risk that could supplement field data.</p> <p>The national standard for major projects recommends a minimum of two years of field surveys to be provided, so that temporal variability can be considered when comparing post-construction against baseline records and other available data.</p> <p>Updated Rationale: ECCC recommends that for major projects, a minimum of two years of field surveys should be provided so that temporal variability can be considered when comparing post-construction against baseline records and other available data. More recent data is needed due to landscape changes that may have occurred since 2017 as well as cumulative effects that have occurred in that time. Additionally, if there was an unusually high population density of birds in 2017 due to extraneous circumstances, Project effects may be attributed to a non-existent decline in the population when the discrepancy can be due to natural variability.</p> <p>A more recent baseline will account for interannual variation and any regional effects and will allow for a more accurate review of mitigation and follow-up measures. Data from the Saskatchewan Conservation Data Centre (HABISask), the Saskatchewan Breeding Bird Atlas and the Boreal Avian Modelling project contain information on avian densities and avian species at risk that could supplement field data.</p> | | <p>The Proponent’s response indicated that their opinion is that the data presented in the draft EIS is sufficient and that no updates to the draft EIS are needed.</p> <p>However, a single year of baseline data from 2017 is insufficient to assess Project impacts during the follow-up and monitoring program. Although pre-construction surveys prior to clearing can give a very localized picture of the avian community, it does not provide a baseline within the Regional Study Area (RSA) of the bird community and will be of limited use for comparing construction and operational monitoring data to baseline conditions. Use of more recent data or supplemental data can account for interannual variation and any regional effects and will allow for a more accurate review of mitigation and follow-up measures.</p> <p>See follow-up IR-142-159-167-R1.</p> | |
| IR-160 | - | ECCC | Migratory birds | Section 9.4.3.2.3 Baseline Studies – Migratory Songbirds | <p>Context and Rationale: ECCC advises that the results of the field studies need to be interpreted/analyzed in the context of the study area. The Proponent presents results on areas with highest richness and diversity but does not make a link to habitat that will be lost or experience indirect effects.</p> <p>Updated Rationale: Results regarding the effects of the Project, including a discussion on habitat types that will be lost or indirectly impacted during the life of the Project, and a discussion on the overall impact on the avian community including results from baseline studies as well as other supplemental information as per IR-159 are required to assess the validity of the Proponent’s conclusions and should be used in effects assessment.</p> | <p>Provide results interpreted in the context of Project direct and indirect effects. Include discussion on the habitat types that will be lost or indirectly impacted during the Project and the overall impact on the avian community, using results from the analysis of baseline studies and other supplemental data (as per IR-159).</p> <p>Discussion should support the conclusions of the effects assessment.</p> <p>See also related IRs: IR-161 and IR-162.</p> | <p>This response has not been accepted.</p> <p>The Proponent did not provide the information requested in IR-59. This information is required to assess the accuracy of the effects assessment.</p> | Not Accepted |

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| IR-161 | - | CNSC | Bird Species at Risk | Section 9.4.3.3 Appendix 10-A (ERA) | <p>Context: For the assessment of effects on Bird Species at Risk (SAR), in the EIS it was decided to use representative species for certain SAR birds:</p> <ul style="list-style-type: none">Olive-sided Flycatcher and Common Nighthawk were selected to represent Barn Swallow.Yellow Rail and Rusty Blackbird were selected as substitutes for Horned Grebe. <p>No further rationale is provided to demonstrate that the identified surrogate species are representative of the Barn Swallow and Horned Grebe in the EIS. For example, do they share a common diet?</p> <p>Moreover, in the residual effects assessment, limited discussion is provided on the conservatism of chosen suitable habitat types for both surrogate and represented species, in the calculation of habitat loss and alteration, as well as change in mortality. For example, how does habitat for Common Nighthawk and Barn Swallow overlap (do they use identical habitat types?) and how does this affect the calculation of habitat loss and alteration used to evaluate the magnitude of residual effect?</p> <p>Finally, in the ERA, Lesser Scaup is the surrogate for Horned Grebe. Yellow Rail is also represented by Lesser Scaup but Rusty Blackbird is represented by Olive-sided Flycatcher.</p> <p>Rationale: It is unclear what criteria were applied to select surrogate species for Barn Swallow and Horned Grebe, and how the chosen surrogates relate to Barn Swallow and Horned Grebe in terms of habitat type and range, nesting, and feeding requirements etc.</p> <p>There is also inconsistency with respect to the use of surrogate species for the Horned Grebe between the EIS and ERA supporting document.</p> | <p>1. Please provide additional information to justify the selection of surrogate species for Barn Swallow and Horned Grebe in the EIS. This should include a description of the similarity of SAR and associated surrogate species and any relevant uncertainties.</p> <p>2. Please provide conservative estimates of habitat loss and alteration for the represented and not directly assessed species (Barn Swallow, Horned Grebe).</p> <p>3. Please provide clarity as to why different surrogate species are used for Horned Grebe between the EIS and ERA.</p> <p>See also related IRs: IR-160 and IR-162.</p> | | Accepted |
| IR-162 | - | ECCC | Migratory birds | Section 9.4.3.3, Bird Species at Risk | <p>Context and Rationale: Not all avian species at risk present in the study area were included as Key Indicators in the avian species at risk (SAR) valued component (VC). Barn swallow and horned grebe were recorded in the study area, but not included as VCs. Additionally, bank swallow may inhabit the Project area. Impacts to Species at Risk Act Schedule 1 listed species need to be identified, avoided, lessened and monitored.</p> <p>In Section 9.4.3.3. the Proponent states: “It is acknowledged that the listed Barn Swallow (<i>Hirundo rustica</i>) and Horned Grebe (<i>Podiceps auratus</i>) could potentially occur in the Terrestrial RSA. Incidental observations occurred during the baseline studies (Appendix 9-B). To focus the effects assessment on a few key species (described in the following) it was decided to use Olive-sided Flycatcher and Common Nighthawk to represent Barn Swallow as well, and to use Yellow Rail and Rusty Blackbird as a substitute for Horned Grebe. Unlike Horned Grebe,</p> | <p>1. Explain how nesting habitat requirements of barn swallow is represented by common nighthawk and olive-sided flycatcher as a VC or assess individually each SAR that overlaps with the Project and is likely to be affected.</p> <p>2. Explain how nesting habitat requirements of horned grebe are represented by yellow rail and rusty blackbird as a VC, or assess individually each SAR that overlaps with the Project and is likely to be affected.</p> <p>3. Assess individually each SAR that overlaps with the Project and is likely to be affected.</p> <p>See also related IRs: IR-160 and IR-161.</p> | <p>This response has not been accepted.</p> <p>Part 1. Of the IR was accepted, however the answer for part 2. And 3. Of the IR are insufficient in order to understand the Proponent’s rationale for using yellow rail and rusty blackbird to represent horned grebe. These species are all associated with wetlands, however, their specific habitat requirements and wetland types differ.</p> <p>Due to differing habitat selection and use, ECCC recommends that each selected VC is given an individual assessment with specific mitigation measures to allow for a more accurate review of the chosen mitigation measures.</p> | Not Accepted |

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| | | | | | <p>Yellow Rail and Rusty Blackbird are also listed provincially.”</p> <p>Barn swallow, bank swallow and horned grebe may have different nesting habitat requirements than the representative species discussed in the draft EIS. An explanation of how differing species are representative of one another is required, or if an explanation cannot be provided, the species should be assessed individually.</p> <p>Updated Rationale: The management plans for these three species demonstrate the variability in their habitat selection.</p> <p>The Management Plan for the Yellow Rail (<i>Coturnicops noveboracensis</i>) in Canada (Environment Canada, 2013) states ”Yellow Rails inhabit shallow wetlands and other wet areas with grass-like vegetation. They breed in wetlands such as damp hay fields or meadows, floodplains, bogs, upper levels of estuaries, salt marshes (Bookhout 1995, Alvo and Robert 1999, COSEWIC 2009), shallow prairie wetlands, and wet montane meadows (Peabody 1922, Sherrington 1994, Popper and Stern 2000). “</p> <p>The Management Plan for the Rusty blackbird (<i>Euphagus carolinus</i>) in Canada (Environment Canada 2015), states: “Rusty Blackbirds tend to select breeding sites with a combination of freshwater bodies with shallow water and emergent vegetation for foraging that are adjacent to wetlands with conifers or tall shrubs with cover for nesting (Matsuoka et al. 2010a, Matsuoka et al. 2010b, Greenberg et al. 2011).”</p> <p>The Management Plan for the Horned Grebe (<i>Podiceps auritus</i>), Western population, in Canada (ECCC, 2022) states: “The Horned Grebe breeds in small (generally 0.5 to 2 ha, but ranging from 0.24 to 18.2 ha), shallow (at least 20 cm deep, but on average 40 cm), and usually fishless, perennial wetlands, but they can also nest on larger lakes with shallow edges and sufficient emergent vegetation. Breeding sites usually contain at least 40% open water with beds of emergent vegetation, such as sedges (<i>Carex</i> spp.), rushes (<i>Juncus</i> spp.) and cattails (<i>Typha</i> spp.) (Faaborg 1976, Kuczynski et al. 2012, Routhier 2012, Stedman 2018).”</p> <p>Due to differing habitat selection and use, ECCC recommends that each selected VC is given an individual assessment with specific mitigation measures. This will allow for a more accurate review of the chosen mitigation measures.</p> | | | |
| IR-163 | - | ECCC | Migratory birds | Section 9.4.3.3.3, Baseline Studies – Avian species at risk VCs | <p>Context and Rationale: The baseline studies and data analysis for species at risk (SAR) birds is insufficient to accurately predict Project effects.</p> <p>ECCC recommends the use of predictive modeling in relation to survey data and habitat attributes to produce distribution and density maps. Sites within the study area that support particularly high densities or diversity of an</p> | Provide additional information, including mapping/modelling of specific habitat requirements for each avian species at risk or provide a justification of models used in the draft EIS. | The additional information presented in the Proponent’s response provided an explanation for the models used in the draft EIS. | Accepted |

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| | | | | | individual species, based on direct observation and, where appropriate, distribution or occupancy models, would greatly improve confidence in Project impact predictions. Additional information on specific habitat use or models of habitat used by SAR would facilitate a more complete analysis of Project effects. | | | |
| IR-164 | - | ECCC | Migratory birds | Section 9.4.4.2.1, Alteration and/or Loss of Habitat – Migratory Breeding Birds | <p>Context and Rationale: The discussion on impacts to migratory songbirds presented by the Proponent is not sufficient to understand the impacts on various guilds of birds (e.g., aerial insectivores, forest birds, wetland birds, habitat specialists).</p> <p>As per IR-158, focal representative species/guilds should be used as key indicators (KI) in the Migratory Breeding Birds Valued Component. A greater level of detail on Project impacts to migratory songbirds with differing habitat requirements is needed for a fulsome assessment of effects.</p> <p>Updated Rationale: A greater level of detail, including a discussion on impacts to different focal species and/or guilds within the Migratory Breeding Birds Valued Component, is required for a more fulsome assessment of effects and identification of mitigation measures. Additionally, mapping detailing important features or habitat types that will be lost due to the Project for different guilds of migratory birds will be required to assess Project effects. This information will be required in order for the Proponent to apply adaptive management, and for ECCC to review the adequacy of these management plans.</p> | <p>1. Provide further discussion on impacts to different focal species/guilds within the Migratory Breeding Birds Valued Component.</p> <p>2. Provide mapping of important features or habitat types that will be lost due to the Project for different guilds of migratory birds.</p> | <p>This response has not been accepted.</p> <p>The Proponent did not provide the information requested in the previous Information Requirement. The discussion of impacts to different focal species/guilds within the Migratory Breeding Birds VC and mapping of important features or habitat types lost for these guilds of birds is required for the Proponent to apply adaptive management, and for ECCC to review the adequacy of these management plans.</p> | Not Accepted |
| IR-165 | - | CNSC ECCC | Birds (all species) | Section 9.4.4.2.2 Section 9.4.5.2.4, Avian Deterrence and Prevention of Entrapment Appendix 10-A (ERA) | <p>Context: On p. 9-364 of the EIS, it is stated that exposure to hazardous materials through contact with contaminated waste ponds could affect avian health and contribute to mortality.</p> <p>However, the ERA places the avian receptors only in waterbodies and locations outside of the Project area (see Figure 5-2 in the ERA), i.e., Whitefish Lake, McGowan Lake, the inlet to Russell Lake, and Kratchkovsky Lake.</p> <p>Further, there are insufficient details on the potential effects of the water quality in the water management and treatment facilities on birds, species at risk, and other wildlife, including the risk of bioaccumulation of contaminants. The Proponent should assess potential effects of water quality from these areas using applicable CCME guidelines.</p> <p>Rationale: It is unclear whether the ecological risk assessment based on the chosen exposure locations is protective and conservative for avian species potentially exposed to contaminated waste ponds on the Project site.</p> <p>While mitigation measures such as physical, visual, and/or auditory deterrents are proposed in Section 9.4.5.2.4, the possibility of avian species</p> | <p>Please perform an ecological risk assessment with avian receptors located at the contaminated waste ponds, including:</p> <p>1. Describe and analyze the possibility of birds, species at risk and other wildlife using the water or waste management facilities and provide an analysis to determine if there is a risk to wildlife that may access these areas.</p> <p>2. Identify the potential toxicity of water management ponds to aquatic migratory birds and species at risk (SAR).</p> <p>3. Describe what measures will be taken if the waters are found to be toxic to migratory birds and SAR.</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends that Denison ensure adequate mitigation measures are implemented to minimize the potential for avian exposure to pond waters.</p> | <p>This response has not been accepted.</p> <p>Please provide an explanation for the appropriateness and conservatism of using the Canadian Council of Ministers of the Environment (CCME) water quality guidelines (WQG) for the protection of livestock for avian receptors, or update the tables provided in Attachment IR-165 using the CCME Water Quality Guidelines for the Protection of Aquatic Life.</p> <p>In order to protect migratory birds from the quality of water in the water management pond, it is recommended that the use of the CCME water quality guidelines for the protection of aquatic life to assess potential impacts to aquatic birds from water management facilities because they are more protective than the CCME water quality guidelines for livestock with lower acceptable levels for contaminants. The water quality guidelines for the protection of aquatic life should also be used to compare predicted contaminant concentrations in water management ponds. The FIRT is unable to verify predicted Project impacts to migratory birds using water management ponds as the selected CCME Water Quality Guidelines for livestock do not accurately reflect the exposure levels and pathways experienced by waterfowl and shorebirds.</p> | Not Accepted |

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| | | | | | coming into contact with waste ponds cannot be excluded based on the available information in the EIS. The possibility of birds, species at risk, and other wildlife accessing the water management and treatment facilities for drinking water or other purposes is not discussed in the draft EIS. | | | |
| IR-166 | - | ECCC | Migratory birds | Section 9.4.5.2 Additional Avian Species-specific Mitigation Measures | <p>Context and Rationale: Avian species-specific mitigation measures are not presented in the draft EIS. The Proponent has committed to providing a variety of environmental management plans.</p> <p>Section 9.4.5.2 reads: “Additional mitigation measures specific to the Raptors, Migratory Breeding Birds, and Bird Species at Risk VCs, in accordance with the Migratory Birds Convention Act, and tailored to Project features will be incorporated into various Project management and monitoring plans such as the, erosion and sediment controls, soil and vegetation monitoring, wildlife monitoring, the Decommissioning Plan, air quality monitoring, Spill Response Plan, Radiation Protection Plan, surface water and effluent monitoring, and Waste Management Plan.”</p> <p>Migratory birds, the nests of migratory birds and/or their eggs can be inadvertently harmed or disturbed as a result of many activities, including but not limited to clearing trees and other vegetation, draining or flooding land, or using fishing gear; this is known as incidental take. This inadvertent harming, killing, disturbance or destruction of migratory birds, nests and eggs is prohibited under the MBCA. Incidental take, in addition to harming individual birds, nests or eggs, can have long-term consequences for migratory bird populations in Canada, especially through the cumulative effects of many different incidents. For further details, please refer to the Avoiding Harm to Migratory Birds website at: https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds.html</p> <p>In order to assess the effectiveness of species-specific mitigations and need for additional mitigations ECCC requires details on the species-specific mitigation measures proposed, and the monitoring plans.</p> | Provide details on species-specific mitigations for species at risk (SAR) and other avian species that will include: <ul style="list-style-type: none">• details on what activity restrictions will be implemented for migratory birds and SAR and when they will be applied;• details on mitigations used during regular maintenance activities such as vegetation management (e.g., mowing), access road repair (e.g., aggregate stockpiles), and infrastructure repair;• details on methods used to detect species listed on Schedule 1 of the <i>Migratory Birds Convention Act</i> (e.g., Pileated Woodpecker) and mitigations/setback distances and timing to reduce risk to these species. | | Accepted |
| IR-167 | - | ECCC | Migratory birds | Section 9.4.5.2.1 Work Timing Windows and Habitat Disturbance | <p>Context and Rationale: The Proponent has stated that when it is not practicable to clear outside of the breeding bird window, they will conduct pre-clearing surveys. Section 9.4.5.2.1 states: “Prior to commencing any site clearing (i.e., vegetation clearing and/or soil disturbance) during the nesting season, pre-clearing nest surveys will be conducted at that location within the Project Area.”</p> <p>ECCC does not recommend the use of nest searches or pre-clearing surveys for active bird nests during the breeding season as a mitigation, given the difficulty associated with finding nests reliably and the high likelihood of disturbing nesting birds when searching. Instead, ECCC recommends that</p> | Provide the following information: <ul style="list-style-type: none">• details on how vegetation clearing related to site development will be conducted to minimize risk to migratory birds and species at risk (SAR).• the timing window that will be used for vegetation removal to reduce risk to migratory birds and SAR | Response is accepted, but also see AD-57 in the Advice to Proponent table and follow-up IR-142-159-167-R1. | Accepted |

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| | | | | | clearing and grubbing activities not be conducted during the breeding bird season. The Migratory Birds Regulations 2022 (MBR 2022) brings new scenarios that need to be considered: <ol style="list-style-type: none">Most migratory birds: - Nests are protected only when they are in use or when live eggs or chicks are present.Migratory birds listed in MBR 2022 Schedule 1: - For the 18 species of migratory birds identified on Schedule 1, the MBR 2022 provide year-round nest protection until they can be deemed abandoned.Migratory birds listed under SARA: - For some SARA listed migratory birds, the residence prohibition (s.33) will protect nests that are not active, but are re-used in subsequent years, and the critical habitat prohibition (s.58) will protect nests that are part of the critical habitat identification. Those prohibitions apply everywhere in Canada and at all times of the year. In these cases, a SARA permit will be required. | | | |
| IR-168 | - | ECCC | Migratory birds | Section 9.4.5.2.4, Avian Deterrence and Prevention of Entrapment | Context and Rationale: The Proponent mentions that avian deterrents will be used on power transmission lines, buildings and other Project infrastructure. However, the Proponent does not mention any deterrents that will be used for deterring birds from the water or waste management facilities. Details on deterrents for all Project components should be identified to assess residual and cumulative impacts to migratory birds. | Provide information on avian deterrents to be used to prevent birds or other wildlife entering water or waste management ponds. 2. Explain how proposed timing of use of deterrents will reduce risk of migratory birds making contact with treatment waters outside of the nesting season (i.e., during migration and stop overuse). 3. Explain which deterrents will be used, which deterrents were considered, and what alternative, adaptive measures will be considered if deterrents are unsuccessful for any Project components. | The Proponent’s response is acceptable. The additional details the Proponent provided on avian deterrents are sufficient to explain how avian deterrents will be used to prevent birds or other wildlife from entering water or waste management ponds, which deterrent will be selected and why, and how they will function during and outside of the nesting season. | Accepted |
| IR-169 | - | ECCC | Migratory birds | Section 9.4.6.3, Residual Effects Evaluation for Migratory Birds, Table 9.4-15 and Map 9.4-11 | Context and Rationale: The analysis of available habitat types for migratory songbirds appears incorrect. In their interpreted ecosite mapping, the Proponent identified 25 different ecosite types. In their table 9.4-15 and map 9.4-11, the Proponent only lists 8 ecosite types that are available migratory songbird habitat. Section 9.4.6 Residual Effects Evaluation for Migratory Songbirds reads: “Considering the baseline data (Appendix 9-B), migratory songbird habitat is described in the following text without species-specific differentiation and referred to as available habitat for migratory songbirds. Based on the baseline study results, 66.8%, 52.2%, and 50.7% of the Project Area, Wildlife LSA, and Terrestrial RSA, respectively, are assumed to provide available habitat for migratory songbirds (Table 9.4-15).” All Project areas, except some anthropogenic features and open water, would be considered available habitat for migratory songbirds. Although | 1. Explain how information in Table 9.4-15 and map 9.4-11 were derived. 2. Explain why other habitat types were not considered as available habitat for migratory songbirds. | This response has not been accepted. In their response to IR-169, the Proponent states, “As per accepted methodology, to appropriately focus the habitat- based effects assessment, as per accepted EA methodology, the most frequently used habitat types (i.e., the ecosites experiencing the highest species richness, highest mean number of breeding songbird pairs, and highest species diversity) within the Project study areas were included as “available habitat” as shown in draft EIS Table 9.4-15 Summary of Available Habitat for Migratory Songbirds in the Project Study Areas and Figure 9.4-11 Available Habitat for Migratory Songbirds.” The methodology used to determine available habitat is not appropriate. The methodology used by the Proponent would be appropriate for the identification of higher quality habitat, but not as a representation of all available habitat. The methods used to determine available habitat may | Not Accepted |

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| | | | | | some ecosite types may have lower density and diversity, it is expected that all ecosites provide migratory songbird habitat. | | underrepresent rare ecosite types that were not sampled or were sparsely sampled, including ecosite types that may be important for species at risk. Avian habitat mapping/analyses should be corrected to reflect all available habitat to understand the location of habitat and the presence/absence of species. Repeat the analysis of available habitat to include all habitats used by birds, or a. Change mapping and analyses to indicate that areas identified are ecosites with the highest frequency of use, or b. Change mapping and analyses to show relative habitat use. | |
| IR-170 | - | ECCC | Migratory birds | Section 9.4.6.4, Residual Effects Evaluation for Bird SAR, Table 9.4-19 | <p>Context and Rationale: The table and map presented by the Proponent do not appear representative of all available habitat for common nighthawk (CONI). Although CONI do preferentially use open areas such as gravel (often an anthropogenic disturbance) and regenerating forest, as identified in the draft EIS, they also use rock outcrops that can be within forested areas. As this area lies within the pre- Cambrian shield, there are likely rock outcrops that are also available habitat.</p> <p>As aerial insectivores, CONI select nesting areas in close proximity to wetlands or lakes where there is abundant forage.</p> <p>Rationale: Habitat requirements and preferences for all species at risk is required for developing effective mitigations and adaptive management.</p> | 1. Provide an updated table and map that considers all available habitat for common nighthawk. 2. Additionally, as part of environmental management plans the Proponent should include species-specific mitigations that are biologically relevant to all the species at risk for all Project phases and components. | <p>This response has not been accepted.</p> <p>Part 1 of the IR was addressed, however, part 2 has not been addressed. ECCC requires this information to properly assess potential the mitigations and adaptive management for Common Nighthawk.</p> | Not Accepted |
| IR-171 | - | ECCC | Migratory birds | Section 9.4.6.4, Residual Effects Evaluation | <p>Context and Rationale: Section 9.4.6.4 Residual Effects Evaluation for Bird SAR – Common Nighthawk reads: “Progressive reclamation is anticipated to begin during Construction. However, a conservative approach is used, with Common Nighthawk (CONI) habitat in the Project Area considered to be unavailable for the duration of the Project, only becoming available as habitat following Post-Decommissioning (i.e., during the regeneration of vegetation following Decommissioning).”</p> <p>CONI may nest on the roadsides of access roads within the Project area. As such, the Project area should still be considered available habitat for the duration of the Project and appropriate mitigations and adaptive management should be discussed for this species.</p> | Develop mitigation plans appropriate for avoiding collisions of common nighthawks with vehicles, when and where nighthawks are observed foraging near or roosting on gravel roads. Demonstrate how the planned mitigation activities will result in reduced residual effects from this pathway. | | Accepted |
| IR-172 | - | CNSC | Birds (all species) | Section 9.4.6.4.2 | <p>Context: Populations of listed species may be less resilient to changes in mortality.</p> <p>CSA N288.6:22 Clause 7.2.4.3 states that effects on a few individuals of endangered, threatened, or vulnerable species would not be acceptable.</p> <p>The residual effects assessment for “Change in Mortality” for bird species at risk states that Project mitigation measures identified in Section 9.4.5 are</p> | Please provide a discussion on mitigation measures with respect to their effectiveness in minimizing mortality for bird species at risk, for which effects on a few individuals would not be acceptable. | | Accepted |

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| | | | | | <p>expected to limit interactions between bird species at risk and potential sources of direct and indirect mortality. However, the mitigation measures are not discussed with respect to their effectiveness to limit interactions, specifically for bird species at risk.</p> <p>Rationale: It is unclear if the proposed mitigation measures are effective in preventing mortality in bird species at risk for which even only a few deaths could negatively impact the population.</p> | | | |
| IR-173 | - | ECCC | Migratory birds | Section 9.4.8 Monitoring and Follow-up | <p>Context and Rationale: Monitoring and follow up programs are part of adaptive management and implementation of additional mitigations.</p> <p>In Section 9.4.8 the Proponent states: “Considering the Project planning, baseline survey results, and proposed mitigation measures, no follow-up programs are considered to be warranted at this time.”</p> <p>Project impacts related to mortality of birds, such as collisions with the transmission line, mortality along roads and use of waste and water management facilities should be monitored during all phases of the Project and adaptively managed.</p> | <p>Provide details on the follow-up program to monitor impacts to avian mortality. The follow-up plan should include:</p> <ul style="list-style-type: none">• Monitoring of avian use of waste and water facilities• Monitoring of mortality along access roads• Monitoring of mortality related to transmission lines• Monitoring of effectiveness of avian deterrents. | | Accepted |
| IR-174 | - | ECCC | SAR – Bats | Appendix 9-B, Denison Mines Corporation Wheeler River Project, Terrestrial Environment, Wildlife and Vegetation Baseline Inventory, Section 2.1.4 Acoustic Bat Surveys | <p>Context: The Proponent conducted acoustic surveys for bats and confirmed presence of two Species at Risk Act (SARA) schedule 1 listed bat species in the Project area, little brown myotis (<i>Myotis lucifugus</i>) and northern myotis (<i>Myotis septentrionalis</i>). However, the Proponent did not do an effects assessment of either of these bat species.</p> <p>Rationale: Although bats are present in the study area, no work was done to identify hibernaculum or maternal roosting sites. All species at risk that are expected to be present in the Project area should be assessed and species-specific mitigations detailed.</p> | <p>1. Conduct an effects assessment for little brown myotis and northern myotis, including the likelihood that tree clearing during the bat roosting period, is likely to ‘kill’, ‘harm’, or ‘harass’ Little Brown Myotis and Northern Myotis and its ability to carry out its life processes.</p> <p>2. Describe and map locations of suitable myotis hibernacula and/or maternal roost habitat within the Local Study Area and Regional Study Area and explain how these habitats may be affected by Project activities.</p> <p>3. Describe what mitigation measures will be taken to avoid the breeding period for bats.</p> <p>4. Describe any pre-construction/pre- clearing surveys will be conducted to identify any hibernaculum and maternal roosting sites. Describe how monitoring will support adaptive management.</p> | <p>This response has not been accepted.</p> <p>Items 1., 3. And 4. of IR-174 are accepted, however, item 2. Of IR-174, which asked for mapping of suitable myotis habitat, was not addressed.</p> <p>Mapping of suitable habitat or results from baseline studies is required to understand Project impacts to Species At Risk (SAR) bat species. This may include providing mapping of bat acoustic results, including locations along with frequency of detections.</p> <p>See also IR-134 and follow-up 134-R1.</p> | Not Accepted |
| IR-175 | - | CNSC | Provincially Listed Species | Appendix 9-B; section 2.2.2 | <p>Context: Vegetation and wildlife habitat characterization field surveys were completed in 2017, based on which ecosite factsheets were prepared. The factsheets list observations of two provincially listed plant species with a rank of S3 (vulnerable/rare to uncommon; Table 2.4-2) according to the Saskatchewan Conservation Data Centre, which are not discussed in the main EIS document:</p> <ul style="list-style-type: none">• Angle-leaved sundew (<i>Drosera anglica</i>) observed in ecosites BS19, BS20, BS22, BS25• Neat Spike-rush (<i>Eleocharis nitida</i>) observed in ecosite BS25 | <p>1. Please provide a discussion on the potential risks from indirect effects on ecosites with observed rare plant species</p> <p>2. Please provide additional information on the ecosites included in the planned pre-construction listed plant surveys</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends focusing monitoring on ecosites that have known observations of listed plant species outside of the Project Area (e.g., BS19, BS20, BS22, BS25).</p> | | Accepted |

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| | | | | | <p>Table 9.2-12 in section 9.2.6.2.1 of the EIS indicates that there may be indirect disturbance to some of these ecosites (BS19, BS20, BS25). In section 9.2.6.3.1 it is discussed that listed plant species are not likely to return once lost from a specific location.</p> <p>Rationale: Given that not all areas in the revised Project footprint were surveyed for listed plant species in baseline studies, there is uncertainty as to whether any species were missed, in particular those that have been observed in ecosites present in the LSA/RSA (e.g., <i>Drosera anglica</i> and <i>Eleocharis nitida</i>, see also Appendix 2 Table of Appendix 9-B). It should also be noted that rare plant surveys were completed in summer 2017 only (section 2.4.2 of Appendix 9-B), which may underestimate annual rare species that may be dormant in the seed bank in some years due to specific seed emergence requirements.</p> <p>It is acknowledged that the Proponent committed to pre-construction listed plant surveys targeted on ecosites encountered in the Project Area but not previously surveyed, as well as ecosites within the Project Area with high potential to support listed plants.</p> <p>More information is requested on the potential indirect effects on rare plant species as well as the planned pre-construction surveys.</p> | | | |
| IR-176 | - | CNSC | Human Health with respect to radiation exposure | Section 10.1.4.2.1 Section 10.1.6.1.4 Appendix 10-A (ERA) | <p>Context: In section 10.1.4.2.1, the Proponent provides an evaluation of air quality constituents of potential concern to human health. It states: “A screening value for radon gas of 200 becquerels per cubic metre (Bq/m3) was available from Health Canada, which applies to total radon including background sources (Health Canada 2009). The radon concentrations which were predicted are incremental concentrations (i.e., above background) and were therefore compared to the applicable incremental screening value of 60 Bq/m3 for indoor air established by the Canadian Nuclear Safety Commission (CNSC) (Health Canada 2010a; Radiation Protection Regulations. SOR/2000-203).”</p> <p>The 60 Bq/m3 radon concentration value also appears in section 7.1.2 of Appendix 10-A (ERA).</p> <p>Further in section 10.1.6.1.4, it is stated: “Radon dose was calculated separately from the dose due to other radionuclides; however, the predicted radon concentration was compared against the CNSC incremental concentration limit of 60 Bq/m3.”</p> <p>The Radiation Protection Regulations do not stipulate a limit for radon above background for sites licensed by the CNSC. The effective dose limits for Nuclear Energy Workers (NEWs) and persons that are not NEWs are listed in section 13 of these regulations, and in subsection 1(3) of these regulations</p> | <p>The EIS and appendices should be aligned with the Radiation Protection Regulations by:</p> <ol style="list-style-type: none">1. Removing the reference to a 60 Bq/m3 limit.2. Reporting the assessment results as the total dose, from all radionuclides combined including radon progeny, and by comparing this annual effective dose to the effective dose limit. <p>Provide a summary of the conservative assumptions that have been included in the dose calculations.</p> <p>Provide a reference that shows how the radon equilibrium factors were determined.</p> | | Accepted |

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| | | | | | <p>for the general public.</p> <p>The annual effective dose from all sources associated with the licensed activities and within the scope of the Nuclear Safety Control Act and Regulations must be compared to the applicable effective dose limit. For members of the public this limit is 1 mSv per calendar year.</p> <p>In Section 4.2.5.3 of Appendix 10-A (ERA), there appears to be no reference mentioned for the radon equilibrium factors. These factors are a significant input into the dose calculations for radon.</p> <p>Rationale: The reason for the requested change is to ensure consistency with the Radiation Protection Regulations.</p> | | | |
| IR-177 | - | HC | Change to an environmental component due to radiological contaminants | <p>Section 10.1.4.2.1 (p. 10-22)</p> <p>Appendix 10-A (ERA) : Appendix B Table B.9, Ref. 19-2638</p> <p>Section 6, Table 6.1-1 (p. 6-7)</p> | <p>Context: Section 10.1.4.2.1 states that, “Screening values for radionuclide concentrations in ambient air were not available. All relevant radionuclides were assessed in the HHRA in terms of their contribution to the total radiological dose to human and ecological receptors” (p. 10-22).</p> <p>Section 10 Appendix 10-A (ERA) states that, “No formal screening was conducted for radionuclides. However, since radiation dose to human receptors is of public and regulatory interest, the radionuclides in the uranium-238 decay series are carried forward as COPCs for further assessment” (Appendix 10-A (ERA): Appendix B Ref. 19-2638).</p> <p>Table 6.1-1 lists radionuclides as a key indicator for air quality, but only uranium and radon are considered in Section 6, and Section 10 Table B.9 does not include doses from uranium progeny in air.</p> <p>Rationale: Health Canada recommends using screening values that are available for radionuclides if they are appropriate for the dose and if the screening values have listed assumptions (such as particulate size and worker exposure time that can be adapted to in Denison’s models). Two examples are ICRP 96, which CNSC uses in their regulatory reports to derive reference air quality values for Pb-210, Ra-226, and Th-230 (CNSC: Regulatory Oversight Report for Uranium Mines and Mills in Canada 2019); and Health Canada’s Guidelines for Management of NORM (Health Canada: Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials, 2011).</p> | <p>1. Assess predicted radionuclides in Section 10 Appendix 10-A (ERA) using appropriate available screening values. Alternatively, provide a justification for why a screening wasn’t conducted for radionuclides despite the availability of screening values (e.g., ICRP 96 and NORM Guidelines, 2011).</p> <p>2. Clarify if uranium progenies in air are considered in the atmospheric transport and air quality modelling and are simply not reported, or if they are not included in the models because no screening criteria are available.</p> | Response is accepted, but also see AD-55 in the Advice to Proponent table. | Accepted |
| IR-178 | - | HC | Change to an environmental component due to hazardous contaminants | <p>Section 10.1.4.2.1 (p. 10-22)</p> <p>Section 6.1.4.2, Potential Project Related Effects (p. 6-31)</p> | <p>The Baseline + Project scenario was not provided for radon levels.</p> <p>Context: Section 6.1.4.2 states that the predicted levels for radon were not added to the respective baseline air quality levels (p. 6-31), and further explains that “In all modelled phases of the Project, annual average radon concentrations at receptors beyond the Property Boundary are expected to be indiscernible from background levels.”</p> | <p>1. Provide further information on whether and how baseline radon concentrations in air were determined.</p> <p>2. Include baseline radon concentrations in the predicted total concentrations when comparing to existing guidelines; alternatively, provide a rationale for why baseline concentrations of radon were not included.</p> | | Accepted |

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| | | | | | <p>In Section 10.1.6.1.4, a different approach to evaluating predicted radon levels is mentioned: “the predicted radon concentration was compared against the CNSC incremental concentration limit of 60 BQ/m3”(p. 10-44).</p> <p>Rationale: Without a rationale as to why baseline levels of radon were not included in the assessment, HC cannot fully evaluate the appropriateness of the air quality assessment. While Health Canada is of the opinion that using background radon levels as a screening value is appropriate in this case from a health perspective, different approaches to screening predicted radon levels in different sections appear to be used (i.e., background radon levels vs. CNSC incremental concentration).</p> | 3. Discuss the potential health implications of the project-only increment-over-baseline radon levels | | |
| IR-179 | - | CNSC | Groundwater quality decommissioning objectives. | Section 10.1.4.2.2, Release of Treated Effluent to Whitefish Lake During Decommissioning | <p>Context: It is stated that “This process would continue until the recovered water meets acceptable groundwater quality decommissioning objectives”.</p> <p>Rationale: The information provided does not include groundwater quality decommissioning objectives nor a reference to these objectives.</p> | Please provide groundwater quality decommissioning objectives or a reference to the information. | | Accepted |
| IR-180 | - | CNSC | Human health with respect to hazardous contaminants | Section 10.1.6.1.1, Human Receptors Selection and Characterization | <p>Context: Within the Human Health assessment, offsite receptors during the operation period are only considered downstream of Whitefish Lake. The only identified concern was for Se to the Fisher/Trapper located at Russel Lake. This section cites Indigenous Knowledge as informing the receptor selection and location.</p> <p>Rationale: While the assessment is fairly conservative in the assumptions made on intake and receptor habits, it stands to reason that if the trapper receptor was located closer to the operation, such as at McGowan or Whitefish Lakes, this exceedance of Se could be more pronounced.</p> <p>In terms of maintaining a conservative assessment, if the most vulnerable receptor can be shown to be protected at the point of highest expected COPC concentration, it can be concluded that this receptor would be protected further away from the Project. Considering this, why was the hunter/trapper receptor not also assessed at Whitefish or McGowan Lake? Was Indigenous Knowledge specific in mentioning Whitefish or McGowan Lakes were not used for the activities carried out by identified receptors?</p> | <p>Please provide justification for excluding a receptor from occupancy at lakes closer to the Project during operation (McGowan, Whitefish). Alternatively, conduct a risk assessment to a receptor at these lakes during operation to determine if there is a predicted risk that may require monitoring or mitigation.</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends the following:</p> <ul style="list-style-type: none">Assessment of a receptor located closer to the point of effluent release may need to be considered to ensure there are negligible risksIf Se is expected to exceed hazard quotients further upstream, selenium removal technology may be required as part of the effluent treatment process as a mitigation measure. Other COPC’s exceeding an HQ of 1 may also be identified under this process that could require specific monitoring or mitigation measures. | Response is accepted, but also see AD-59 in the Advice to Proponent table. | Accepted |
| IR-181 | - | CNSC | Human Health with respect to radiation exposure | Section 10.1.6.1.4 | <p>Context: In section 10.1.6.1.4, it is stated: “The maximum incremental radon concentration at the camp worker site during Operation was predicted to be 12.4 Bq/m3, which is below the CNSC limit of 60 Bq/m3 for incremental radon.”</p> <p>As per IR-176, there is no such CNSC limit for incremental radon.</p> <p>The camp worker would be considered a person who is not a nuclear energy worker (NEW) and subject to the dose limits of section 13 and 14 of the</p> | <p>The EIS and appendices should be aligned with the Radiation Protection Regulations by:</p> <ol style="list-style-type: none">Removing the reference to a 60 Bq/m3 limit for incremental radon.Revising all references to the ‘public dose limit’ applied to camp workers (non-NEWs) to align with section 13 and 14 of the Radiation Protection Regulations. <p>The Proponent should explain why the radon dose for the camp worker appears as 0.13 mSv/year in one instance and 0.02 mSv/year in another.</p> | | Accepted |

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| | | | | | <p>Radiation Protection Regulations, not the dose limit for the general public as per subsection 1(3) of the Radiation Protection Regulations. The CNSC has regulatory requirements for the ascertainment and recording of doses of radiation as per section 5 of the Radiation Protection Regulations. Every licensee must ascertain and record the magnitude of exposure to radon progeny, the effective dose and equivalent dose received by and committed to a person who performs duties in connection with any activity that is authorized by the Nuclear Safety and Control Act or is present at a place where that activity is carried on.</p> <p>The camp worker performs duties in connection with the licensed activity and is present at the location where the activity is carried out. Hence, they are not considered to be a member of the general public (who has no connection with the activity)</p> <p>Further, the Proponent indicates that the maximum incremental radon dose to the camp worker was estimated to be 0.13 mSv/year during Operation. The assessment assumes that the camp worker spends 100% of the time indoors. Table 10.1-11 shows the maximum total incremental dose for the camp worker to be 0.02 mSv/year. This appears to be a discrepancy.</p> <p>Table 5.2 in Appendix 10-C provides internal annual dose from radon inhalation. The radon doses to some NEW workers (9.44E-02 mSv/a Driller 1 and 1.03E-01 mSv/a Wellfield Operator 1, 2) here appear less than the radon dose (0.13 mSv/year from section 10.1.6.1.4) to the camp worker, who is a non-nuclear energy worker.</p> <p>Rationale: The reason for the requested change is to ensure consistency with the Radiation Protection Regulations and the environmental impact statement.</p> | <p>The Proponent is also asked to provide the rationale as to why a non-NEW has a higher radon dose than a NEW.</p> | | |
| IR-182 | - | HC | Change to an environmental component due to radiological contaminants | Section 10.1.6.1.4, (p. 10-44) | <p>Context: Section 10.1.6.1.4 states, “The limit is incremental and is exclusive of natural background, such as natural levels of radon and medical exposures. A dose constraint of 0.3mSv/yr was established for the public from all radionuclides and all pathways for the Project, as recommended by Health Canada (2010a). The dose constraint represents a dose lower than the public dose limit that ensures the combined dose from multiple sources does not result in exceedance of the public dose limit. Radon dose was calculated separately from the dose due to other radionuclides; however, the predicted radon concentration was compared against the CNSC incremental concentration limit of 60 BQ/m3” (p. 10-44).</p> <p>Rationale: Calculating radon separately from all radionuclides may underestimate the health risks by not considering combined doses from multiple sources when comparing to the public dose limit constraint of 0.3 mSv/yr recommended by Health Canada (2010a).</p> | <p>1. Provide clarification on how combined doses from all sources would be accounted for in respecting the public dose limit of 0.3 mSV/yr if radon concentrations are being calculated separately.</p> | <p>Response is accepted, but also see AD-65 in the Advice to Proponent table.</p> | Accepted |

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| IR-183 | - | CNSC | Human Health with respect to radiation exposure | Section 10.2 Appendix 10-C | Context: Exposure scenarios for workers have been identified and high-level summaries of the assumptions and resultant dose estimates have been provided. However, the detailed dose calculations have not been provided. Rationale: The method used to estimate effective, equivalent and committed dose is required to be verified. Sample dose calculations should be included, to confirm use of acceptable input data, for at least the most dose significant scenarios. | Provide the dose calculations for deriving the dose estimates for workers in all exposure scenarios, for at least the most dose significant scenarios. | | Accepted |
| IR-184 | - | CNSC | Human Health with respect to radiation exposure | Section 10.2 Appendix 10-C, 2.0 | Context: It is stated in Appendix 10-C, section 2.0 that: “In addition, the CNSC has proposed a 100 mSv 5-year equivalent dose to lens of eye, in accordance with recent recommendations of the International Commission for Radiological Protection (ICRP, 2012a). This implies an average annual equivalent dose to lens of 20 mSv/a and will be considered as an applicable dose limit for workers.” As per section 14 of the Radiation Protection Regulations, the equivalent dose limit for the lens of an eye for nuclear energy workers (NEWs), effective January 1, 2021, is 50 mSv in a one-year dosimetry period. Rationale: The reason of the requested change is to ensure consistency with the Radiation Protection Regulations. | The EIS and Appendix 10-C should be aligned with the Radiation Protection Regulations regarding the equivalent dose limit for the lens of an eye for NEWs. | | Accepted |
| IR-185 | - | CNSC | Human Health with respect to radiation exposure | Section 10.2.3.2 Appendix 10-C Table 3.10-3.12 | Context: The Geometries for External Exposure Scenarios Modelled in MicroShield for Sources in various locations were provided in tables 3.10-3.12 in appendix 10-C. The doses from those scenarios were omitted. Rationale: The method used to estimate effective, equivalent, and committed dose is required to be verified. Sample dose calculations should be included, to confirm use of acceptable input data. | The Proponent is asked to provide all the necessary information and assumptions required to perform the MicroShield calculations independently and to list the resulting calculated values from the listed scenarios. | | Accepted |
| IR-186 | - | CNSC | Human Health with respect to radiation exposure | Section 10.2.3.2.4 Section 10.2.3.2.6 Section 10.2.4 Appendix 10-C, Section 3.2 | Context: In sections 10.2.3.2.4 and 10.2.3.2.6, as well as section 3.2 of Appendix 10-C, the Proponent has stated that workers in the drying and packaging areas of the processing plant will be required to wear powered air purifying respirators (PAPR) to reduce/eliminate inhalation exposure. Further in section 10.2.4, which elaborates mitigation measures, it is stated: “For the drying and packaging/loading areas of the ISR plant, use of PAPR has been assumed. It will be needed in these areas, and it has been planned in these areas to substantially reduce doses from inhalation of uranium dust. Dust levels in these areas will be monitored and kept ALARA.” The use of respirators appears to be in contradiction of the requirements of section 13 of the Uranium Mines and Mills Regulations, which states: <i>No licensee shall rely on the use of a respirator to comply with the Radiation Protection Regulations unless the use of the respirator (a) is for a temporary or unforeseen situation; and (b) is permitted by the code of practice referred</i> | Provide the rationale for mandating the use of respirators by workers in the drying and packaging areas of the processing plant. Include the demonstration of the application of the hierarchy of control for radiological protection within the design of these areas of the processing plant. Justify that this approach complies with section 13 of the Uranium Mines and Mills Regulations. | | Accepted |

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| | | | | | <i>to in the licence.</i> The Proponent is also reminded that respirators should not be the first choice for dose reduction in workplaces. They should only be used when the hierarchy of control (elimination, substitution, engineering, or administrative controls) is not possible. Rationale: At this stage of the Project, the Proponent is expected to identify design improvements to these areas of the ISR plant/processing plant following the hierarchy of control for the radiological protection of workers, as per regulatory requirements and as described in REGDOC-2.7.1, <i>Radiation Protection</i> . | | | |
| IR-187 | - | CNSC | Human Health with respect to radiation exposure | Section 10.2.3.2.4 Section 10.2.3.2.6 Appendix 10-C, Section 3.3, 6.0 | Context: The exposure scenarios and assumptions for the workers in the drying area and the packaging/loading area of the processing plant include the wearing of PAPRs, which is assumed to provide a 1000-fold reduction in dust exposure. Further to reference IR-186, the use of a respirator as well as in worker dose predictions for the Project, appears to contravene section 13 of the Uranium Mines and Mills Regulations, and does not follow the hierarchy of controls for radiological protection of workers as described in REGDOC-2.7.1, Radiation Protection. Rationale: At this stage of the Project, the Proponent is expected to identify design improvements to these areas of the ISR plant/processing plant following the hierarchy of control for the radiological protection of workers, as per regulatory requirements and as described in REGDOC-2.7.1, <i>Radiation Protection</i> . | Modify the exposure scenarios and assumptions (i.e., remove the use of a respirator) for the workers in the drying area and the packaging/loading area of the processing facility. Assess the resultant exposures against CNSC regulatory dose limits and the ALARA principle. Identify mitigation measures as per the hierarchy of control for radiological protection. | | Accepted |
| IR-188 | - | CNSC | Human Health with respect to radiation exposure | Section 10.2.4 | Context: The following is stated in section 10.2.4: “Dust inhalation is also a potentially substantial component of worker dose at the core shack. At this location, PAPR will not be required; however, N95 masks will be used, and dust levels will be monitored here...It may be possible to increase air exchange in the core shack, above the planned six exchanges per hour, should this be necessary. This would also reduce radon exposure in the core shack.” If it is possible to increase air exchanges in the core shack, it is not clear why this was not assessed and incorporated in the design of the core shack. Rationale: It appears that a control measure (e.g., air exchange protocols in the core shack) to reduce the exposure to workers has been identified. However, it is not certain if it has been formally documented to ensure that it is incorporated in the engineered design of the core shack. | Provide details on how the control measures to reduce the exposure to both workers through the air exchange protocols in the core shack have been formally documented to ensure that it is incorporated in the engineered design of the core shack. | | Accepted |

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| IR-189 | - | CNSC | Woodland Caribou Ecological Model | Appendix 10-A (ERA) | <p>Context: In the ERA (p. C.12, section 2.3.6 Woodland Caribou) it is stated: “For the ecological model a diet comprised of 50% browse, 20% lichen and 30% macrophytes is assumed for the woodland caribou.”</p> <p>In the EIS, section 9.3.3.3.1, it is stated: “Research has shown that up to 70% of the year-round diet of caribou may consist of ground and arboreal lichens.”</p> <p>Rationale: It is unclear whether the assumptions in the ecological model in the ERA regarding Woodland caribou diet are conservative, given only 20% lichen intake in the model. Lichen is known to accumulate COPC such as metals and dust from the atmosphere.</p> | <p>Please provide additional evidence to support that those Woodland Caribou who may have higher consumption rates of lichen as part of their diet, will remain protected. This can be provided through including a second model that assumes 70% lichen in the diet.</p> <p>See also related: IR-138.</p> | <p>This response has not been accepted. Please:</p> <ol style="list-style-type: none">1. Provide a summary table of all hazard quotients for the second woodland caribou model assuming a diet of 70% lichen, 20% browse, and 10% macrophytes, for completeness.2. Clarify if the Appendix 10-A (ERA) will be updated to include the second woodland caribou model. | Not Accepted |
| IR-190 | - | HC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Table 3-8 (p. 3.31) and Table 3-9 (p. 3.36) Appendix 6, Table 5 (p. 16) | <p>NO2 criteria is not being consistently compared.</p> <p>Context: Provincial and federal air quality criteria/screening values for NO2 have been used inconsistently.</p> <p>Table 3-9 in Appendix 10-A (ERA) uses the 2015 Saskatchewan Ambient Air Quality Standards (SAAQS) value of 300 µg/m3 to compare the maximum concentrations of NO2 at receptor locations for the 1-hour average period, while Table 5 of Appendix 6 uses the 2025 Canadian Ambient Air Quality Standards (CAAQS) of 79µg/m3 for the same average period time.</p> <p>Rationale: By utilizing the SAAQS screening value for NO2, the maximum concentrations at receptor locations exceed the 1-hour threshold solely during the decommissioning stage (Table 3-9). However, if the 2025 CAAQS are applied, the screening values would be exceeded at receptor locations for all project phases. It is best practice to use the more protective air quality standards to evaluate potential human health risks associated with project activities.</p> | <p>1. Compare the predicted maximum concentrations to the most protective applicable air quality standards available. Alternatively, provide a rationale as to why the SAAQS for NO2 were used rather than the more protective 2025 CAAQS to determine potential exceedances and screen for the need for additional mitigation measures.</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends use of the standards from the 2025 CAAQS for NO2 in future mitigation and follow-up plans.</p> | <p>This response has not been accepted, as the rationale for not applying the CAAQS in the assessment is not accurate.</p> <p>Health Canada acknowledges the commitment to use the 2025 CAAQS for NO₂ in future mitigation and follow-up plans. However, the response to IR-190 did not compare the predicted maximum concentrations to the most protective applicable air quality standards available (i.e., CAAQS), and included the following rationale:</p> <p><i>The CAAQS are applicable to measured ambient air concentrations over a three-year period and are not applicable to modelled results from a single facility; and, Use of the CAAQCs would require a three-year site specific data set.</i></p> <p>The statement is incorrect. The CAAQS are national air quality standards, but they are not restricted to applications within the context of the Air Quality Management System (AQMS). The comparison with CAAQS may be considered in determining the nature and severity of the Project’s impact on air quality levels and the resulting mitigation measures that may be required to maintain good air quality levels or to prevent an exceedance of the CAAQS.</p> <p>The CAAQS are generally calculated for specific multi-year averages and for a particular statistical form so that extreme and unpredictable events do not drive risk management. However, if the data is not available for comparison to a full CAAQS timeframe, Health Canada suggests using model results for at least one calendar year to allow for a basic comparison with the CAAQS statistical form. The modelling results should be able to indicate the frequency of CAAQS exceedances, which can be used in the discussion as to whether any anticipated human health impacts are anticipated.</p> <p>Please see the Advice to the Proponent table for further discussion on the use of CAAQS (AD-69), which also notes that, while being more conservative than the NAAQO, Saskatchewan & Alberta’s screening value do not reflect</p> | Not Accepted |

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| | | | | | | | the most recent science, which indicates that there is no apparent threshold for NO ₂ , meaning that health effects may occur at any level of exposure. See also follow-up IR 190-R1. | |
| IR-190 | IR-190-R1 | HC | Change to an environmental component due to hazardous contaminants | Section 6.1.3.2.2 (p. 6-21) Table 6.1-8 (p. 6-22); and, Table 6.1-9 (p. 6-22) Section 6.1.8 (p.6-44) IR-190 Response from Denison | <p>Limitations with the proposed use of passive NO₂ monitoring would not allow comparison of measurement results to the 2025 CAAQS for 1-hour NO₂.</p> <p>Context: In response to IR-190, there was agreement to using the 2025 CAAQS for NO₂ in future mitigation and follow-up plans, which Health Canada supports. However, the proposed air quality monitoring and follow-up plans (Chapter 6.1.8) anticipate continued use passive NO₂ samplers, which do not measure hourly (1-hour) concentrations.</p> <p>Section 6.1.3.2.2 indicates that the assessment makes use of passive samplers to measure NO₂ at two sampling locations. The results from those samplers are presented in tables 6.1-8 and 6.1-9, for a ~30-day sampling period (i.e., a total concentrations for NO₂ in ambient air over ~30 days).</p> <p>While passive samplers provide measurement data for comparison to the annual 2025 CAAQS for NO₂, measurement data for the 1-hour NO₂ standard commonly requires use of an active sampler.</p> <p>Rationale: Health Canada encourages the monitoring of air contaminants when exceedances or near-exceedances of air quality criteria, standards and/or guidance values are predicted or reported, to:</p> <ul style="list-style-type: none">• determine the accuracy of predictions;• help verify whether standards are being met; and,• assist with implementing or modifying mitigation measures. | <p>1. Provide additional details on proposed air quality monitoring for NO₂ that will allow for comparisons to both the 1-hour and annual 2025 CAAQS and how that will be used to support mitigation and follow-up plans. Distinguish between comparisons with measured and modelled monitoring data, as well as use of passive and active samplers.</p> <p>2. If multiple approaches will be used to monitor NO₂ (e.g., use of passive and/or active samplers, modifications due to differences between project phases, etc.), describe their intended contribution to the monitoring objectives and outcomes (e.g., determine the accuracy of predictions; assist with implementing or modifying mitigation measures).</p> | | Follow-Up IR |
| IR-191 | - | HC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Table 3-9 (p. 3.36) and Table 3-10 (p. 3.46) Section 6.1.8 (p. 6-44) | <p>Non-threshold substances are not included in screening and monitoring plans.</p> <p>Context: Fine particulate matter (PM_{2.5}) is not being considered further in secondary air quality screening for short and long-term exposure at human and ecological receptors because it is not predicted to exceed the screening values of the Ontario Ambient Air Quality Criteria (OAAQC) or the Canadian Ambient Air Quality Standards (CAAQS) for both annual and 24-hour average periods (Tables 3-9 and 3-10). Furthermore, it is not compared against the baseline for analysis.</p> <p>Table 3-9 indicates that coarse PM (PM₁₀) is predicted to exceed the 24-hour CAAQS during all phases of the Project. However, Appendix 10-A p. 3.46 states that, “There were no exceedances of PM_{2.5} which is generally considered to be a more reliable indicator of potential health effects. However, health effects would be infrequent and reversible, subsiding after</p> | <p>1. Include PM_{2.5} and PM₁₀ in the secondary air quality screening for short and long- term exposure at human receptors.</p> <p>2. Include PM₁₀ and PM_{2.5} in the air quality monitoring plan as they are non- threshold substances.</p> <p>3. Provide a discussion of the significance of predicted exceedances of health- based standards.</p> <p>4. Identify additional mitigation measures to reduce concentrations of non-threshold air contaminants associated with the Project.</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends use of the <u>2025 CAAQS Management Levels</u> to develop mitigation measures that reduce project contributions of non-threshold pollutants (e.g., PM_{2.5}, NO₂).</p> | | Accepted |

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| | | | | | <p>exposure; therefore, PM10 was not considered for further quantitative assessment in the ERA.”</p> <p>PM10 and PM2.5 were not included in the air quality monitoring plan (Section 6.1.8).</p> <p>Rationale: Particulate matter and NO2 are considered non- threshold pollutants, meaning that health effects can occur at any level of exposure, The CAAQS for PM2.5 PM.10, and NO2 recognize that there is no population health threshold for human health effects; therefore, any increase in exposure will result in an incremental population risk (Environment Canada and Health Canada, 2012; CCME, 2000). The CAAQS values should not be construed as limits to which polluting up to is allowed. In addition, based on the principles of keeping clean areas clean and continuous improvement, proposed mitigation measures should not be confined to meeting the standards but should also be targeted towards reducing population exposure to CACs associated with the proposed project.</p> <p>Furthermore, although health risks associated with PM2.5 are higher than those associated with PM10, both fractions are considered non- threshold pollutants and identified by IARC (2013) as causes of cancer.</p> <p>Reference: [1] International Agency for Research on Cancer (IARC). 2013. IARC monographs on the evaluation of carcinogenic risks to humans. Volume 109. Outdoor air pollution. Lyon: International Agency for Research on Cancer.</p> | | | |
| IR-192 | - | CNSC | Human Health with respect to radiation exposure | Appendix 10-A (ERA), Section 3.1.1.2, including Tables 3-1 and 3-2 | <p>Context: Section 3.1.1.2 in Appendix 10-A (ERA) provides the method of how select constituents including cadmium, chromium, selenium and lead-210 were determined. This section does not mention how the other constituents as listed in Tables 3-1 and 3-2 are determined.</p> <p>The values for Th-230 and U-238 in Table 3-1 are unexpected. Typically, these values should be at equilibrium.</p> <p>Rationale: The technical basis for the selection of constituents of concern is required as part of the environmental and human health risk assessments.</p> | <p>1. Provide the methodology of how all listed constituents are determined.</p> <p>2. Provide the rationale as to why Th-230 and U-238 are not in equilibrium.</p> | | Accepted |
| IR-193 | - | ECCC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Section 3.1.1.2 Section 8.2.4.2.3 | <p>Context: Appendix 10-A (ERA) Table 3-1 ‘Screening of Effluent Quality against Surface Water Quality Guidelines for the Wheeler River ERA’ does not include acute water quality thresholds for all COPCs compared against predicted effluent quality. For example, it is stated that the final effluent quality discharge target for uranium is 0.057 mg/L. However, the CCME water short term (acute) water quality guidelines for the protection of aquatic life is 0.033 mg/L. The proposed effluent discharge target for uranium exceeds the acute water quality guidelines, indicating effluent may pose the risk of being acutely lethal to aquatic biota at end-of-pipe.</p> | <p>1. Provide acute and chronic water quality thresholds for all required COPCs with monitoring required under the MDMER.</p> <p>2. Ensure all water quality thresholds are derived from receiving environment baseline parameters and that these thresholds are consistently applied throughout the draft EIS.</p> | This response has not been accepted, as the Proponent has not included un-ionized ammonia, mercury and phosphorous in Table 3-1 in Appendix 10-A or provided acute and chronic water quality thresholds for all COPCs, including those with monitoring required under the MDMER, in Table 3-1 in Appendix 10-A (ERA). Water quality thresholds derived from receiving environment baseline parameters have not been consistently applied throughout the draft EIS. It is unclear from the current information provided if predicted effluent concentrations exceed acute water quality guidelines, | Not Accepted |

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| | | | | | <p>All water quality thresholds should be derived from receiving environment parameters, and there are discrepancies between the values used in Appendix 10-A (ERA) Table 3-1 and the values presented in Tables 8.2-8 and 8.2-10 in Section 8.2.4.2.3 of the draft EIS. No selected screening value for TSS has been calculated from baseline conditions. Un-ionized ammonia, which is a regulated Schedule 4 substance under the MDMER, has not been included.</p> <p>Rationale: A review of all modelling results for all COPCs under the MDMER will assist ECCC in understanding the potential risks to the receiving environment.</p> | | <p>indicating effluent may pose the risk of being acutely lethal to aquatic biota at end of pipe.</p> <p>The Proponent should:</p> <ol style="list-style-type: none">1. Update Table 3-1 in Appendix 10-A to include un-ionized ammonia, mercury and phosphorous. Update the risk assessment to incorporate these parameters as needed.2. Update Table 3-1 in Appendix 10-A and Tables 8.2-8 and 8.2-10 in Section 8.2.4.2.3 of the draft EIS to include both acute and chronic water quality thresholds derived from receiving environment baseline parameters and in accordance with IR- 114. | |
| IR-194 | - | ECCC | Aquatic species | Appendix 10-A (ERA), Section 3.1.1.2 and Section 3.1.2.3 | <p>Context: In the ERA, COPCs should be selected for further assessment based upon the following factors:</p> <ol style="list-style-type: none">1. COPC concentrations in effluent that exceed selected water quality guidelines for the protection of aquatic biota, and2. Baseline COPC concentrations in the LSA that exceed selected surface water and sediment quality guidelines for the protection of aquatic biota. <p>However, only COPCs that had concentrations in effluent that exceeded guidelines were assessed further. Baseline concentrations of COPCs in sediment were not considered. In addition to this, not all COPCs that require monitoring under the MDMER had predicted effluent concentrations. From Section 8.2.3.3 Table 8.2-2 of the Aquatic Environment Report, it appears Aluminum in McGowan Lake and Whitefish Lake South and North, and pH in Whitefish Lake North exceed water quality guidelines. Predicted effluent concentrations or near-field surface water concentrations for Aluminum and pH are not provided.</p> <p>Rationale: It is not possible to determine if there is risk from effluent to the receiving environment and aquatic receptors based on the current information provided.</p> | <ol style="list-style-type: none">1. As noted in IR-114, provide the information on predicted effluent quality for COPCs with required monitoring under the MDMER.2. Provide the information on predicted maximum receiving environment surface water concentrations for COPCs with required monitoring under the MDMER in IR-114.3. Update the ERA to assess the risk of any additional MDMER COPC concentrations in effluent that exceed water quality guidelines.4. Update the ERA to assess the risk of COPCs that had elevated baseline water and sediment quality concentrations in the receiving environment. | <p>This response has not been accepted, as the Proponent has not updated the ERA to assess elevated baseline concentrations to delineate potential Project effects from background conditions.</p> <p>The Proponent’s response states: “The ERA followed the guidance in CSA N288.6-22 which does not require COPCs with elevated baseline concentrations to be considered COPCs for further quantitative assessment in the ERA. Clause 6.2.5.9 indicates that constituents with naturally elevated concentrations should be excluded from further consideration as a COPC.”</p> <p>Section 6.2.5.9 of N288.6-22 is specific to the Human Health Risk Assessment, and this statement does not apply to the Ecological Risk Assessment (EcoRA). Section 7 of N288.6-22 is specific to the development of the EcoRA methodology, and in Section 7.2.5.2.6 of N288.6-22 it states: “In addition to screening of effluent and emissions data, concentrations measured in environmental media should be considered, as determined in the EMPs. Maximum concentrations measured in soil, receiving water, or sediment should be compared to screening criteria.” Therefore, COPCs that had elevated baseline water and sediment quality concentrations in the receiving environment should be assessed in the ERA.</p> <p>Additionally, in Section 7.2.5.4.2 of N288.6-22 it is stated: “If COPCs exceed the screening level for one medium, they should be carried forward into the EcoRA for all media that are likely to contribute to exposure. For example, for a given COPC, if a water screening benchmark is exceeded, the same COPC should be carried forward for sediment if its concentration was above the detection limit.” Therefore, if baseline exceedances occur in one media types, they should be carried forward for all media types in the ERA.</p> <p>It is not possible to determine if there is risk from effluent to the receiving environment and aquatic receptors based on the current information provided. Negative effects to biota from naturally elevated background</p> | Not Accepted |

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| | | | | | | | concentrations of COPCs can be exacerbated by additional input of COPCs from Project effluent into the receiving environment. It is important to characterize and assess those potential effects and delineate potential Project effects from background conditions. Please: 1. Update Table 3-1 in Appendix 10-A to include un-ionized ammonia, mercury and phosphorous. Update the risk assessment to incorporate these parameters as needed. 2. Update the ERA to assess the risk of COPCs that had elevated baseline water quality concentrations in the receiving environment: aluminum, iron, and lead. | |
| IR-195 | - | ECCC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Section 3.1.2.1 | <p>Context: Figure 3-2 depicts modelled concentrations of COPCs in the receiving environment surface water during all Project phases. Effluent discharge rates during Operations and Decommissioning are not anticipated to differ significantly. However, COPC concentrations seem to decrease rapidly after the end of the operations period despite effluent releases continuing into the decommissioning phase.</p> <p>Rationale: There has been no information provided on predicted changes in effluent COPC concentrations and discharge rates during the decommissioning phase. It remains unclear how COPC concentrations would decrease so quickly following the end of operations.</p> | 1. Provide further information on modelled maximum COPC concentrations for each individual Project phase with estimated timing for peak concentrations to appear in the receiving environment. 2. Provide further information on predicted effluent quality during the Project decommissioning phase. 3. Update ERA figures and conclusions as needed. | <p>This response has not been accepted. Although the Proponent addressed items 2 and 3, further information on maximum predicted concentrations of COPCs in water quality during various Project stages and how hydrological processes affect COPC concentrations from Project effluent is required based on the information provided in the Proponent’s response to validate the Proponent’s predictions.</p> <p>The Proponent has provided updated tables with modelled maximum COPC concentrations in water and sediment by individual Project phase but did not include the environmental quality guidelines for COPCs which were included in the original tables. The Proponent’s response confirmed the predicted effluent quality during the decommissioning phase. In their response the Proponent states: “Therefore, the modelled maximum COPC concentrations in water are the same for operations and decommissioning phases (which is considered conservative), the same peak concentrations appear annually due to the variation of the monthly local inflow. Since COPCs are accumulated in sediment, the modelled maximum COPC concentrations in sediment appear at the end of each individual Project phase, which are year 20 for the operations and year 25 for the decommissioning in Figure 3-3.”</p> <p>The figures provided in the response support this statement, however, maximum predicted concentrations of COPCs in receiving water quality occur within a year of operations commencing. COPC concentrations in water also return to baseline within one year after decommissioning is complete. However, maximum predicted concentrations of COPCs in sediment quality do not occur until the end of the Project lifecycle due to accumulation over time, which is expected.</p> <p>Rationale: It is unclear how maximum predicted concentrations of COPCs in water quality occur so quickly and decrease so quickly after Project operations commencement and decommissioning respectively. Further</p> | Not Accepted |

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| | | | | | | | <p>information on the hydrological processes that facilitate this is necessary to validate predictions.</p> <p>Provide further information regarding maximum predicted concentrations of COPCs in water quality during various Project stages and how hydrological processes (i.e. flows, retention time, etc.) facilitate the fast increase and decrease of COPC concentrations from Project effluent. This information should be included in Appendix 10-A, Section 3.1.2.1.</p> | |
| IR-196 | - | ECCC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Section 3.1.2.3 | <p>Context: Table 3-6 provides predicted maximum sediment concentrations of COPCs compared to sediment quality guidelines. Several selected sediment screening values are not the most stringent sediment quality guidelines, with no justification provided. Additionally, copper and lead appear to be missing guidelines that are available from the Burnett-Seidel and Liber (2013) study.</p> <p>Rationale: The most stringent guidelines should be used for the sediment quality risk assessment in the ERA. Use of the most stringent guidelines will allow the most protective assessment to analyze risks to the receiving environment, aquatic and terrestrial biota.</p> | <p>1. Provide further information and justification for the selection of less stringent thresholds.</p> <p>2. Update the ERA as needed.</p> | . | Accepted |
| IR-197 | - | ECCC | Aquatic species | Appendix 10-A (ERA), Section 3.2 | <p>Context: It remains unclear if atmospheric deposition from Project related emissions has been incorporated into modelling for the ERA and surface water and sediment quality assessments.</p> <p>Rationale: While expected Project air emissions are unlikely to have direct impacts on the aquatic receiving environment and aquatic biota, this Project effect pathway may have indirect effects through accumulation of COPCs over time or deposition of contaminants that are not expected in effluent, which should be evaluated with predicted emissions data incorporated into water quality modelling predictions.</p> | Incorporate atmospheric deposition from Project-related emissions into water quality modelling and assess any Project related effects to aquatic receptors from this pathway. | <p>This response has not been accepted, as the Proponent has not provided a valid explanation for not incorporating atmospheric deposition from Project-related air emissions into water quality modelling and assessing Project-related effects to aquatic receptors from this pathway.</p> <p>In the Proponent’s response it is stated: “Consistent with CSA N288.1-20, Clause 5.1.5, atmospheric depositions to large water bodies such as lakes, are considered negligible; therefore, the air to surface water pathway has been excluded for the ecological risk assessment. The rationale for exclusion of atmospheric deposition to lakes and rivers is explained in detail in Section G9, Appendix G of the COG DRL Guidance Document (Hart, 2019).” However, both of these documents explicitly apply to human dose rate calculations and models for human end-points from radiation effects of radionuclides; they do not cover non- human biota nor non-radionuclide COPCs or chemical toxicity of radionuclides. Atmospheric deposition rates to large water bodies may be negligible for dose rates to human biota as they are not likely to be directly impacted or in the near-field vicinity. However, this may not be the case for aquatic receptors directly within the receiving environment.</p> <p>A sufficient explanation for exclusion of atmospheric deposition of COPCs to surface water from Project activities has not been provided from an ecological perspective. This Project effect pathway may have effects on the aquatic receiving environment through accumulation of COPCs over time or deposition of contaminants that are not expected in effluent, which should be evaluated with predicted emissions data incorporated into water quality modelling predictions.</p> | Not Accepted |

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| | | | | | | | <p>ECCC requires atmospheric deposition from Project-related emissions to be incorporated into water quality modelling and that the Proponent assess any Project-related effects to aquatic receptors from this pathway in order to assess potential effects on the aquatic receiving environment.</p> <p>Incorporate atmospheric deposition from Project- related emissions into water quality modelling and assess any Project-related effects to aquatic receptors from this pathway. Review CSA N288.6, otherwise, provide valid rationale from an ecological perspective for the elimination of this potential Project effects pathway.</p> | |
| IR-198 | - | HC | Change to an environmental component due to radiological contaminants | <p>Appendix 10-A (ERA) Appendix B, Tables B.7 and B.8 Ref. 19-2638</p> <p>Appendix 10-A (ERA), Table 4-3 Ref. 19-2638 (p. 4.17)</p> | <p>Context: Section 10 Appendix 10-A (ERA) contains Table 4-3 (p. 4.17), which lists ingestion rates for traditional foods and includes the category “organs” for Mammals.</p> <p>Tables B.7 and Table B.8 in Section 10 Appendix 10-A (ERA) Ref. 19-2638 provide the predicted concentrations of radionuclides for ecological receptors during the Project phases and during future centuries, respectively. They list the concentrations of radionuclides in moose and in moose organs, which is presented as a single cumulative organ value. Other terrestrial and aquatic animals (such as the black bear and woodland caribou) that are a part of the traditional diet of nearby Indigenous communities have higher concentrations of radionuclides than moose, yet concentrations are not provided for organs of these species.</p> <p>Rationale: While Health Canada is not aware of transfer factors to individual organs, or to organs in animals that are not ruminants, it would be beneficial to have a better understanding of radionuclide concentrations in the organs of other animals that may be consumed by local Indigenous communities.</p> | <p>1. Provide more clarification on how the mammalian organ ingestion rates are calculated (which animals and relative contribution percentages).</p> <p>2. Provide a rationale for why concentrations of radionuclides were not assessed in organs of animals (other than moose) that are consumed as country foods by Indigenous people harvesting in the area.</p> | <p>This response has not been accepted, as the assessment should consider organ meats from different animals if these are consumed by local population, and estimated consumption rates should be confirmed.</p> <p>The response to IR-198 presents the estimated radionuclide concentrations in moose and caribou organ meats (as mass concentrations), where the concentrations of certain radionuclides (U-238, U-234, Pb-210 and Po-210) in caribou organ meat are indeed estimated to be higher than in moose organ meat. However, the response also indicates that moose organ meat consumption represents the large majority of organ meat consumption (~80%), roughly offsetting the higher concentrations in caribou organs. When calculating tissue concentrations of radionuclides, the higher consumption rate of moose organ meat in comparison to caribou organ meat appears insufficient to compensate for the higher estimated concentrations of U-238, U-234, Pb-210 and Po-210 in caribou meat and as a result, exposures to these radionuclides from organ meat consumption may be underestimated. Health Canada recommends assessing moose and caribou organ meat separately (rather than using moose as a proxy) to confirm that COPCs including radionuclides from organ meat consumption have not been underestimated.</p> <p>IR-198 also includes additional information on organ meat consumption rates for the La Plonge and Patuanak communities to estimate dietary exposure via organ consumption, but it is unclear how these relate to the values used in the Draft EIS and ERA (Appendix 10-A). Specifically, Page 4.16 of Appendix 10-A: <i>Environmental Risk Assessment for Wheeler River</i> (September 9, 2022) states:</p> <p><i>“As a conservative approach for this assessment, the Patuanak diet was selected to represent the average traditional foods consumer in the HHRA”</i></p> <p>However, Table 4-4 (p. 4.19) reports an annual organ meat consumption rate of 4.49 kg for the adult average traditional food consumer while the reported daily Patuanak consumption rate for organ meat is 16.2 g (Table 4-3; p.4.17), which equates to an annual rate of 5.91 kg. Health Canada</p> | Not Accepted |

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| | | | | | | | recommends a rationale be provided for this discrepancy, and if necessary, the correct estimated rate and associated assessment calculations. See also follow-up IR-198-R1. | |
| IR-198 | IR-198-R1 | HC | Change to an environmental component due to radiological contaminants | Annex 1 Response to Information Requests (Denison Mining) – August 18, 2023 IR-198 Response from Denison – COPC Concentrations in Organs (<i>Pages 74, and 354-357 of 419</i>) Appendix 10-A (ERA) | <p><i>Environmental Risk Assessment for Wheeler River</i> (September 9, 2022) does not include an assessment of radionuclides based on their mass concentrations in country foods (the assessment is only based on radionuclide concentrations).</p> <p>Context: As part of the response to IR-198 estimated Pb-210 concentrations in moose organ and caribou organ of 7.15 and 49.4 mg/kg (ww) are reported, respectively. However, Appendix 10-A: <i>Environmental Risk Assessment for Wheeler River</i> (September 9, 2022) does not include an assessment of lead among the non-radionuclide COPCs.</p> <p>Using the organ meat consumption figure from the Patuanak community (16.2 g/day), exposure to Pb-210 from caribou organ meat is estimated at over 11 ug/kg bw per day (based on the response to IR-198) which would be close to 10 times greater than the 95th percentile dietary lead exposure estimates for the general Canadian population consuming retail foods.</p> <p>Rationale: While the abundance of radionuclides may pose a health risk with respect to radioactivity, their presence as chemical contaminants may also have an impact on health. This is demonstrated by the case of Pb-210 described above. Due to their potential toxicological significance to human health, Health Canada recommends assessing arsenic, cadmium, lead and mercury as part of country food assessment, regardless of the method employed to determine COPCs.</p> | <p>1. Provide a rationale on why radionuclide mass concentrations were not assessed for their impact to human health.</p> <p>2. Provide an assessment of Lead (Pb) as a chemical contaminant (non-radionuclide) COPC to better understand potential health risks and inform management, mitigation, monitoring and/or follow-up planning.</p> | | Follow-Up IR |
| IR-199 | - | ECCC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Sections 3.2.1 and 3.3.1, Wheeler River Project IMPACT Model | <p>Context: Model calibrated concentrations of selenium, uranium, and lead-210 are under-predicted compared to measured baseline concentrations for water quality in the IMPACT modelling based on Figure 3-2. Calibrated concentrations of cobalt are under-predicted and there is poor agreement between model calibrated and measured concentrations of arsenic, lead-210, polonium-210, and radium-226 for sediment quality in Figure 3-3.</p> <p>Rationale: It is unclear how poor agreement between model calibrated and measured baseline concentrations of COPCs impacts the near-field and far-field modelling predictions of COPCs during all Project phases. It is also unclear why measured concentrations of COPCS could not be used directly as model inputs when there was poor agreement.</p> | <p>1. Provide justification as to why model calibrated concentration inputs of COPCs were preferable for use in predictive modelling of water and sediment quality over measured baseline concentrations.</p> <p>2. Provide a rationale detailing how under- or over-predicted model calibrated COPC concentration inputs influence IMPACT model predictions and uncertainty for water and sediment quality. Provide specific details on how this may impact the risk analysis for parameters that have been highlighted as having poor agreement between calibrated and measured concentrations (i.e., arsenic, selenium, uranium, lead-210, polonium-210, and radium-226).</p> | <p>This response has not been accepted, as the explanation and rationale provided by the Proponent is not sufficient to validate the model performance.</p> <p>Beyond the figures demonstrating modelled versus measured concentrations of COPCs in water and sediment provided in Appendix A, no quantitative statistical metrics validating model performance have been provided by the Proponent. It is also unclear if the geometric mean for each COPC at each monitoring station was calculated as individual inputs per station or if a single geometric mean for each COPC was calculated using all sampling data. Using a single geometric mean of all samples would result in not capturing the variation in concentrations of COPCs between sampling stations such as variation between different lakes. The Proponent’s response provided no additional information that was not already in the EIS to the information request for specific details on how under- or over-predicted model calibrated COPC concentration inputs</p> | Not Accepted |

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| | | | | | | | <p>influence IMPACT model predictions and uncertainty for water and sediment quality.</p> <p>Without statistical metrics validating model performance, there is no quantitative evidence to support conclusions of model performance regarding the use of model calibrated concentration inputs of COPCs and conclusions on under- and over-predicted COPC concentration inputs influence on risk assessment conclusions. It is also unclear if the methodology for using the geometric mean of all samples for each COPC has eliminated variation between sample sites for modelling, and how this affects the conclusions of risk.</p> <p>ECCC requires further information on how using geometric mean values of the measured baseline data influences variation between sites and model outputs, as well as quantitative statistical metrics validating model performance to verify the Proponent’s conclusions.</p> <p>Please provide:</p> <p>1. Further information on how using geometric mean values of the measured baseline data influences variation between sites and model outputs.</p> <p>2. Quantitative statistical metrics validating model performance to support conclusions on model calibrated concentration inputs of COPCs and risk assessment conclusions, with particular focus on influence of over- and under-predicted COPC concentration inputs. Include model performance benchmarks for comparison.</p> | |
| IR-200 | - | HC | Indigenous Peoples' health / Socio-economic conditions | Section 10 (p. 4.10) Appendix 10-A (ERA), Table 4-4 (p. 4.19) | <p>Indigenous consultation should be included in the Country Foods analysis.</p> <p>Context: The Proponent obtained country food consumption data through engagement with a single local fisher/trapper and from a dietary survey administered by CanNorth to the English River First Nations (ERFN) in 2017. However, the potential health risks to consumers of traditional food were only assessed using the data obtained from the CanNorth dietary survey. Section 10 of the EIS <i>states the following</i>: “The diet assumptions for the fisher/trapper are conservative and are based on engagement with a local fisher/trapper. The diet of the fisher/trapper is representative of one person, who consumes a unique composition and quantity of traditional foods (e.g., ingestion rate of 175 kg/yr of caribou, equivalent to approximately 2 to 3 servings per day). Most people fishing, hunting, and trapping in the Local Study Area and Regional Study Area would consume traditional foods more consistent with the average traditional foods consumer diet which was developed from the ERFN country foods study. In comparison, the ERFN country foods study in Section 10 Appendix 10-A (ERA) Table 4- 4 indicates a caribou ingestion rate of 2.6 kg/yr (1 to 2 servings per month) and a total game ingestion rate of 21.3 kg/yr” (p. 4.10).</p> | <p>1. Evaluate the suitability of using the 2017 EFRN survey results and consider surveying additional community members (such as local hunters/trappers) to obtain more representative country food consumption rates for use in the traditional foods risk assessment, and for communicating the results to the communities.</p> <p>2. Additionally, consider evaluating consumption patterns (and applicable TRVs) of sensitive or vulnerable populations (e.g., elders, toddlers, women of childbearing age) in the traditional food risk assessment and provide risk levels for these sub-groups separately.</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends providing the community with the opportunity to validate the ERFN 2017 survey results.</p> | <p>This response has not been accepted, as it did not provide the requested information to support the assumption used in the traditional foods risk assessment.</p> <p>The response did state:</p> <p><i>The 2017 report was authored by ERFN and as such there is no need for Denison to ask ERFN to validate their own report.</i></p> <p>The dietary survey administered by CanNorth to the English River First Nations (ERFN) in 2017 was an important resource that contributed to the risk assessment; however, the ERFN’s Information Request (IR-1) raised similar questions about the EIS’s assumptions on Indigenous land use and diet, and the perception that feedback from the local ERFN trapper was not representative of the community’s current and future land use. The response to IR-1 referenced meetings/discussions that were held with the ERFN to better understand how their community uses the area and their diet.</p> | Not Accepted |

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| | | | | | Rationale: Health Canada is in general agreement that the dietary habits of the local fisher/trapper may be an outlier and not necessarily representative of most of the local population. However, a rationale has not been provided to demonstrate whether and how the 2017 ERFN dietary survey results are representative of consumption patterns of local Indigenous communities. Also, it is unclear whether or how the ERFN dietary survey results account for the consumption patterns of vulnerable or more sensitive subgroups (e.g., heavy consumers, children and women of child-bearing age) | | The following contradictory clarification was provided in the response to IR-1: [The] <i>ERFN considers the ERFN Trapper’s use of the area as representative of current and future land users and expects that the relationship to the Project area will be continued and strengthened through generations of future use.</i> See follow up IR-200-R1. | |
| IR-200 | IR-200-R1 | HC | Indigenous People” health / Socio-economic conditions | Section 10 (p. 4.10) Appendix 10-A (ERA), Table 4-4 (p. 4.19) IR-200 Response from Denison | The traditional foods risk assessment should be updated to include an “Intense Land User” scenario and consider all relevant sub-groups. Context: See ‘Rationale for Status’ in IR-200 Rationale: Health Canada notes that the response to IR-1 confirms that the use, diet and consumption rates used to assess the “Trapper” receptor are representative of “intensive land users” from the ERFN and possibly others. This change in the assumption is significant and should be integrated into the traditional foods risk assessment. Suggestions and follow-up measures have been provided to assist in responding to this information request, which benefits from the clarity provided in response to IR-1. Health Canada also notes that the response to IR-200 did not consider evaluating consumption patterns (and applicable TRVs) of sensitive or vulnerable populations (e.g., elders, toddlers, women of childbearing age) in the traditional food risk assessment and provide risk levels for these sub-groups separately. | 1. Update assumptions used in the risk assessment to reflect the new information provided in response to IR-1. (e.g., the <i>ERFN Trapper’s use of the area as representative of current and future land users</i>). 2. Update the risk assessment in the EIS and ERA for the “Trapper” receptor (i.e., Intensive Land Users) to account for the representative nature of their described diet (i.e., consumption rates and composition). 3. Update the rationale and decisions related to management, mitigation, monitoring and follow-up. Include a specific discussion for those COPCs that contribute to elevated health risks among “intensive land users” and those raised by Indigenous communities (i.e., selenium, mercury & cadmium). 4. Revise receptor’s descriptor/title from “Trapper” to “Intensive land users” throughout the EIS and ERA to be consistent with proposed revisions made in response to IR-1. Consider evaluating consumption patterns (and applicable TRVs) of sensitive or vulnerable populations (e.g., elders, toddlers, women of childbearing age) in the traditional food risk assessment and provide risk levels for these sub-groups separately. Alternatively, provide a fulsome rationale to justify their exclusion. | | Follow-Up IR |
| IR-201 | - | ECCC | Aquatic species | Appendix 10-A (ERA), Section 5.0 | Context: For the ERA methodology the Proponent followed CSA N288.6-12 for the assessment of risk to aquatic biota from radionuclide and non-radionuclide COPCs. This is the 2012 version, and a more recent 2022 version was publicly released. Rationale: The Proponent should review the most up-to-date version of the standard to ensure no changes to the methodology of the COPC exposure assessment are required for the ERA. | Update the COPC exposure assessment methodology in the ERA using the most recent CSA N288.6-22 standard, as needed. | | Accepted |
| IR-202 | - | CNSC | QA/QC | Appendix 10-A (ERA), Section 6.0- Quality Assurance | Context: This section provides only Quality Assurance (QA) of the ERA, including planning and preparation of the ERA. Rational: The Quality Control (QC) aspects are not included. Both QA and QC aspects provide confidence that ERA results are defensible and fit for use in decision-making. | Please include appropriate QC aspects, as per a Clause 10.2 of the N288.6. | | Accepted |

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| | | | | | The N288.6 (Clause 10.2) requires that “Appropriate QA/QC requirements shall exist for all aspects of the ERA and should be specified prior to conducting the ERA”. | | | |
| IR-203 | - | CNSC | Sediment Quality and Benthic Invertebrates | Appendix 10-A (ERA), Section 6.2 Future Centuries Sensitivity Analysis | <p>Context: This section of the ERA states “If treated effluent was released at the maximum upper bound discharge rate, the modelled concentrations of all COPCs are expected to be below their corresponding sediment quality guidelines.” It appears from Figure 6-2: “Comparison of maximum concentrations of COPCs in sediment at expected and upper bound discharge rate” that cadmium and vanadium would be over their sediment quality guidelines indicated if maximum upper bound discharge rates are used.</p> <p>Rationale: It is not clear which is correct; the statement that no exceedances of sediment quality guidelines when considering the maximum upper limit effluent release, or the figures indicating there could be exceedances for cadmium and vanadium. This discrepancy in the ERA should be explained and corrected.</p> | Please provide clarity on if cadmium and vanadium are expected to be over the sediment quality guidelines for the maximum upper bound discharge rate scenario. | <p>This response has not been accepted.</p> <p>Although these potential sediment quality exceedances if treated effluent were to be released at the maximum upper bound discharge rate are to be documented in the ERA, the response does not address the potential risk to receptors nor propose any mitigation measures. Please provide additional assessment/justification/mitigation measures for these predicted sediment quality exceedances.</p> | Not Accepted |
| IR-204 | - | CNSC | Human health with respect to hazardous contaminants | Appendix 10-A (ERA), 7.1.1, Non-radiological Human Health Risk Assessment | <p>Context: In the human health risk assessment of the non-radiological COPCs, it was determined that the Project incremental HQ was predicted to remain below 0.2 for all non-carcinogens and all pathways during all phases of the Project, except for selenium for the fisher/trapper at Russell Lake from the fish ingestion pathway.</p> <p>Rationale: Given that the fisher/trapper receptor will likely be exposed to higher concentrations of selenium from the consumption of fish at Russell Lake, there is an elevated risk of selenosis in exposed individuals. This potential for selenosis would be further exacerbated in individuals who consume fish taken from other lakes closer to the mining operation. There is, however, no discussion of mitigation of these risks to exposed individuals.</p> | <p>Please provide a discussion of measures that could be applied to mitigate the risk of selenosis in exposed individuals who consume fish from Russell Lake and other waterbodies closer to the mining operation.</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends the following:</p> <ul style="list-style-type: none">• Selenium abatement technologies may be considered to eliminate or reduce selenium in effluent entering the lake system.• If HQs continue to exceed 0.2, then it may be necessary to post fish consumption advisories, in consultation with the Medical Officer of Health for the jurisdiction where the Project is located. | | Accepted |
| IR-205 | - | CNSC | Geology and Groundwater | Section 7, appendix H | <p>Context: In this appendix the analytical concentration of various groundwater samples taken from monitoring wells is reported.</p> <p>Rationale: There is one sample labeled as “Tracer Tank” with no definition available in the current report. It is difficult to judge whether the results presented are relevant to the EIS and how it may impact the findings therein.</p> | Please clarify the definition of “tracer tank”. | | Accepted |
| IR-206 | - | CNSC | Current use of lands and resources for traditional purposes | Section 11 Section 12 Section 15 Section 16 | <p>Context: Impacts to Lands and Resources Use have been identified by Indigenous Nations and communities.</p> <p>Rationale: Additional information is required to demonstrate whether Indigenous Nations and communities were engaged directly by Denison regarding the cumulative effects assessment, significance determination and residual effects, and thus the overall conclusions on potential adverse impacts of the Project on the potential or established Indigenous and/or</p> | Please describe any outstanding or residual issues or concerns raised by Indigenous Nations and communities that Denison was unable to address. In addition, outline any plans to find solutions or continue discussions with the potentially impacted Indigenous Nations and communities. | <p>This response has not been accepted.</p> <p>The IR response directs the FIRT to refer to the response for IR-28. However, this IR response does not directly respond to this IR in question. In IR-28, Denison does discuss how they plan to address the concerns raised by Indigenous Nations and communities, but Denison does not demonstrate whether Indigenous Nations and communities were engaged directly by</p> | Not Accepted |

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| | | | | | treaty rights and effects of changes to the environment on Indigenous peoples, pursuant to paragraph 5(1)(c) of the CEEA 2012. | | Denison regarding the cumulative effects assessment, significance determination and residual effects. CNSC requires Denison to provide this information before the response can be accepted. | |
| IR-207 | - | CNSC | Current use of lands and resources for traditional purposes | Section 11, Perceived Risks to Lands and Resources | <p>Context: The EIS states: “Resource users may also experience changes in their perception of the quality of resources for consumption such as the palatability of fish or wildlife or have apprehensions about the safety of resources for consumption. These changes may affect the patterns of ILRU during all Project phases including Post Decommissioning. The ERFN refer to this indicator as a “psycho-social’ effect, meaning that even if people know their fears are “<i>perceived fears, the fear ... is real and has real impacts on ERFN members’ perception of their overall health and well-being</i>” (ERFN and SVS 2022a).” (p. 11-11)</p> <p>Resource harvesters may experience Project-related disturbances and, depending on how these changes are perceived, it may cause some resource harvesters to avoid the Project Area.</p> <p>Reductions in harvests may occur based on fear or uncertainty about the ongoing quality of country foods. For example, “<i>People stopped picking berries in this area when Key Lake mine was established because of concerns about health impacts</i>” (ERFN and SVS 2022b).</p> <p>Rationale: CNSC’s Generic Guidelines for the Preparation of an EIS state: “The EIS will document specific suggestions raised by Indigenous groups for mitigating the effects of changes to the environment on Indigenous peoples (section 5(1)(c) of CEEA 2012). For the mitigation measures intended to address the effects of changes to the environment for Indigenous peoples, the Proponent must discuss the residual effects with the Indigenous groups prior to submitting the EIS.”</p> <p>These changes may affect the patterns of ILRU during all Project phases including Post Decommissioning.</p> | <p>How does Denison plan to work directly with Indigenous Nations and communities who currently use the potentially impacted areas, including the RSA, to mitigate and monitor the perceived risks and/changes to the RSA?</p> <p>Has Denison had discussions with the potential impacted Indigenous Nations and communities on how fear and avoidance behaviors and related impacts on traditional land use will be mitigated, especially within the RSA?</p> <p>Additional information is needed to determine if Denison has engaged directly with the Indigenous Nations and communities to develop potential mitigation measures to address fear and avoidance impacts, such as a community monitoring program, which could help to reduce the perceived risk to lands and resource use through education, collaboration, and long-term monitoring with Indigenous Nations, in order to build trust.</p> <p>Suggestions for mitigation and follow-up measures: It is recommended that Denison consider engaging with potentially impacted Indigenous Nations and communities on the collaborative development and implementation of a monitoring program to help address concerns about potential impacts on lands and resources as a result of the Project. The program(s) could help to monitor changes over time related the potential perceived risk of contamination of the land from Project activities and subsequent effects on the quality of fish, vegetation, and wildlife resources, which in turn could affect the safety of traditional foods and human health, and impacts on culture practices, and overall community well-being that travel to region yearly.</p> | Response is accepted, but also see AD-60 in the Advice to Proponent table. | Accepted |
| IR-208 | - | CNSC | Indigenous physical and cultural heritage | Tables 11.1-3, 11.1-4 and 11.1-5 Section 11.1.3.2.6 | <p>Context: Black bear is listed as a species hunted by several Indigenous nations, including Pinehouse residents. CNSC participated in an in-person engagement with Pinehouse residents in October 2022 and bears eating waste was identified as a concern for hunting and consumption.</p> <p>Rationale: Perceived risk of eating animals that are contaminated by hazardous or radiological wastes could deter community members from harvesting animals that are normally part of their traditional diet. Fencing for waste was specified as a deterrent for human trespassers, not animals.</p> | Please specify measures that Denison will take to ensure bears and other animals do not scavenge from waste facilities. | | Accepted |

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| IR-209 | - | CNSC | Indigenous Peoples' health / Socio-economic conditions | Section 12.1.4.2.1 (p. 12-22) Section 12.1.5 Section 12.1.6.2 | Context: KML indicates that working at a mine camp could inhibit community members from participating in cultural activities and sharing them with family and community members, resulting in a loss of cultural knowledge and language, thus impact knowledge transmission (p. 12-22). Rationale: Denison addresses this by briefly identifying culturally sensitive policies which would eliminate residual effects (p. 12-30) | Please provide detailed proposed mitigation measure for KML’s concerns related to loss of cultural knowledge and language should they work for Denison. | This response has not been accepted. Please provide validation that this proposed mitigation measure is considered suitable and has been accepted by KML. | Not Accepted |
| IR-210 | - | CNSC | Current use of lands and resources for traditional purposes | Section 12.1.4.2.2, Potential Effect 2: Change in Traditional Diet, Perceived Suitability of Country Foods (p. 12-26) | Context: The EIS states: “Project activities could change the perceived suitability of country foods. An ecological risk assessment (ERA) was conducted to consider both radiological and toxicological risks to ecological receptors such as terrestrial and aquatic invertebrates, terrestrial and aquatic vegetation, fish, and terrestrial and aquatic mammals and birds. Results for the radiological assessment predicted no exceedances of the radiation dose benchmark for the ecological receptors. For non-radiological COPCs, no exceedances were predicted except for selenium in fish from Russell Lake, based on a conversative dietary assumption for one resource user. The traditional foods diet for the fisher/trapper is conservative as it assumes that their annual fish consumption (183 kg of fish per year) would be obtained from Russell Lake, meaning the exceedance of the benchmark for selenium from fish would only occur if fish were only sourced from this one lake. This one exceedance could potentially change the perceived safety of country foods for community members and make country foods a less desirable part of a traditional diet. <u>Experience from other uranium operations in northern Saskatchewan suggests that resource use will continue despite the potential selenium exceedance. An examination of members of the Hatchet Lake Denesyliné First Nation who live in Wollaston Lake near the Rabbit Lake operation found that over years of being active on the landscape both with and without the presence of the uranium industry, members had developed their own culturally appropriate practice of risk assessment and management based on their relationship with the land. Hatchet Lake Denesyliné First Nation members appear to be more concerned with the direct effects of uranium mining on the local environment and less concerned about uranium mining’s effects on their health through consumption of plants and animals. This is likely due to their high level of confidence in recognizing affected plants and wildlife and avoiding them (Elias et al. 1997).</u> The usage patterns of the ERFN Trapper have similarly allowed for continued use and access to areas proximal to other uranium operations. The ERFN Trapper had a positive relationship with other uranium operations in the ILRU LSA. He also continued to trap (i.e., used his trapline in Fur Block N-18), fish, and opportunistically pick berries, and consumed those resources during operations (KPI Program 2021). Good relationships between Denison and a new trapper who eventually takes over the trapline from the ERFN Trapper would promote continued use.” (p. 12-26) | Given concerns with psycho-social impacts and the influence of perception discussed by ERFN earlier on in the EIS, does Denison have information on the perspectives from Indigenous Nations and communities to validate this conclusion is applicable? | | Accepted |

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| | | | | | Rationale: The underlined reference suggests that negative perceptions may not prevent traditional resource users from continuing to consume, due to adaptation to potential risks in the environment. | | | |
| IR-211 | - | CNSC | Accidents and Malfunctions | Section 14.6.1, Bounding Scenario 1, Vehicle Accident and Aquatic Release of Radioactivity | <p>Context: Scenario 1 describes a spill of uranium concentrate into the lake. It’s not clear how the ecological risk assessment was performed. It is stated that sediment concentrations in post-remediation conditions are expected to exceed the benthic invertebrate benchmark and that these results indicate that a spill of uranium concentrate could potentially affect benthic invertebrate populations following a spill, but the spatial extent would be limited. For water, it is stated that when evaluating the potential effect, a comparison was made between the results of the estimated short-term water quality 1,892 µg/L (1.892 mg/kg) and the guideline (33 µg/L). This indicates that there may be some aquatic species that could be affected, but the effects are expected to be transient as the water concertation quickly drops to a long-term level of 0.19 µg/L. However, when looking at dose to other receptors, the results of the ecological risk assessment indicated short-term ingestion of contaminated water resulting from an accident would not result in potential risks to grouse, vole, or deer, however rationale for how these receptors were chosen is not provided.</p> <p>Rationale: It’s not clear from the EIS, why the receptors grouse, vole, and deer were chosen to evaluate ecological effects from a potential spill, and why they differ from receptors in the ERA. It is also not clear if the pathway from sediment ingestion/contact was considered for semi-aquatic receptors as they could be exposed to the increased concentrations post-spill. It is also not clear if SARA species exposure to sediment and water post-spill was considered.</p> | Please clarify why grouse, vole, and deer were chosen as receptors for the ecological risk assessment performed for accidents and malfunctions scenario 1 and clarify if the sediment pathway to receptors post-spill was considered, as well as if SARA species were considered. | | Accepted |
| IR-212 | - | HC | Human health with respect to hazardous contaminants | Section 14 (p. 14-3) Appendix 16-C (p. 14 & 15) | <p>The follow-up plan does not sufficiently describe how various parties will be engaged in the design, implementation, and review of monitoring programs.</p> <p>Context: Section 14 of the EIS states that “The overarching fear of contamination from the mine is woven in to almost every other concern noted by participants in the TK study. It is worth acknowledging this concern separately given the potential for mental health impacts related to people’s experiences of fear and anxiety” (p. 14- 3).</p> <p>The commitment regarding monitoring and follow-up activities appears limited to “<i>shar[ing] information in a transparent manner with the General Public, and specifically those Communities of Interest and Nearby Land Users with whom Denison is regularly engaging about the Project. Such an information-sharing program would consider the involvement of the Regulators to make sure the information available addresses the issues identified as concerns</i>” (p. 14).</p> | <p>1. Provide details of how local, provincial and federal authorities, and Indigenous Nations and communities will be engaged in developing the follow-up and monitoring program, including the information-sharing program.</p> <p>2. Describe the steps that will be taken if there are any exceedances of established benchmarks or deviation from predictions.</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends that the Proponent’s plan for communicating follow-up results (environmental and country foods) aims at, among other things, responding to community concerns regarding country foods to minimize avoidance of this resource. This goes beyond a passive dissemination of information and developing a strategy based on dialogue and the direct involvement of communities in monitoring, surveillance, and risk communication activities.</p> | <p>This response has not been accepted as it does not provide sufficient detail on engagement and adaptive management.</p> <p>The response to IR-212 expresses interest and intent to working with local and Indigenous communities to develop follow-up and monitoring programs, supported by an overview of the intended approach. It also articulates that the detail of follow-up and monitoring plans will be developed as part of the licensing and regulatory phases of the Project’s approval process.</p> <p>As previously indicated, country food safety is not regulated federally unless foods are sold commercially. Certain aspects of country food safety and availability may be covered by provincial regulators. As such, it is unclear whether and how various levels of government and potentially affected communities would be involved in the development of the follow-up and monitoring program for country foods.</p> | Not Accepted |

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| | | | | | Rationale: Country food safety is not regulated federally unless foods are sold commercially. Certain aspects of country food safety and availability may be covered by provincial regulators. It is unclear whether and how various levels of government and potentially affected communities would be involved in the development of the follow-up and monitoring program. It is also unclear what the information sharing program entails and how it would inform any adaptive management if monitoring results deviated from the prediction | | Additionally, the preliminary monitoring plan should include decision criteria/thresholds/benchmarks for initiating action and what those actions might entail (e.g., inspection of treatment processes, additional sampling, communication with local land users & residents, engagement with interested communities, etc.). HC reiterates its previous IR, with added clarification: 1. Provide details of how local, provincial and federal authorities, and Indigenous Nations and communities will be engaged in developing the follow-up and monitoring program, including the information-sharing program, for substances in country foods that may represent a potential health risk and/or are of concern to community members and land users (e.g., Mercury/Methylmercury, Selenium, Cadmium and Lead). 2. Describe the decision criteria/thresholds/benchmarks for these substances in country foods and steps that will be taken if there are any exceedances of established benchmarks or deviation from predictions. | |
| IR-213 | - | CNSC | Accidents and Malfunctions | Section 14.5.3 Appendix 14-A | Context: The Proponent states that the assessment of accidents and malfunctions began with the initial identification of hazard scenarios. Hazard scenarios were identified using a systematic approach that considered the existence of sources of hazards and initiating events for the Project in consideration of Project activities and components. The hazard identification was conducted to identify a comprehensive list of potential project-related accident and malfunction scenarios associated with the key project components and activities with further details provided in Appendix 14-A. The initial hazards were then screened qualitatively based on likelihood and consequence to determine overall risk level using a risk matrix approach. Bounding scenarios were then selected from this initial list of hazard scenarios. The results of numerical analyses (RESPEC, 2021) of detailed strip model suggest that the deformation imposed on the cemented steel casing from downward movement of the rock mass may exceed the assumed casing-strain yield limits and the failure limit locally after extracting the uranium ore. However, this potential hazard is not identified in the hazard identification. Rationale: Exceedance of steel casing yield limits and failure limit would either compromise the steel casing integrity or damage the steel casing and result in the leakage of injected solution, which could impact on mine operation and contaminate the surrounding groundwater. | Please include the hazard of steel casing yield or damage in the table of hazard identification evaluation and conduct an initial risk screening and further detailed assessment as required. | | Accepted |
| IR-214 | - | CNSC | Accidents and Malfunctions | Section 14.5.3 Appendix 14-A, section 3.2.3 | Context: Hazard scenarios were identified using a systematic approach that considered the existence of sources of hazards and initiating events for the Project in consideration of Project activities and components. Details for how each of these project components and activities are considered in the | Please clarify or correct all inconsistent and/or inaccurate information in Tables 3-1 to 3-14 in Appendix A of Appendix 14-A. | | Accepted |

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| | | | | | <p>initial hazard scenario identification process are provided in the accidents and malfunctions TSD (see Appendix 14-A; Ecometrix 2022).</p> <p>However, in Table 3-1 to Table 3-14 in Appendix A of Appendix 14-A, the following inconsistencies were identified:</p> <ul style="list-style-type: none">i. consequences for the hazards ID# 1.1, 1.5, 1.7, 14.2 include occupational major injuries; however, the severity (S) is denoted as number 2 that appears to be inconsistent with consequence rating number in Figure 14.5-2ii. Hazard ID# 1.5 has a L=2, but it is described as a highly unlikely event, which is inconsistent with the term in Figure 14.5-2iii. Hazards ID# 3.6 and 3.7 have a L=1, but they are described as low probability event that is inconsistent with the term in Figure 14.5-2iv. Hazards ID# 8.2, 8.3, 9.1, 10.1 to 10.5, 11.1, 11.5 have a L=1, but they are described as unlikely events, which are inconsistent with the term in Figure 14.5-2. Rationale needs to be provided how stockpile erosion is considered to have a L=1v. Hazard ID# 12.1 has a L=2 and S=3, but it’s risk ranking is moderate, which is inconsistent with the term in Figure 14.5-2vi. Hazard ID# 13.3 has a L=2. Based on the operation experience in the similar projects in the northern Saskatchewan, ponds lining failure and leakage is a very likely event. Rationale needs to be provided to support L=2 or change the number for L. <p>Rationale: Inconsistent or inaccurate/incorrect information was included in Accidents and Malfunctions assessment.</p> | | | |
| IR-215 | - | CNSC | Human health with respect to hazardous contaminants | Section 14.6 | <p>Context: One of the potential risks of a uranium mine and mill is a spill of untreated effluent.</p> <p>Rationale: In the EIS, it doesn’t appear that the scenario of a spill of untreated effluent to the environment has been considered.</p> <p>A failure of the piping containing the untreated effluent could result in an uncontrolled release to the environment and could affect the groundwater, soil quality, and terrestrial biota.</p> | Please evaluate and provide the results for a bounding scenario of a spill of untreated effluent or provide justification for its exclusion. | | Accepted |
| IR-216 | - | CNSC | Human Health with respect to radiation exposure | Section 14.6.1 Section 14.6.7 Appendix 14-A | <p>Context: Radiological doses to human receptors, including workers (i.e., driver(s) of the vehicles), from the Bounding Scenarios 1 (Vehicle Accident Including Rollover, Collision, Run Off Road) and 7 (Vehicle Accident Including Rollover, Collision, Run Off Road) have not been assessed.</p> <p>Rationale: An estimate of the effective doses to human receptors, including workers, are required to determine whether the expected doses meet the dose limits set out in the Radiation Protection Regulations.</p> | Provide estimates (including calculations) of the potential radiological doses to human receptors, including workers, resulting from Bounding Scenarios 1 and 7. | <p>This response has not been accepted.</p> <p>In order to accept this response, CNSC staff request that the proponent specify in the EIS that worker health, as it relates to accidents and malfunctions, will be addressed independently and part of the licensing process as required. Please provide proposed text for the revised EIS, for SME review and acceptance.</p> | Not Accepted |

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| IR-217 | - | CNSC | Accidents and Malfunctions | Sections 14.6.1 and 14.6.2 | <p>Context: Highway 914 crosses the Wheeler River 10 km southwest of the access road junction. A vehicle accident, including a rollover, collision, or run off road, at or near the bridge could potentially result in a release of uranium concentrate and release of fuels and chemicals into the surface water at this location. Denison believes that a release of uranium concentrate and a release of fuels and chemicals at this location would bound the releases at any other water crossing along the transportation corridor. However, no information on what other water crossings along the transportation corridor exist and how bounding scenarios 1 and 2 would bound the risk of releasing uranium concentrate and fuels and chemicals at other crossings.</p> <p>Rationale: The release of uranium concentrate and fuels and chemicals at water crossings would contaminate the water body at the crossings and pose a risk to the environment and public health.</p> | Please provide information on all water crossings along the transportation corridor and justification why bounding scenarios 1 and 2 would bound the effects of the accidental releases of uranium concentrate and fuels and chemicals at these crossings. | <p>This response has not been accepted.</p> <p>The Proponent has provided information on all water crossings along the transportation corridor. However, it is insufficient for the justification why bounding scenarios 1 and 2 would bound the effects of the accidental releases of uranium concentrate and fuels and chemicals at these crossings.</p> | Not Accepted |
| IR-218 | - | CNSC | Accidents and Malfunctions | Sections 14.6.1.1 and 14.6.1.4 | <p>Context: Table 14.6-1 indicates that the average flow of Wheeler River south of Russel Lake is 17,340 L/s or 17.34 m³/s. This rate is used for uranium dissolution rate calculation. However, in section 14.6.1.4, it states that the average annual flow is 24.3 m³/s. In Table 14.6-3, the last two rows appear to be added wrongly.</p> <p>It also states that sediment quality results are shown in Table 14.6-5 for post-remediation conditions. During minimum flow conditions, the affected volume is expected to be smaller, resulting in a higher sediment concentration. In comparison, higher flow conditions are expected to result in a greater footprint and lower concentrations. However, in Table 14.6-5, the average sediments concentration and porewater concentration appear to be incorrect and switched between average flow and maximum flow.</p> <p>Rationale: Inconsistent/inaccurate information provided in the EIS.</p> | Please clarify and correct the inconsistent information on average flow rate of Wheeler River at the crossing and incorrect information in Table 14.6-3, and average sediment concentration and porewater concentration under average and maximum flow conditions in Table 14.6-5. | <p>This IR has not been accepted as there are two typos in Denison’s response.</p> <p>In the column: Final EIS Update, the wording “Section 14.6.4.1” appears to be “Section 14.6.1.4”; for the <u>Revisions to Appendix 14-A</u>, the wording “average annual low of 24.3m³/s (average flow)” should be “average annual low of 17.3m³/s (average flow)”. Please update this text.</p> | Not Accepted |
| IR-219 | - | CNSC | Accidents and Malfunctions | Sections 14.6.1.1.1 and 14.6.1.4.1; Sections 5.1.1 and 8.1 of Appendix 14-A | <p>Context: When assessing the release characterization of Bounding Scenario 1, the Proponent assumed that 95% of the released uranium concentrate can be recovered from the release location without sufficient justification, and that different water column depths, i.e., 10 cm and 5 cm, and average water depth of 1.2 m at the release location were used without explanation.</p> <p>Rationale: As the recovery rate of the uranium concentrate would have an impact on the assessment of its potential effects, it is necessary to understand how the recovery rate and water level were selected for assessing this bounding scenario.</p> | Provide further rationale for assuming 95% recovery rate and for using different water column depths for uranium concentrate release characterization. | This response has not been accepted as the Proponent’s response does not include rationale for using different water column depths for uranium concentrate release characterization. | Not Accepted |
| IR-220 | - | CNSC | Accidents and Malfunctions | Section 14.6.1.1.1 Appendix 14-A, Section 5.1.1 | <p>Context: The Proponent states that based on drum deformations performed in a previous analysis (McSweeney et al. 2004), if a drum experienced a crush force of 100,000 lbs., then the deformation of the drum would cause the lid to detach from the drum. Using this drum failure mechanism, and assuming the drums weigh 450 kg and are arranged four across in the truck,</p> | Please provide information and/or rationale as to whether drum stacking would impact drum failure at different speeds and confirm whether 55% drum fail for such an accident is still valid. | | Accepted |

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| | | | | | <p>at a speed of 48 km/h, the front 25% of the drums would fail, at 60 km/h to 97 km/h 55% would fail, at 145 km/h 75% would fail, and at ≥193 km/h all would fail. Given that the speed of the truck is likely between 60 km/h to 97 km/h, it was concluded that less than 55% of the drums would fail upon a traffic accident scenario.</p> <p>It is assumed to be 40 drums per shipment, so some stacking or rows of drums should be expected in this scenario. The drums stacked above could be at greater risk of deformation in a traffic accident. It is not clear whether drums stacking was considered in the previous study cited by the Proponent and whether less than 55% fail is still an adequate percentage of drum failures in such traffic accident scenarios if drums stacking is needed.</p> <p>Rationale: Drum failure percentage will impact the release quantity of uranium in such an accident scenario and then impact the consequence assessment. Therefore, the drum failure should be adequately assessed and supported with sufficient information and justification.</p> | | | |
| IR-221 | - | CNSC | Accidents and Malfunctions | Section 14.6.1.3, Appendix 14-A, Section 7.1 | <p>Context: It is projected that there would be about 100 drums packaged per mill operating day. One trip per day for 330 days per year is assumed for the probability evaluation. This means 100 drums per trip, which is inconsistent with description in section 14.6.1.1.1 where assuming 40 drums in one shipment per day.</p> <p>Rationale: Shipments per day will impact the probability evaluation, and number of drums per trip will impact the release of uranium during an accident.</p> | Please clarify the number of shipments per day and number of drums per shipment that are expected and re-calculate the probability as necessary. | | Accepted |
| IR-222 | - | CNSC | Accidents and Malfunctions | Section 14.6.2.4 | <p>Context: Bounding Scenario 2 consists of the aquatic release of fuel and hazardous chemicals due to traffic accidents. The EIS states that amongst the fuels considered for this scenario, the consequences of the release of gasoline and solvents are bounded by the consequences associated with the release of diesel. Both gasoline and solvents are lighter with higher vapour pressure; therefore, they have a shorter half-life in the aquatic environment and a lesser tendency for adsorption to sediments and suspended solids in the water column. There is no other justification provided to show that the release of diesel can bound other chemicals such as sulfuric acid and sodium hydroxide that are heavier than diesel.</p> <p>Rationale: The release of either sulfuric acid or sodium hydroxide during accident could change the water PH significantly at the releasing location, which would post a negative impact on the local environment.</p> | Please provide further justification that the consequences of the release of sulfuric acid and sodium hydroxide can be bounded by the consequences associated with the release of diesel. | <p>This response has not been accepted as the Proponent states that: <i>“Through the hazard identification process (see Appendix 14-A Section 3.0 and Appendix A), the overall risk of the release of acids and bases was characterized as "moderate" and "ALARP" and as such consistent with the A&M assessment methodology was not carried forward further evaluation.”</i></p> <p>This is not the case. In Appendix A, Table 3, item 3.3 identifies that aquatic release of fuel, hazardous chemicals and reagents as having a high risk and further assessment is needed. If the Proponent believes the above statement is true, Appendix A in Appendix 14-A should be revised to reflect such a case.</p> | Not Accepted |
| IR-223 | - | CNSC | Accidents and Malfunctions | Section 14.6.4.1 Appendix 7-A, Appendix K | <p>Context: The EIS states that the 3D strip numerical model predicted that stresses and displacements did not show instability in the altered sandstone or basement rock at the location where a freeze wall would be placed around the Phoenix Deposit boundary (RESPEC 2021). The potential damage to the freeze wall due to mine-induced stresses and displacements under</p> | Please provide information on the stresses and displacements/deformation of the area northeast of the phase 4 ore body from the geomechanical studies to demonstrate the resulted stresses and displacements will not impact on the freeze wall integrity after IRs for geomechanical studies for ore extraction are addressed. | | Accepted |

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| | | | | | <p>this scenario is excluded.</p> <p>Rationale: One outer section of the freeze wall (i.e., north-east freeze wall of the phase 4 mining area) and some internal cross walls are located in the desilicified zone. The RESPEC 2021 report (i.e., Appendix K of Appendix 7-A) appears not to have included the desilicified zone in the geomechanical modeling, nor is provided the stresses and the displacements/deformation of the area northeast of the phase 4 ore body where a significant extent of the desilicified zone exists.</p> | Technical Discussion Required: Yes | | |
| IR-224 | - | CNSC | Human Health with respect to radiation exposure | Section 14.6.5.4 Appendix 14-A | <p>Context: For the Bounding Scenario 5 (Process System and Piping Failure), doses to receptors at distances of 100 and 500 metres (0.25 and 0.01 mSv respectively) are predicted. The assessment also indicated that the dose to the unprotected worker staying inside the processing plant during the spill could exceed the 50 mSv dose limit specified by CNSC if workers did not leave the area quickly after the spill.</p> <p>The Proponent did not provide the dose calculations for deriving the dose estimates.</p> <p>Rationale: The method used to estimate effective, equivalent, and committed dose is required to be verified. Sample dose calculations should be included, to confirm use of acceptable input data.</p> | Provide the dose calculations for deriving the dose estimates for workers and members of the public for Bounding Scenario 5 (Process System and Piping Failure). | | Accepted |
| IR-225 | - | CNSC | Human Health with respect to radiation exposure | Section 14.6.5.4 Appendix 14-A | <p>Context: With the Bounding Scenario 5 (Process System and Piping Failure), the Proponent states that Denison ensures that the process is designed to include control measures to reduce the exposure to both workers and members of the public as low as achievable. The measures would ensure that the processing plant is adequately ventilated, and that spills or leaks are detected by loss of system pressure, observation, or flow imbalance.</p> <p>It is not indicated where these additional measures have been detailed/elaborated within the EIS.</p> <p>Rationale: Control measures to reduce the exposure to both workers and members of the public as low as achievable, that are identified in the assessment of Bounding Scenario 5, must be formally documented to ensure that they are carried over into the engineered design of the processing plant.</p> | Provide details on how the control measures to reduce the exposure to both workers and members of the public, identified in the assessment of Bounding Scenario 5, have been formally documented and incorporated in the engineered design of the processing facility. | <p>This response has not been accepted.</p> <p>In order to accept this response, CNSC staff request that the proponent specify in the EIS that any engineering design control measures identified in Bounding Scenario 5 will be included in the detailed design and will be provided for acceptance by the CNSC during Project licensing. Please provide proposed text for the revised EIS, for SME review and acceptance.</p> | Not Accepted |
| IR-226 | - | CNSC | Accidents and Malfunctions | Sections 14.6.6.1 and 14.6.6.4 | <p>Context: It is stated that in the case of the accident and for a release amount of 1 kg inside the processing plant, the dose to offsite receptors at 200 m from the Project site was calculated to be less than the CNSC public dose limit of 1 mSv. The analysis also indicated that the dose to a worker in a full-face-piece powered air-purifying respirator who stays in the area would be 88 mSv, which exceeds the annual worker dose limit of 50 mSv.</p> <p>Rationale: Section 14.6.6.1 indicates that 2 kg of uranium concentrate could</p> | Please provide the rationale for using a source term of 1 kg rather than 2 kg of uranium concentrate for the dose calculation to offsite receptors and workers. If sufficient rationale cannot be provided, the doses to offsite receptors and workers should be recalculated using 2 kg uranium concentrate, and the results provide. | | Accepted |

| Original IR# | Follow-Up IR # | SME | Project Effects Link | Reference to EIS, appendices, or supporting documentation | Context and Rationale | Information Requirement (IR) | Rationale for Status | Status |
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| | | | | | be released in case of the accident. No rationale is provided why 1 kg rather than 2 kg uranium concentrate is used for dose calculation. If 2 kg is used as the source term, the dose to offsite receptors at 200m and workers in the area would be higher. | | | |
| IR-227 | - | CNSC | Accidents and Malfunctions | Section 14.6.6.1.1 | <p>Context: Bounding Scenario 6 involves a fire and/or explosion within the processing plant, resulting in the release of a large amount uranium to the atmosphere. The airborne source term for this scenario is estimated with equation developed by the United States Department of Energy (USDOE), where the respirable faction is assumed to only include particles of 10 mm and smaller.</p> <p>Rationale: No rationale was provided to support the consideration of only 10 mm and smaller particles. As provided in Table 14.6-3, the particle size of uranium <15 mm is less than 20%. Majority of the uranium particle size is larger than 10 mm. The airborne source term is an important factor for the effects assessment and should be calculated with transparent and justified information/data.</p> | Provide rationale for only considering 10 mm and smaller particles for the respirable fraction. | | Accepted |
| IR-228 | - | CNSC | Human Health with respect to radiation exposure | Section 14.6.6.4 Appendix 14-A | <p>Context: For the Bounding Scenario 6 (Facility Fire and/or Explosion), the predicted dose is less than 1 mSv to a member of the public 200 metres away from the Project site. The analysis also indicated that the dose to a worker in a full-face powered air-purifying respirator who stays in the area would be 88 mSv, which exceeds the annual worker dose limit of 50 mSv.</p> <p>The Proponent did not provide the dose calculations for deriving the dose estimates.</p> <p>Rationale: The method used to estimate effective, equivalent, and committed dose is required to be verified. Sample dose calculations should be included, to confirm use of acceptable input data.</p> | Provide the dose calculations for deriving the dose estimates for workers and members of the public for Bounding Scenario 6 (Facility Fire and/or Explosion). | | Accepted |
| IR-229 | - | CNSC | Human Health with respect to radiation exposure | Section 14.6.6.4 Appendix 14-A | <p>Context: With the Bounding Scenario 6 (Facility Fire and/or Explosion), the Proponent states that Denison would ensure that the design of the plant includes control measures to reduce the exposure to both workers and members of the public to levels that are as low as achievable. The measures would ensure that the processing plant is adequately ventilated.</p> <p>It is not indicated where these additional measures have been detailed/elaborated within the EIS.</p> <p>Rationale: Control measures to reduce the exposure to both workers and members of the public as low as achievable, that are identified in the assessment of Bounding Scenario 6, must be formally documented to ensure that they are carried over into the engineered design of the processing plant.</p> | Provide details on how the control measures to reduce the exposure to both workers and members of the public, identified in the assessment of Bounding Scenario 6, have been formally documented and incorporated in the engineered design of the processing facility. | <p>This response has not been accepted.</p> <p>In order to accept this response, CNSC staff request that the Proponent must specify in the EIS that any engineering design control measures identified in Bounding Scenario 6 such as ventilation will be included in the detailed design and will be provided to the CNSC during Project licensing. Please provide proposed text for the revised EIS, for SME review and acceptance.</p> | Not Accepted |

| Original IR# | Follow-Up IR # | SME | Project Effects Link | Reference to EIS, appendices, or supporting documentation | Context and Rationale | Information Requirement (IR) | Rationale for Status | Status |
|--------------|----------------|------|--|---|---|---|----------------------|----------|
| IR-230 | - | CNSC | Accidents and Malfunctions | Section 14.6.7.4 | <p>Context: It is stated that a conservative penetration time of 15 min was applied in the assessment. Based on this assumption, the maximum depth of contamination could be 90 cm (for penetration rate of 0.1 cm/s). It is not clear why the penetration time of 15 minutes is considered conservative as the penetration time would depend on the time needed for the emergency response team to respond.</p> <p>It is also stated that the wide range of the calculated velocities is a result of variation of soil conditions and the slope of the surface. The distance that the groundwater can travel under these extreme (i.e., conservative) conditions ranges from 0.15 m to 100 m. It is not clear how the groundwater travel distance of 0.15m and 100m is calculated.</p> <p>Rationale: The penetration time will influence the penetration depth of the released materials, which in turn, considering the groundwater travel distance, will impact the potential areas and volumes of contaminated soils and shallow groundwater.</p> | Please provide justification for applying 15 minutes of penetration time, and why it is considered conservative. In addition, please provide information on how the groundwater travel distance of 0.15 m and 100 m was obtained. | | Accepted |
| IR-231 | - | CNSC | Accidents and Malfunctions | Sections 14.6.6.4 and 14.6.6.5 | <p>Context: The EIS states that in the unlikely event of an unmitigated accidental release of uranium due to a dryer explosion, doses to the workers are expected to have a moderate effect, while doses to members of the public are expected to have a minor effect. Based on this evaluation, the severity of the consequences of this accident and malfunction scenario is predicted to be moderate. In consideration of both probability and consequences, the overall risk related to Bounding Scenario 6 is predicted to be low.</p> <p>Rationale: When there is an explosion within the process plant, it is likely there will have worker fatality. The severity of the consequences of an explosion would be catastrophic and the risk of Bounding Scenario 6 would be higher.</p> | Please re-evaluate the consequence and the risk of Bounding Scenario 6 by considering the potential worker fatality resulted from an explosion. | | Accepted |
| IR-232 | - | ECCC | Change to an environmental component due to hazardous contaminants | Appendix 14-A, Table 3-7, ID# 7.1 Appendix 14-A, Table 5-5 | <p>Context: The Proponent indicates in Appendix 14-A, Table 3-7 that a release of sulfuric acid is a low consequence event therefore would not require further assessment. However, according to a Safety Datasheet on high concentrated sulfuric acid (ICSC–0362 - SULFURIC ACID, concentrated (> 51% and < 100%) (ilo.org)), the substance is incompatible with certain materials and can give off toxic fumes. Furthermore, it reacts with various metals to produce hydrogen gas, which is explosive.</p> <p>The Proponent provides estimates of chemicals, including sulfuric acid, to be transported to site in Appendix 14-A, Table 5-5. The annual consumption of sulfuric acid is estimated at 15,417 m3, in 617 trucks per year, but the concentration is not stated.</p> <p>Rationale: Given the high reactivity and inherent corrosive nature of sulfuric acid combined with the volume and concentration that may be</p> | <p>1. Provide the volume and the concentration of sulfuric acid that will be stored on site.</p> <p>2. Provide a detailed risk assessment of the fate and behavior of sulfuric acid during a release into the environment.</p> | | Accepted |

| Original IR# | Follow-Up IR # | SME | Project Effects Link | Reference to EIS, appendices, or supporting documentation | Context and Rationale | Information Requirement (IR) | Rationale for Status | Status |
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| | | | | | stored on site, ECCC requests that the Proponent provide a detailed risk assessment related to a terrestrial spill of sulfuric acid, specifically at the processing plant. | | | |
| IR-233 | - | HC | Human health with respect to hazardous contaminants | Appendix 14-A, Section 8.7 (p. 8.10) | <p>An effects assessment for a transportation accident scenario involving radioactive materials was not included.</p> <p>Context: The Proponent provided an effects assessment relating to a diesel spill on the ground (Section 14 Appendix 14-A, Section 8.7). However, no information was provided regarding the potential human health effects of a uranium concentrate release at the two locations considered (Section 14 Appendix 14-A p. 8.10).</p> <p>Rationale: An accident involving radioactive material may have an impact on human receptors, based on the proximity of receptors and the proposed response protocols.</p> | <p>1. Assess and describe the potential health effects (chemical and radiological) of a transportation accident involving a uranium concentrate spill at the following locations:</p> <ul style="list-style-type: none">a) km 160 of Hwy 914, which is the location of a cultural camp that has been established by the ERFN.b) km 67 of Hwy 914, which is a gathering location for the Kineepik Métis Local associated with the Northern Village of Pinehouse.c) All other potential sites of importance for the public and Indigenous peoples. | | Accepted |
| IR-234 | | CNSC | Effect of Environment | Section 15.2.2 | <p>Context: Effects of seismic events on the uranium extraction and post decommissioning are not assessed.</p> <p>Rationale: Seismic events could further exacerbate the stability of the voids induced by the uranium extraction, which will result in extra stresses and displacements/deformation in the overlying rock formations. These extra stresses and displacements/deformation could impact on the mine operation and post decommissioning groundwater flow and contaminant transport.</p> | <p>Please provide an assessment of seismic events on the mine-induced voids stability and the resulted effects on the mine operation and post decommissioning.</p> <p>Technical Discussion Required: Yes</p> | | Accepted |
| IR-235 | - | ECCC ERAD | Fish and fish habitat | Section 15.5.2, Expected Environmental Conditions | <p>Context: In this section it is stated that: “Table 15.5-1 and Table 15.5-2 summarize the predicted mean values of the climate variables for the Tomblin Lake regional grid unit, following the RPC4.5 and RCP8.5 scenarios, respectively, as indicated by the Climate Atlas (PCC 2019).”</p> <p>RCP4.5 represents predicted climate conditions of a moderate carbon future.</p> <p>RCP8.5 represents predicted climate conditions under a high carbon future.</p> <p>The values shown in Tables 15.5-1 and 15.5-2 show averages of 25.9 and 26.7 mm for RCP4.5 and 25.9/27.5 mm for RCP8.5. These values do not correspond to the source indicated by the Proponent.</p> <p>Rationale: Based on the Proponent’s description we would expect to find the same values for “Max 1-Day Precipitation (mm)”in the Climate Atlas for RCP4.5 and RCP8.5 scenarios. ECCC was unable to duplicate the results.</p> <p>ECCC queried the Climate Atlas for Tomblin Lake and returned a result of “Region Geikie River.” https://climateatlas.ca/find-local-data</p> | <p>1. Provide the source of the data displayed in Max 1-Day Precipitation (mm) category in Tables 15.5.1 and 15.5-2.</p> <p>2. Provide detailed calculations for the following average values:</p> <ul style="list-style-type: none">25.9 mm 26.7 mm in Table 15.5-1: Predicted Climate Conditions of a RCP4.5 Moderate Carbon Future25.9 mm 27.5 mm in Table 15.5-2: Predicted Climate Conditions of a RCP8.5 High Carbon Future <p>3. Explain how the data shown in Tables 15.5.1 and 15.5.2 were used in the precipitation risk assessment.</p> <p>4. Denote the differences between “mean”, “value/max value”, and “fluctuation”, in the calculation of extreme event risk.</p> <p>5. Compare model derived data against:</p> <ul style="list-style-type: none">1. Natural variability of the observed data.2. Variability in the statistics generated via observation based time series. <p>Technical Discussion Required: Yes</p> | <p>Although responses 1 to 4 have been accepted, this response has not been accepted for the following reasons:</p> <p>5. although PMP is used for design purposes as indicated in Section 8, presenting the variability of observed versus climate model predicted historical precipitation values would provide understanding on the uncertainties associated with climate model projected or historical precipitation (Max 1-day, seasonal or annual) values. Thus, the proponent is recommended to include more clarification in the revised EIS.</p> | Not Accepted |

| Original IR# | Follow-Up IR # | SME | Project Effects Link | Reference to EIS, appendices, or supporting documentation | Context and Rationale | Information Requirement (IR) | Rationale for Status | Status |
|--------------|----------------|------------------|-----------------------|---|---|---|--|--------------|
| | | | | | <p>ECCC then queried the Climate Atlas for Max 1 Day Precipitation (mm). https://climateatlas.ca/data/grid/782/maxdaypr_2030_85/line https://climateatlas.ca/data/grid/782/maxdaypr_2030_45/line</p> <p>The results displayed an array of values ranging from 83.6 mm (2050) to 87.3mm (2092) for a Regional Concentration Pathway RCP8.5 scenario and values ranging from 48.9mm (2050) to 89.5 mm (2083) for an RCP4.5 scenario.</p> <p>These values do not match the averages shown in Tables 15.5-1 and 15.5-2.</p> | | | |
| IR 236 | - | ECCC ERAD | Fish and fish habitat | Section 15.5.2, Expected Environmental Conditions | <p>Context: It is stated that, “Table 15.5-1 and Table 15.5-2 summarize the predicted mean values of the climate variables for the Tomblin Lake regional grid unit...”</p> <p>As per the Proponent’s description, Tomblin Lake was chosen as representative location for Wheeler when Climate Atlas was used as data source.</p> <p>Rationale: In those two tables, for the “Max 1-Day Precipitation (mm)” the historical average is given as 24.1mm. Local time series analysis for the climatic region in which Wheeler Project is located provide averages (for 1-day max precipitation) of approximately 30+ mm.</p> <p>It is the Proponent’s responsibility to keep the required database current and up to date, because the length of the time series influences all derived statistics. Statistical analysis of extreme events is highly dependent of the mean with extreme values reaching values 3 to 4 times higher than the mean.</p> | <p>1. Provide a clear explanation on how the historical mean for 1-Day Max Precipitation was calculated.</p> <p>2. Compare the values obtained via various means (ex: copied from the internet, modeled via some online algorithm, derived from specialty literature), against time series analysis based on observations.</p> <p>Technical Discussion Required: Yes</p> | <p>This response has not been accepted.</p> <p>The Proponent made a correlation between precipitation and the Probable Maximum Precipitation (PMP). However, annual maximum and PMP cannot be correlated as they are two separate concepts that require different statistical methods to verify.</p> <p>The Proponent provided two tables which displayed precipitation data under current, existing, and future climate scenarios for two nearby lakes. These were provided to support the Proponent’s response, however, the calculations used to achieve the table figures within the response or Attachment: IR-236 were not provided. As one value cannot be used to infer the other, reviewing the calculations is required to support the Proponent’s conclusions.</p> <p>Please see the following requests:</p> <p>1. In Table 3 of Attachment: IR-236, the historical mean value (1976 to 2005) for the Maximum 1-Day Precipitation is 24.1 mm and is indicated as measured. However, this estimate appears to be derived from ensembles of climate modeled historical precipitation. Thus, proponent to insert a footnote at Table 3 that indicate the total annual as well as maximum 1-day are estimates based on ensembles of climate modeled historical precipitation. The Proponent needs to provide the calculations that were used to reach the conclusions found within Tables 2 and 3 of Attachment: IR-236. Reviewing the calculation will allow for verification of the Proponent’s conclusions. If the currently used data sources do not allow for accurate representation of their conclusions, the Proponent should use complete regional observational data sources to support the conclusions in Tables 2 and 3.</p> <p>2. The analysis of mean maximum one day and mean annual total precipitation [1976-2005] based on weather station (Climate ID 4063755) at Key Lake is roughly 32mm and 470mm respectively. Thus, include both modeled and observed historical precipitation statistics in the EIS for context.</p> | Not Accepted |

| Original IR# | Follow-Up IR # | SME | Project Effects Link | Reference to EIS, appendices, or supporting documentation | Context and Rationale | Information Requirement (IR) | Rationale for Status | Status |
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| | | | | | | | Measured data should take precedence over modeled data. The Proponent is taking an ensemble of modeled data to "predict" historical data when measured data is available and can validate the models. Without strong justification, it is not appropriate to replace measured data with "predicted" modeled data. | |
| IR-237 | | CNSC | EA follow-up and monitoring program | Appendix 16-C throughout, including Table 1.5-1: Wheeler River Monitoring and Follow-up Program Summary (p. 8-15) | <p>Context: CNSC’s Generic Guidelines for the Preparation of an EIS state: “The EIS should provide discussion on the follow-up program’s requirements, and include:</p> <ul style="list-style-type: none">objectives and structure of the follow-up program and the VCs targeted by the programtabular summary and explanatory text of the main components of the program including:<ul style="list-style-type: none">a description of each monitoring activity under that component<u>which of the two generic program objectives the activity is relevant to (e.g., verify EA predictions, determine effectiveness of mitigation measures)</u>the specific statement from the EA that goes along with that generic objective and will be the focus for that activity (e.g., program objective: verify predicted effects; environmental assessment effect: no potential adverse effects)the specific monitoring objective for that activityplanned schedule<u>roles and responsibilities to be played by the Proponent, regulatory agencies, Indigenous people, local and regional organizations and others in the design, implementation and evaluation of the program results</u><u>possible involvement of independent researchers</u><u>program funding sources</u>information management and reporting (reporting frequency, methods and format)<u>possible opportunities for the Proponent to include the participation of the public and Indigenous groups, during the development and implementation of the program</u> <p><u>The follow-up program plan should be sufficiently described in the EIS to allow independent judgment as to the likelihood that it will deliver the type, quantity and quality of information required to reliably verify predicted effects (or absence of them) and confirm the effectiveness of mitigation measures.”</u> (Section 11)</p> <p>Rationale: The Summary of Monitoring and Follow-up Programs provided in Appendix 16-C contains very high-level information, and while some of the aspects detailed in the Generic EIS Guidelines are included, the aspects underlined are missing or appear incomplete.</p> <p>Further, all information from throughout the EIS should be incorporated into this Summary. For example, the EIS notes that: “Groundwater samples will be collected at least monthly and semi-annually in the wells within the</p> | <p>It is recognized that this document will evolve over the planning process and be finalized prior to the EA Decision; however, as plans are developed and revised, CNSC staff expect that updates will be made to this document and provided with any future versions of the EIS.</p> <p>Appendix 16-C Summary of Monitoring and Follow-up Programs must include sufficient details to allow CNSC staff to determine the likelihood that it will deliver the type, quantity and quality of information required to reliably verify predicted effects (or absence of them) and confirm the effectiveness of mitigation measures. This includes concrete monitoring plans (sampling locations, frequency, etc.).</p> <p>Additionally, please incorporate any relevant information included in the EIS into this Summary.</p> | <p>This response has not been accepted.</p> <p>Denison has indicated they will update the follow-up program in Appendix 16-C, but this information has not been provided. CNSC reminds Denison that there should be no new information in the final EIS, and that we must review this information before accepting the response to this IR.</p> <p>Please provide an updated version of Table 1-5.1 with detailed information proposed by Denison in the IR response for the next iteration of the FIRT technical review, for SME review and acceptance.</p> | Not Accepted |

| Original IR# | Follow-Up IR # | SME | Project Effects Link | Reference to EIS, appendices, or supporting documentation | Context and Rationale | Information Requirement (IR) | Rationale for Status | Status |
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| | | | | | freeze wall and on the freeze wall perimeter, respectively” (p. 7-109) and that “At least five to seven multi-well clusters are proposed across the mined area (Figure 7.8-2). Sampling will include KI parameters or the full suite of COPC at different times in the remediation process” (p. 7-111). These details (only examples) are not included in Appendix 16-C. | | | |
| IR-238 | - | CNSC | Current use of lands and resources for traditional purposes | Various sections of the EIS, including: Section 8 Section 9 Section 10 Section 11 Section 12 Section 15 Section 16 Appendix 16-C (p. 3) | Context: The EIS indicates that “further detailed [follow-up and monitoring programs] will be developed as Project designs are finalized that may influence the nature, frequency, and locations of monitoring. In addition, input from regulatory agencies, the public and Indigenous Peoples will be considered.” (Appendix 16-C, p.3) It is not clear in several section(s) of the EIS and the Indigenous Engagement Report, whether Denison has provided the interested Indigenous Nations and communities with the opportunity to participate in the development, implementation, and review of monitoring and mitigation measures, as per the guidance of REGDOC-3.2.2 and CNSC’s Generic EIS Guidelines. Rational: As outlined in Section 11 of CNSC’s Generic Guidelines for the Preparation of an EIS , please include roles and responsibilities to be played by the Proponent, regulatory agencies, Indigenous people, local and regional organizations and others in the design, implementation and evaluation of the monitoring program results as well as possible opportunities for the Proponent to include the participation of the public and Indigenous Nations and communities, during the development and implementation of the program. | Please provide additional information to demonstrate whether Indigenous Nations and communities were engaged directly on the potential mitigation and monitoring measures to address the concerns raised regarding potential impacts of the Project on the potential or established Indigenous and/or treaty rights. Provide a rationale if this engagement has not been completed. As the Project develops, please provide concrete actions Denison will take in the follow-up and monitoring programs to engage Indigenous Peoples to alleviate concerns and incorporate their interests, and when this engagement is planned to take place. | This response has not been accepted. Please provide additional information and updates on engagement activities to the EIS and IER (to date) that demonstrate whether Indigenous Nations and communities have been engaged directly on the potential mitigation and monitoring measures to address the concerns raised regarding potential impacts of the Project on the potential or established Indigenous and/or treaty rights. See also AD-62 in the Advice to Proponent table. | Not Accepted |

Additional Lung Cancer Mortality from PM2.5: Recommended Approach and Sample Calculation

Health Canada, Water and Air Quality Bureau, October 2022

Health Canada (2022) provides a quantitative estimate of the risk of lung cancer associated with exposure to PM2.5 in Canada. The pooled hazard ratio (HR) for lung cancer mortality in the Canadian population is 1.127 (95% CI: 1.085, 1.170) per 10 µg/m3 increase in long-term exposure to ambient PM2.5. The slope coefficient (β) for this relationship is 0.01196, as derived below:

$$e^{(\beta \times 10 \text{ } \mu\text{g}/\text{m}^3)} = \text{pooled hazard ratio per } 10 \text{ } \mu\text{g}/\text{m}^3$$

$$e^{(\beta \times 10 \text{ } \mu\text{g}/\text{m}^3)} = 1.127$$

$$\beta \times 10 \text{ } \mu\text{g}/\text{m}^3 = \ln 1.127$$

$$\beta = (\ln 1.127)/(10 \text{ } \mu\text{g}/\text{m}^3) \text{ `}$$

$$\beta = 0.01196$$

The additional lung cancer mortality (over the baseline rate) from PM2.5 derived from a given source can be determined using the equation below, based on the attributable fraction or (HR-1)/HR (Greco et al. 2020):

$$ALCM = \left[\left(e^{\beta \cdot Exposure} - 1 \right) / e^{\beta \cdot Exposure} \right] \cdot Baseline\ rate \cdot Years$$

ALCM = additional lung cancer mortality cases per 100,000 population

β = 0.01196 (slope coefficient from meta-analysis in Health Canada (2022))

Exposure = estimated PM2.5 exposure concentration from the relevant source(s) (µg/m3) (does not include baseline PM2.5 exposure)

Baseline rate = 45.5 per 100,000 (current Canadian Age Standardized Mortality Rate (ASMR) for lung cancer from Canadian Cancer Statistics Advisory Committee 2021); the Canadian baseline rate is appropriate as the slope coefficient was derived from Canada-wide studies and an updated ASMR of Canada (if available) would be appropriate for use in the calculation

Years = years of project or project phase

Sample calculation:

Project estimates an exposure from relevant source(s) of 0.067 µg/m3 over 50 years of operation

$$ALCM = \left[\left(e^{\beta \cdot Exposure} - 1 \right) / e^{\beta \cdot Exposure} \right] \cdot Baseline\ rate \cdot Years$$

$$ALCM = \left[\left(e^{0.01196 \cdot 0.067} - 1 \right) / e^{0.01196 \cdot 0.067} \right] \cdot 45.5 \cdot 50$$

ALCM = 1.8 additional lung cancer mortality cases per 100,000

References:

- [1] Canadian Cancer Statistics Advisory Committee in collaboration with the Canadian Cancer Society, Statistics Canada and the Public Health Agency of Canada. Canadian Cancer Statistics 2021. Toronto, ON: Canadian Cancer Society; 2021. Available at: cancer.ca/Canadian-Cancer-Statistics-2021-EN
- [2] Greco, S.L., MacIntyre, E., Young, S. et al. An approach to estimating the environmental burden of cancer from known and probable carcinogens: application to Ontario, Canada. BMC Public Health 20, 1017 (2020). <https://doi.org/10.1186/s12889-020-08771-w>
- [3] Health Canada. Lung cancer and ambient PM2.5 in Canada: a systematic review and meta-analysis.
- [4] Health Canada, 2022. Available online at: <https://publications.gc.ca/site/eng/9.907038/publication.html>

Annex 1 Responses to Information Requirements

Federal Indigenous Review Team (FIRT) – Denison’s Responses to Information Requirements for the Wheeler River Project Environmental Impact Statement

| Ref. # | Department | Project Effects Link | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Information Requirement (IR) ² | Denison Response | Final EIS Updates |
|--------|-----------------------------------|---|--|--|--|--|--|
| IR-01 | English River First Nation (ERFN) | Current use of lands and resources for traditional purposes | General | <p>Context: Denison has not gone far enough in terms of learning from and incorporating information from ERFN provided in the <i>Traditional Knowledge Study and Health and Socio-Economic Study Report</i>. It appears Denison put a disproportionate amount of reliance on the views and interests of one ERFN land user. While we applaud the efforts of Denison to seek feedback from ERFN land users directly and to work closely with such land users, ERFN’s rights and interests in the region of the Project (and the potential of the Project to adversely impact such rights and interests) extend well beyond that of just one land user.</p> <p>Rationale: It is important for the proponent and regulators to understand that while the rights and interests of individual ERFN members are important to consider, the Elders and elected leaders of ERFN represent the collective rights and interests of ERFN as a Nation. The results of the scoping study indicated that ERFN holds firmly established rights to the area where the planned project is located. Numerous studies conducted over several decades have examined ERFN's relationship and connection to land use and occupancy of the region where the proposed mine is located from traditional land use, subsistence harvesting, ecological, and sociocultural and economic perspective.</p> | <p>The draft EIS should be revised to reflect the totality of ERFN TK and land use information.</p> <p>Denison and CNSC must continue to work with ERFN to ensure that impacts on ERFN rights are appropriately and fully considered, mitigated, and accommodated.</p> | <p>Denison has met with ERFN regarding the IR and has gained a better understanding of the specific concern raised in the IR. ERFN's relationship and connection to the land is important. Denison will continue to work with ERFN to refine its understanding of this relationship and will work with ERFN to make sure this is accurately reflected in the final EIS.</p> <p>Despite the passing of the late trapper/resource harvester referred to throughout draft EIS, ERFN has communicated to Denison that ERFN considers his use of the area as representative of current and future land users and expects that the relationship to the Project area will be continued and strengthened through generations of future use. Changes will be made throughout the EIS to reflect that the late ERFN land user is but one of many current and future land users, and should be considered as representative of future land uses and expression of rights.</p> <p>For example, statements about the land being inactive at this time or statements that suggest that other land users are limited or have not provided documented use of the area will be removed and repositioned so as to reflect the importance of the area to ERFN. This may result in the inclusion of additional mitigation and enhancement measures. Denison will continue to work with ERFN on the list of Project elements that ERFN feels required additional refinement or that are sources of concern as the EIS review process continues.</p> | <p>As noted in the IR response, the final EIS will be updated. To support review of the response, a few examples of updates to the draft EIS are provided, with new text in bold, and deleted text in strikethrough:</p> <p>Example 1:</p> <p><i>10.1.6.1.4 Human Health Risk Assessment Results</i> (excerpt only) The ingestion rate for caribou, based on engagement with a local fisher/trapper, was 175 kg/yr of caribou (equivalent to approximately 2 to 3 servings per day). This ingestion rate is conservative compared to an annual caribou ingestion rate of 2.6 kg/yr (1 to 2 servings per month) from the ERFN’s Country Food Study (CanNorth 2017) and 54.4 kg/yr for the total game diet for a high traditional foods consumer in the Boreal Shield as per the First Nations Food, Nutrition and Environment Study for Saskatchewan (Chan et al. 2018). Thus, the local fisher/trapper represents is relatively extreme an intensive land user with respect to local game consumption. Denison recognizes that ERFN considers the fisher/trapper’s use of the area as representative of current and future land users and expects that the relationship to the Project Area will be continued and strengthened through generations of future use.</p> <p>Example 2:</p> <p>10.1.6.2 Residual Effects Characterization (excerpt only)</p> <p>For non-carcinogens, the results of the HHRA predicted no exceedances of the HQ benchmark (HQ<0.2) for human receptors for non-carcinogens (cadmium, copper, chromium, cobalt, molybdenum, uranium, and zinc) during all phases of the Project. The one exception was selenium for the fisher/trapper at Russell Lake, where the incremental Project HQ for the fisher/trapper from fish ingestion (northern pike and white sucker) was predicted to be 0.93. The traditional foods diet assumptions for the fisher/trapper are conservative and are based on engagement with a local fisher/trapper which is representative of one person, who consumes a unique composition and quantity of traditional foods. Most Many people fishing, hunting, and trapping in the Project Area would consume traditional foods more consistent with the average traditional foods consumer diet, which was developed from the ERFN country foods study (CanNorth 2017). Denison recognizes that ERFN considers the fisher/trapper’s use of the area as representative of current and future land users and expects that the relationship to the Project Area will be continued and strengthened through generations of future use.</p> <p>Example 3:</p> <p>11.1.2.1 English River First Nation</p> <p>Indigenous Knowledge (referred to as Traditional Knowledge or TK by the ERFN) was provided by ERFN for consideration in the EIS. This included several reports:</p> <ul style="list-style-type: none">• <i>Wheeler River Project – Summary of Health and Socio-Economic Study Results</i>, which summarizes results from 16 interviews that were conducted for the health and socio-economic topics (ERFN and SVS 2022a). |

¹ Unless otherwise stated, the section noted refers to the draft EIS.
² Where IR contents note “See also related IR(s)”, responses from Denison may be similar or provided in a single detailed response, but it was preferred to keep original IRs distinct.

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| | | | | | | | <ul style="list-style-type: none">• <i>Wheeler River Project - Summary of Traditional Knowledge Study Results</i>, which analyzed and presented results from 21 land use interviews that provided both IK and LK and included details on ERFN’s resource harvesting locations, species harvested, travel routes, cabins and special sites (ERFN and SVS 2022b).• <i>The English River First Nation Country Foods Study Final Report</i>, which conducted in 2016 through funding secured from the First Nations Environmental Contaminants Program to complete a country foods study. The study involved three components: a dietary study, a sampling program, and a human health risk evaluation. The overall study objectives were to examine country food usage by ERFN community members and to assess if the country foods are safe to eat. The involvement of ERFN community members was one of the fundamental goals of the study, which relied heavily on TK to identify what and where to sample (CanNorth 2017a).• <i>The English River First Nation Aboriginal Traditional Knowledge Summary Report</i>, which was compiled by Environment Canada on behalf of ERFN to summarize information for the purposes of recovery of the Woodland boreal caribou population. Ten individuals (mostly Elders) were selected by ERFN to complete TK interviews to understand boreal Caribou in the English River Traditional Territory (ERFN 2011). <p>Local Knowledge also was provided by an ERFN trapper, fisher, and resource harvester (ERFN Trapper) who resided in and conducted resource use in the Project Area. The ERFN Trapper explained the use of the area by outfitters and cabin lease holders, fish and wildlife abundance and distribution, species harvested for traditional use, and navigation and travel along waterbodies and roads. On October 29, 2019, at Denison’s Project exploration camp, the resource user attended a full-day interview. Notes from this interview were finalized on January 2, 2020, with their approval and are used in most ILRU components herein. Unfortunately, prior to the filing of the EIS, the ERFN Trapper passed away. Despite his passing, ERFN considers the ERFN Trapper’s use of the area as representative of current and future land users and expects that the relationship to the Project area will be continued and strengthened through generations of future use.</p> |
| IR-02 | Canadian Nuclear Safety Commission (CNSC) | Mitigation Measures | General Appendix 16-C | <p>Context: Denison’s 2019 Wheeler River Terms of Reference states: “The EIA will also discuss the monitoring programs required to demonstrate regulatory compliance and compliance with the commitments Denison has made to its Indigenous and non-Indigenous Stakeholders.”</p> <p>The CNSC’s Generic Guidelines for the Preparation of an Environmental Impact Statement (EIS), also state: “The EIS will then describe mitigation measures that are specific to each environmental effect identified. Measures will be written as specific commitments that clearly describe how the proponent intends to implement them and the environmental outcome the mitigation is designed to address.</p> <p>Rationale: The EIS and the Summary of Monitoring and Follow-up Programs provided in Appendix 16-C contains very high-level information. It is not clear which monitoring programs will be employed to demonstrate regulatory compliance, and compliance with the commitments Denison has made to its Indigenous and non-Indigenous Stakeholders.</p> | CNSC staff expect Denison to provide a comprehensive list of commitments along with the next version of the EIS, including any commitments made to Indigenous Nations and communities and other stakeholders (As committed in the Wheeler River Terms of reference, and as noted in the November 28 th , 2022 email from CNSC staff to Denison: <i>Future Submission of a Commitments Table for Wheeler River EIS</i>). | A list of commitments, including specific commitment or mitigation measures related to Project effects as an outcome of engagement, made in the draft EIS, throughout the Federal information request period and the Provincial comment response period, will be included with the submission of the revised draft EIS. For clarity, this would not include any private, confidential accommodations made under contractual agreements. | No EIS updates are anticipated to address this IR at this time. Denison acknowledges that a comprehensive list of Project-related commitments will be provided for the record as part of the process of finalizing the EIS. |
| IR-03 | CNSC | Site preparation | Section 1.3.2 Temporal Boundaries | <p>Context: The EIS and TSD-ERA provide assessment on the project timeframe, including construction, operation, and decommissioning phases.</p> <p>Rational: The site preparation phase is not included in the timeframe</p> | Please provide an assessment of those facility characteristics and activities that may interact with the environment during the site preparation phase, along with an assessment of their potential effects, in order to reflect the entire lifecycle or provide a rationale for its exclusion. | The EIS phase 'Construction' includes site preparation activities and as such these site preparation activities have been assessed within the EIS and the supporting documentation, including Appendix 10-A. | Section 5.3.4 of the final EIS will be modified as follows: Temporal boundaries are based on the different phases of the Project: Construction (including |

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| | | | Appendix 10-A (ERA) | (EIS and TSD-ERA). As per REGDOC 2.9.1, the sub-section 4.1.1 Complexity of the environmental risk assessment requirements states that “The applicant or licensee shall identify facility characteristics and activities that may interact with the environment during the relevant phase of the facility or activity’s lifecycle (for example, site preparation, construction, operation, and decommissioning.” | | <p>EIS Section 5 Approach and Methodology of the Assessment, Section 5.3.4 outlines the temporal boundaries for the assessment and the Project activity tables used throughout the EIS include elements of site preparation in the Construction phase. The list of key project activities included in the Construction phase are included below; elements related to site preparation are shown in bold:</p> <p>Construction Activities</p> <ul style="list-style-type: none">• Development of access roads and air strip• Site preparation and earthworks; clearing, levelling, and grading of the Project Area• Power generation - generators• Installation of main substation and distribution of power around site• Wellfield and freeze hole drilling; ground freezing• Batch plant operation (concrete); crusher at borrow area• Development of surface infrastructure (camp, operations centre, plants, ponds, pads, and support facilities)• Waste management (composting, domestic and industrial landfill operation, recycling)• Water management (including treatment and site runoff)• Groundwater supply• Surface water withdrawal• Fuel management (e.g., propane for comfort heating; vehicle and aircraft fuel)• On-site and off-site operation of vehicles and transport of materials• Air transportation for workers• Regulatory site inspections• Engagement – site visit from Interested Parties | <p>site preparation), Operation, Decommissioning, and Post-Decommissioning, as described in Table 5.3-3.</p> <p>Section 1.3.2 of Appendix 10-A will be modified in the final EIS as follows:</p> <p>Consistent with the Wheeler River Project EIS, the temporal boundaries of the assessment include the following Project phases: construction (which includes site preparation), operation, decommissioning, and post-decommissioning (Table 1-1).</p> |
| IR-04 | Environment and Climate Change Canada (ECCC) | Fish and fish habitat | Section 2, Project Description Section: Glossary | <p>Context: The Proponent defines ‘clean waste rock’ as “Waste rock generated as sandstone cuttings and core from drilling activities associated with well and freeze hole development that does not have uranium containing materials”.</p> <p>ECCC notes that the use of the term “Clean Waste Rock” could be misunderstood to mean that the waste rock is devoid of any contaminant. Even when the waste rock referred to as “clean waste rock” does not contain uranium materials, it could contain other metals or contaminants that could have adverse environmental effects. It is also not clear whether the “clean waste rock” is characterized for Acid Rock Drainage/Metal Leaching (ARD/ML) given that some portion of the basement rock is to be drilled out to anchor the freeze walls and may have ARD/ML potential.</p> <p>Rationale: The current definition of ‘clean waste rock’ in the draft EIS could lead to inappropriate handling and disposal if it is assumed to be devoid of any metals or other contaminants that might negatively affect the environment.</p> | Provide a clear and more detailed definition of the term ‘clean waste rock’. | <p>Clean waste rock is defined as non-mineralized and non-potentially acid generating (PAG) rock. Clean waste rock will be sent to a storage pad (clean waste rock pad) that is proposed to be lined with an impermeable geomembrane collecting precipitation that will be monitored for quality and would allow for treatment if necessary.</p> <p>The clean waste rock pad is expected to hold approximately 7,800 m³ of clean waste rock.</p> <p>Further characterization and test work are ongoing to confirm the ARD/ML characteristics of this waste rock. From the historically completed testing it is recognized that the non-mineralized mine rock is expected to include both non-PAG and PAG mine rock.</p> <p>The clean waste rock pile is being evaluated for potential segregation of the PAG mine rock. However, it is noted that, as observed in the six field barrel tests on Phoenix mine rock, including four bins that were identified as containing PAG mine rock, no net-acidity was observed over at least the first two years of the field barrel testing. In all barrel tests the pH values were greater than 7 and were producing substantial alkalinity (SRK, 2020). This indicates that the potential lag-time to net-acid generation would be on the scale of years and monitoring/collection/potential treatment could be pursued as conditions at the clean rock pile develop.</p> <p>It is noted that the non-mineralized mine rock is expected to have central tendency (i.e., median) solids contents that are generally similar to the average upper continental crustal abundance contents (Rudnick and Gao, 2014).</p> <p>The field barrel tests have all maintained neutral pH conditions and metals concentrations and their respective loading rates have generally either been stable or decreasing over the test duration (SRK 2020). However, further testing is required to confirm the expected behaviour at field-scale over operational-timescales.</p> <p>It is noted that comparing field barrel leachate concentrations are not directly representative of expected contact water within an at-scale storage pad; however, it is recognized that the clean waste rock pad is of a modest size and that loadings to contact water are expected to be directly correlated with the quantity of rock held within a catchment. Further, the barrel tests were performed on materials that were crushed to less than 1mm, field-scale mine rock of larger grain sizes would be expected to have appreciably lower mass loading rates than the unit rates observed in the field cells.</p> <p>Confirmatory sampling of both the waste rock and drainage at the clean waste rock is planned during both construction and operations.</p> <p>References:</p> <p>Rudnick, R.L. and S. Gao. 2014. Composition of the Continental Crust. Treatise on Geochemistry (Second Edition) Volume 4, 2014, Pages 1-51</p> <p>SRK Consulting Inc. (SRK).2020. Wheeler River On-site Kinetic Leach Tests, Progress Update – Draft. Prepared for Denison Mines Corp. January 2020.</p> | <p>Section 2.2.4.8 of the final EIS will be updated as follows:</p> <p>Clean waste rock (non-mineralized and non-potentially acid generating [PAG] rock) will be generated as sandstone cuttings and core from drilling activities. Based on the current wellfield and freeze wall design, approximately 7,800 m³ of clean waste rock will be generated. Clean waste rock will be stored on a 2,500 m2 single geomembrane liner (Figure 2.2-26) and can be used for road construction and/or concrete production. The clean waste rock will be assayed and tested for PAG during Operations to ensure the material can be reused when required.</p> |
| IR-05 | CNSC | Change to an environmental component due to hazardous contaminants | Section 2.2.1.2 | <p>Context: Water volumes for mud/diamond drilling is listed as minimal as the mud will be re-used. The mud is identified as a mixture of water, clay, and environmentally friendly polymers that clean out the cuttings and help to keep the drilling bit cool.</p> <p>Rationale: Although the mud for drilling will be re-used, there could be environmental impacts should there be an accident while drilling.</p> | Please identify the components of the environmentally friendly polymers for the drilling mud and potential environmental impacts should the mud not be recovered. | Two primary drilling methodologies are planned for the development of the wellfield that will be comprised of monitor, injection, recovery and freeze wells. The two primary forms of drilling are diamond and mud rotary drilling. Diamond drilling will be used for freeze, monitor and small diameter injection wells. Mud rotary drilling will be used for recovery and larger diameter injection wells. Both methodologies employ similar mud management programs as part of the drilling process in that they both use a combination of light polymer and bentonite products to stabilize the subsurface formation during drilling and well installation. | No EIS updates are anticipated to address this IR at this time. |

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| | | | | | | <p>Various products are used at specific depths to stabilize the formation and include Ultra PAC, Sawdust, Prima Seal, Premium Gel, Prairie Drill, KCl, Hyper drill, Hydrated lime, Envirofloc, Caustic Soda, Calcium Chloride, Purevis and bentonite. All products used on the Wheeler River Project are considered environmentally friendly and safe for use for workers as indicated by their respective safety data sheet (SDS) and product data sheet (PDS. The use of drilling muds was addressed within the A&M hazards screening (Table 3-2; in Appendix A of Appendix 14-A) and characterized it as a low risk event.</p> <p>Potential worker safety risks primarily include slipping hazards at the worksite as the products generally create non-adhesive bonds in surfaces that are contacted.</p> <p>All of the products used are routinely landspread on farmer’s fields in the Oil and Gas industry in both Saskatchewan and Alberta at the same quantities or greater proposed for use on the Wheeler River Project. As a vast array and combination of products are used, the specific compositions are not presented herein but are available upon request.</p> | |
| IR-06 | CNSC | Geology and groundwater | Section 2.2.1.4, Wellfield for In Situ Recovery Mining | <p>Context: This Section of the EIS indicates that a tracer test was completed in 2021 and a feasibility field test was initiated in 2022. No information from these tests is included in the EIS and no reporting timelines are provided.</p> <p>Rationale: Guidance from the IAEA (2001) and best practices highlighted by regulatory regimes in other countries such as the United States (IAEA, 2016) and Australia (Geoscience Australia, 2010) indicates that single and multi-well trial (feasibility) testing for mining and remediation techniques should be carried out before a licence for full-scale operations can be granted. This is part of the requirement for proponents to demonstrate to government authorities that all potential risks have been considered during the life of operation and post-remediation of the mine.</p> <p>Additionally, Section 8.5.2 of the Generic EIS Guidelines states: “Units may be characterized as aquifers or aquitards, and unit descriptions should include their geochemical characteristics, vertical and lateral permeabilities, transport mechanism (diffusion versus advection) and the directions of groundwater flow”,</p> <p>And that “The applicant or licensee should present a conceptual and numerical hydrogeological model that discusses the hydrostratigraphy and groundwater flow systems”.</p> <p>Outcomes from the tracer test inform model parameters such as effective porosity (see IR-78), dispersion, and dispersivity (see IR-96). The wellfield leach tests and remediation trails ultimately inform environmental monitoring during site activities, and the source term for the groundwater model. This source term represents the contaminants which flow through the desilicified zone into Whitefish Lake, which represents a source of contamination considered in the ERA.</p> <p>References: [1] International Atomic Energy Agency (IAEA). 2001. Manual of Acid in Site Leach Uranium Mining Technology. IAEA-TECDOC-1239. Vienna. 283 p. [2] International Atomic Energy Agency (IAEA). 2016. In Situ Leach Uranium Mining: An Overview of Operations. IAEA Nuclear Energy Series No. NF-T-1.4. Vienna. 76 p. [3] Commonwealth of Australia (Geoscience Australia). 2010. Australia’s in situ recovery uranium mining best practice guide. ISBN 978-1-921672-95-8. Canberra. 33 p.</p> | <p>1. Please provide a summary of the results of field tests (i.e., tracer tests, wellfield leach tests, and remediation trials) in the EIS, or provide a technical supporting document with this information, and ensure the documentation is appropriately referenced in the EIS.</p> <p>2. Please indicate how outcomes from these field tests inform the design of In Situ Recovery. This information should include:</p> <ul style="list-style-type: none">• feasibility of meeting remediation targets.• groundwater flow conditions and validation of flow models.• mobilization of contaminants (e.g., Al, Se or V).• potential for free gas evolution/two-phase flow.• identifying composition of lixiviant and production solutions.• success despite presence of >2% carbonate minerals (siderite, FeCO3) in the ore zone (see Table 4-3 of Appendix 7-A).• site-specific data to parameterize, validate, and refine solute transport models (hydraulic conductivity, effective porosity, dispersivity, diffusion, etc.). <p>3. Please provide further information of proposed operations including % recovery, uranium concentrations, optimal liquid/solid ratios, anticipated reagent consumption, etc.</p> | Please see Attachment IR-06. | <p>The following text will be added to the final EIS, under a new heading, Section 2.2.1.6 ISR Mining-Related Inputs for the EIS:</p> <p>It is important to note that Denison is completing a sequential EA and licensing process for the Project (see Section 1). Detailed ISR mining-related information needed to support licensing and permitting has not been included in the EIS; it will be provided to regulators as part of permitting and licensing.</p> <p>For the EIS, an understanding of ISR design is needed to describe potential effects related to Project activities within the biophysical environment (EIS Part II, Section 6 to 9), human environment (EIS Part III Sections 10 to 13), and accidents and malfunction (Section 14) assessments. Denison used the ISR mine design and the 3D hydrogeology and contaminant transport numerical modelling of the injection and extraction wells to determine the potential interactions between mining activities and the environment. Two key outputs from the ISR mine design and 3D hydrogeology modelling work were used as inputs for the groundwater assessment (Section 7): 1) The extent of mining solution migration away from the injection and recovery well screens, as defined by the mining area (50m above the ore zone and within the freeze wall) and 2) groundwater quality of the mining area following remediation. Monitoring will be completed during operations and decommissioning to confirm these inputs.</p> <p>Importantly, since the mine design includes the freeze wall, movement of mining solution is restricted and contained horizontally during operations. Wellfield pumping provides the hydraulic containment to keep mining solution within the 50 m mining area (see Section 2.2.1.4.2). During the operation phase, and under normal operational conditions there is no interaction between the mining zone and surface water or down gradient groundwater environments, and the groundwater assessment (Section 7) focuses on the post-decommissioning period following removal of the freeze wall, once the groundwater flow paths return to pre-mining conditions. During mining area remediation (see Section 2.3.3.1.1), the freeze wall will remain in place until decommissioning objectives are achieved. Refinement of the mining area decommissioning objectives and associated modelling will be done through updates to the Decommissioning Plan, and will be bounded by the objectives evaluated in the EIS.</p> |
| IR-07 | ECCC | Fish and fish habitat | Section 2.2.1.4.2, Wellfield Operation Section 2.2.1.4.2.2, Secondary Containment of Mining Solution – Pumping | <p>Context: The description in Sections 2.2.1.4.2 and 2.2.1.4.2.2 refer to the differential rates of injection and withdrawal, which implies that more solution will be withdrawn through the recovery well than volume of mining solution injected. According to the description of the site, a freeze wall will create a barrier between the uranium deposit to be mined and outside the isolated area to prevent inflow of groundwater from the sandstone outside the freeze wall. Secondly, it was indicated that the basement rock below the uranium deposit will prevent infusion of groundwater from below.</p> <p>The Proponent stated that inward hydraulic gradient will be created</p> | Clarify where the extra groundwater will come from to sustain this differential rate of injection and withdrawals during operation and if this extra water has been accounted for in the model and the amount of water that ends up in the receiving environment. | <p>The freeze wall will provide hydraulic containment between the internal wellfield and the external regional groundwater system with each well pattern maintaining a minimum 1% 'bleed' to maintain hydraulic gradients towards recovery wells.</p> <p>The "extra" water pumped (i.e., the water pumped in excess of injection) will be derived from stored groundwater within the sandstone units above the ore zone, and from the underlying paleoweathered zone, within each phase of Operation that is surrounded by freeze walls. The volume of stored water was estimated using the calibrated groundwater flow model, which contains 3D volumes for the saturated soil and rock within each of the walled phases, including appropriate porosity values. These volumes of stored water were compared to the volume pumped within each phase of operation, over the expected period of extraction</p> | No EIS updates are anticipated to address this IR. |

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| | | | | <p>by recovering more solution than is being injected. In general, the wellfield will operate to draw a minimum of 1% more solution out of the wellfield compared to solutions injected in. This will help avoid increased subsurface pressures from injection pressure build up within the deposit.</p> <p>Rationale: It is not clear where the extra groundwater will come from that will sustain this differential rate of injection and withdrawals as the freeze wall and bedrock basement will isolate the injection well from groundwater.</p> <p>If it is assumed that there is limited amount of groundwater present in the sandstone layer above the uranium deposit, that amount of groundwater in the sandstone layer is finite and will be exhausted at some point. Therefore, it is not clear where the extra groundwater will come from. If the extra volume of water is not accounted for in the modelling, that would ultimately affect the volume of water that ends up in the receiving environment and likewise the amount of contaminants contained.</p> | | <p>based on the mining plan. The stored volume of water was calculated to be 3.4 (Phase 1) to 9.7 (Phase 4) times the estimated excess pumped volume. In other words, there is ample stored water within each walled phase to supply the excess pumped volume. The excess pumping creates a hydraulic gradient toward the ore zone within each walled phase, which will help to avoid vertical spreading of the UBS during operations. If monitoring during operations indicates water levels are falling quicker than anticipated, additional water could be added within the walled phase, within the Upper Sandstone Aquifer.</p> <p>The volume of water reduction within each phase of operations was evaluated within model simulations presented in Appendix 7C, Section 2.7. The volume reduction within mined phases was found to be minor compared to the volume of water pumped from the Upper Sandstone Aquifer located outside the freeze wall confines and within the regional groundwater system during decommissioning (i.e., pumping at 35.5 m³/hr). The pumping of groundwater for process water results in an order of magnitude more water volume extraction than the estimated volume required to replenish stored water when the freeze walls are thawed.</p> | |
| IR-08 | ECCC | Change to an environmental component due to radiological contaminants | Section 2.2.1.4.2.2 Project Description | <p>Context: This section describes how an inward hydraulic gradient will be created within the mining area as a secondary containment method for control of mining solution. While the process is described, there is no information on contingency measures in place for pump failure or system maintenance solutions. There is also no information on how quickly the hydraulic gradient, and therefore secondary containment, would be compromised if any pumps stopped working. It is also unclear how primary containment (i.e., well design) failure, such as physical/mechanical issues compromising casings, would affect the creation of the hydraulic gradient and secondary containment as well.</p> <p>Rationale: It is important to have contingency planning in place in the event that there are any issues with the hydraulic gradient and secondary containment system for control of the acidic mining solution.</p> <p>There is no information in this section on how the hydraulic gradient (i.e., secondary containment) would be maintained if a well or pump (i.e., Primary containment) experienced problems.</p> | Provide further information regarding how the inward hydraulic gradient system functions, with particular focus on how the hydraulic gradient and secondary containment will be maintained if any wells or pumps were compromised. | <p>The following highlights the three levels of containment that will be in place to mitigate the potential for loss of containment of the mining solution. Mining solution containment was discussed in the draft EIS, Section 2.2.1.4.2 Wellfield Operation. As noted in the IR, the hydraulic gradient created in the mining zone between injection and recovery wells provides for secondary containment.</p> <p>i. Primary Containment (Well Design) The well configuration is designed to make sure fluids, whether injected or extracted, are confined to set depth locations. In the case of most injection and extraction wells, this would refer to the surface injection point and the screened location at the ore zone depth. The cased and sealed well in all other portions of the well design ensure no interaction with groundwater from other formations from surface to the deposit depth, thus preventing dilution from inward fluid flow of formation waters or outward migration from the well. Well integrity is monitored through live pressure monitoring systems in the annulus of the wells for leak detection and scheduled compliance checks via wireline tools of well integrity.</p> <p>ii. Secondary Containment (Hydraulic Gradient) Hydraulic gradients within the wellfield are maintained initially on a per pattern basis comprising of a single extraction well with four injection wells. In this initial stage of wellfield operations, all solutions from the four injection wells are drawn towards the single extraction well. As wellfield development progresses subsequent adjacent patterns are constructed. In these subsequent stages, the fluid from the injection wells is now drawn toward multiple extraction wells, essentially dividing the recovered solution between the number of operating extraction wells. As subsequent progression of wellfield development evolves, the inward hydraulic gradient of fluids injected will be further divided by adjacent extraction wells.</p> <p>In upset conditions, such as pump failure, or during scheduled pump maintenance when a given extraction well would be shut down purposefully, the fluids that would normally be recovered by a particular extraction well would then temporarily be recovered by one of the adjacent extraction wells within the larger extraction well network. This is a standard approach used in ISR mining. When the upset conditions or scheduled maintenance have been completed, the “normal” mining solution recovery pattern would be restored to the original flow path. In this way, and by design, hydraulic containment is maintained at all times.</p> <p>iii. Tertiary Containment (Freeze Wall) The freeze wall provides two main benefits:</p> <ol style="list-style-type: none"> A defined area for the mining process to occur with the establishment of clear ‘no flow’ boundaries being the freeze wall itself. Essentially removes the effects of the regional groundwater system and regional hydraulic gradient within the confines of the freeze wall. In the event of an upset condition, groundwater velocity is essentially null preventing any migration of fluids up or down gradient. This allows time to recover any fluids in a controlled manner while re-establishing operating conditions in what would otherwise be considered a ‘stagnant’ system. | <p>The following text will be added to the final EIS in section 2.2.1.4.2.2 Secondary Containment of Mining Solutions.</p> <p>“In the case of an upset condition, such as pump failure, or scheduled pump maintenance when a given extraction well would be shut down purposefully, the fluids that would normally be recovered by a particular extraction well would then temporarily be recovered by one of the adjacent extraction wells within the larger extraction well network. When the upset conditions or scheduled maintenance have been completed, the “normal” mining solution recovery pattern would be restored to the original flow path. In this way, and by design, hydraulic containment is maintained at all times.”</p> |
| IR-09 | CNSC | Geology and Groundwater | Section 2.2.1.4.2.2 | <p>Context: This section indicates that mining solution within the mining area can primarily be controlled by maintaining an inward hydraulic gradient. The inward hydraulic gradient will be created by recovering more solution than is being injected.</p> <p>Rationale: If, for some reason, the recovered solution is much more than that being injected, an excessive drawdown could be created. If, by accident, mining solution is leaking into the upper sandstone aquifer through crack in injection/recovery well casing at the same time, it would be challenging to remediate the upper sandstone aquifer in dry conditions (due to excessive drawdown).</p> | Please clarify if any measure will be implemented to avoid excessive drawdown and develop contingency measures to address such accident. | <p>The measures that will be implemented to avoid excessive drawdown are as follows:</p> <p>Continuous (real-time) water level monitoring will be implemented for hydraulic head measurements in individual wells as well as the surrounding open aquifer system contained within the boundaries of the freeze wall. These monitor wells will be installed at various depths throughout the mining area (i.e., within the freeze wall) ranging from the shallow groundwater system to the deposit depth and further, through the paleoweathered zone, into basement rock below the deposit and mining horizon. The mining methods operational success and efficiencies are benefitted by maintaining a shallow depth to water to reduce the magnitude of hydrostatic head needed to be applied to pump within each recovery well.</p> <p>In the event that excessive drawdown was identified through the monitoring system, it could be mitigated. Water would be pumped into the overburden aquifer to offset such injection and pumping imbalance. Water sources would include those from both groundwater and surface sources previously assessed.</p> <p>It is noted that leakage of “mining solution” into the upper aquifer is a hypothetical accident</p> | No EIS updates are anticipated to address this IR. |

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| | | | | | | or malfunction that would not be allowed to persist as it would be identified by monitoring. Individual wells will be monitored for integrity and well operation would stop if a leak were detected to prevent or limit migration of fluid outside of the mining zone. Further, all monitor, injection and recovery wells can be retrofitted with down hole pumps to recover solution that may have leaked or migrated in an upset condition. Additional recovery wells can be installed at select depth to further increase recovery if the need should arise. | |
| IR-10 | ECCC | Fish and fish habitat | Section 2.2.1.4.2.3, Tertiary Containment of Mining Solution - Freeze Wall | <p>Context: The Proponent stated that as a tertiary means of containment for the mining area, the uranium deposit is proposed to be surrounded by a freeze wall that extends from the surface to the basement rock, isolating the mining area from regional groundwater. Current plans are for the freeze wall to be a minimum of 10 m thick, be installed 25 m away from the uranium deposit, and extend 30 m into the basement rock (Figure 2.2-6).</p> <p>As explained in Section 2.2.1.4.2.2, mining solution will be injected into the ore zone under pressure and will likely react, not just with the uranium in the ore zone, but also the binding or cementing material in the sandstone. This means that some portion of the sandstone above the uranium layer and perhaps some portions of the freeze wall will dissolve, thereby creating more void than just the thickness of the uranium layer or horizon. The void may affect the integrity of the freeze wall as containment.</p> <p>Rationale: It is not clear how the Proponent will monitor the freeze wall to verify whether portions of the freeze wall are being dissolved in the mining process and how it plans to verify the integrity of the freeze wall as a containment for the mining solution. In addition, if the dissolution reaction of the uranium ore is exothermic, then the heat generated may also affect the integrity of the freeze wall.</p> | <p>1. Explain how the integrity of the freeze wall will be maintained as a means of containment that prevents migration of the mining solution out of the ore zone into the receiving environment.</p> <p>2. Demonstrate that the mining solution injected under pressure will not compromise the integrity of the freeze wall as a containment.</p> <p>3. Demonstrate how both exothermic and chemical reactions of the mining solution used to dissolve the uranium ore will not compromise the integrity of the freeze wall as a containment.</p> <p>Technical Discussion Required: Yes. ECCC would like to better understand the chemical constituents that compose the mining solution and the chemical reactions that it will cause.</p> | Denison met with the FIRT reviewers on April 19, 2023 to discuss the response to IR-10. Greg Newman, from Newmans Geotechnique Incorporated, attended the meeting to provide information on the freeze wall integrity and basis for the design, which relies on site field data and lived experience from several exiting Saskatchewan mining operations. A written response to IR-10, summarizing the material presented by Greg Newman, is included here as Attachment IR-10. | No EIS updates are anticipated to address this IR. |
| IR-11 | ECCC | Change to an environmental component due to hazardous contaminants | Section 2.2.3 Project Description | <p>Context: It is unclear how much contact water may be produced during the drilling of the mine well field during the construction phase of the proposed Project. Figure 2.2-14 indicates that no water will be produced during the drilling process in the construction phase. In Section 2.2.1.2 both mud rotary drilling and diamond drilling are proposed for the creation of wells. Both processes require water, however only mud rotary drilling produces liquid mud that is then reused in the drilling process.</p> <p>Rationale: It is unclear if the liquid mud produced during drilling can be reused indefinitely with further water additions, or if this eventually becomes the clean sand grain cutting and how it will be disposed of (i.e., liquid or solid waste). If the mud produced from drilling is classified as liquid waste and disposed of as contact water, it is not clear if this is accounted for in the site water management plan and water balance during the construction phase. Contact water from well drilling during the construction phase has not been quantified or accounted for in Figure 2.2-1, and therefore it is unclear if proposed infrastructure during the construction phase has the capacity to contain this waste stream in addition to the waste streams currently outlined in Figure 2.2-1.</p> | Provide further information on potential wastewater produced during the construction phase from drilling processes, and if proposed infrastructure can contain any water produced. | A centrifuge will be used for separating out solids during both diamond and mud rotary drilling to recycle fluids. Only solid drill cuttings, not wastewater, will be produced and all muds and waters will be recycled as part of the drilling process. Upon completion of a drilling campaign, all remaining mud and water will be stripped of remaining solids, treated with mud zymes to break down polymers, and injected back down into the mineralized horizon. During active drill campaigns clean water will be held in approved tanks as part of the drill program between well drilling. | No EIS updates are anticipated to address this IR. |
| IR-12 | ECCC | Change to an environmental component due to hazardous contaminants | Section 2.2.3, Project Description | <p>Context: There is not enough information provided within the draft EIS and site water infrastructure designs to determine if the infrastructure will sufficiently contain mine site contact and non-contact water runoff. It is unclear how water management will occur during all proposed Project stages at the Project airstrip, which is located away from the main Project site. No information has been provided regarding water that may come into contact with fuels and oils from machinery on the air strip, how and where that contaminated water will be treated, and how surface runoff around the airstrip will be managed. Additionally, it is unclear if contaminants from heavy machinery on roads have been considered during runoff collection plans throughout the mine Project site. Water management at the airstrip and roads can have impacts on surface water quality and sediment quality and contaminants (e.g., Hydrocarbons) from these sources should be considered in overall site water management plans.</p> <p>In Section 2.2.3.1 a site drainage plan for contact and non-contact water has been provided in Figure 2.2-17, and water balances have been provided for the different Project phases in Figures 2.2-14 to 2.2-16. In Section 2.2.3.4 a volume of 30,000m3 for the process water pond is provided, and it is stated that the process water pond has the capacity to contain Probable Maximum Precipitation (PMP) event estimated to be 483.3mm while allowing for 1.0m of freeboard. However, there are no estimates on the total volume of water that may be drained from the overall site infrastructure (i.e., the well field, processing areas, etc.) during a 24-hr PMP event. Additionally, in Figure 2.2.17 culvert locations are provided, however there is no further information on culvert designs, flow ratings and capacity for PMP events.</p> | <p>1. Provide information on how contact and non-contact water from the site airstrip will be managed. Include information on potential contaminant characterization and loadings and an assessment of risk to the environment.</p> <p>2. Provide further information on how potential contaminants in runoff from roads have been considered in the site water management. Include information on potential contaminant characterization and loadings and an assessment of risk to the environment.</p> <p>3. Provide estimated volumes of water to be drained from overall site infrastructure (such as the mine terrace, airstrip, camp area etc.), during a 24-hr PMP event.</p> <p>4. Provide additional information on culvert designs and conveyance capacity for PMP events.</p> | <p>1. and 2. Denison's approach to site water management is keep non-contact water “clean” – that is, the management approach provides that non-contact water does not come into contact with site aspects that may impart constituents/contaminants of concern and that non-contact water mingles with contact water. Contact water is water expected at the wellfield and processing plant terrace (refer to runoff collection arrows shown in draft EIS Figure 2.2-17), and also includes leachate collected from landfills. As such, runoff from the airstrip and site roads is considered non-contact water and will not be actively managed. However, should a spill occur, the spill response plan will be followed. Details of Denison's response plans will be developed to support licensing as part of the Waste Management and Emergency Management and Fire Protection programs.</p> <p>By following best practice and mitigation measures outlined in the EIS, Denison does not anticipate a need to continually manage water at the airstrip or along site roads as the water here will be clean, non-contact runoff. Examples of relevant mitigation measures include:</p> <ul style="list-style-type: none">• Project components including equipment and machinery will be regularly maintained and inspected to make sure they are in good working order.• Fuel storage and distribution infrastructure will be constructed in accordance with applicable legislation requirements.• Fuels will be stored in approved, above-ground, double-walled storage tank(s) equipped with secondary containment in accordance with provincial regulations and standards.• A wash bay will be available to clean items, equipment, and vehicles that may have been in contact with potential contaminants. <p>Refer to Section 14 of the draft EIS for the screening and evaluation of various accident and malfunction scenarios. Should unplanned events or conditions occur, it will be important for Denison to address and respond in an appropriate manner. Details of Denison's response plans will be developed to support licensing as part of the Waste Management and Emergency Management and Fire Protection programs. Additionally, should unexpected water pooling be observed at the airstrip or site roads during Operation, temporary water</p> | No EIS updates are anticipated to address this IR. |

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| | | | | <p>Rationale: In order to be able to understand site water management and flood risk potential, more information needs to be provided regarding the site water infrastructure designs and capture volumes during PMP events. This information will aid ECCC in understanding how contact and non-contact water will be conveyed throughout the site. Runoff from roads and the site airstrip will contain contaminants from vehicles, heavy machinery, aircrafts and de-icing practices. Additional information on the runoff collection systems and expected contaminant concentrations for the site airstrip and roads is needed to determine if the receiving environment and aquatic and terrestrial receptors are protected.</p> | | <p>removal means such as vac trucks or sump pumps could be employed and the areas would be re-graded to minimize water accumulation.</p> <p>3. As indicated in the response to IR-12, points 1 and 2 above, Denison expects contact water requiring management is at the wellfield and processing plant terrace (refer to runoff collection arrows shown in draft EIS Figure 2.2-17). For this area, the volume of water expected during a 24-hour PMP of 493 mm is approximately 37,240 m³. The wellfield runoff pond has been sized appropriately (38,200 m³ with 1 m of freeboard) to contain this volume of water.</p> <p>4. Details related to culvert design and conveyance capacity are being developed as part of ongoing engineering activities. Culverts will be a designed with a sufficient size and length to convey water around the site during a PMP event.</p> | |
| IR-13 | ECCC CNSC | Fish and fish habitat | Section 2.2.4, Waste Management Section 2.2.7.7, Borrow Area Section 2.3.1.3 Site Preparation and Earthworks | <p>Context: The Proponent indicates that a borrow area is planned for an area northeast of the processing plant. The borrow material or overburden will be used during construction for roads, airstrip, pads, and in the batch plant for concrete production needs, during Operation for ongoing maintenance of various Project components and during decommissioning for fill and cover material. Suitable construction fill material will be sourced from the proposed borrow area and any suitable clean sandstone generated during freeze wall and well drilling (Section 2.2.7.7).</p> <p>It was also noted in Sections 2.2.1.3 and 2.2.14 that the freeze wall will be established by drilling over 300 vertical holes from surface to the basement rock. The freeze holes will extend 30 m into the basement rock and will produce waste rock from basement rock (Figure 2.2-6). However, there is no information whether the waste rock from basement rock would potentially be acid generating and/or metal leaching. This means that all the extra 30 m of basement rock should also be characterized for potential ARD/ML to determine use or appropriate disposal.</p> <p>Rationale: ECCC notes that the Proponent did not indicate whether the borrow material and the drill out part of the sandstone layers and basement rock will be tested for Acid rock drainage/metal leaching (ARD/ML) potential before they will be used during construction, operation and decommissioning. ARD/ML is an environmental hazard that will have an adverse effect on waterbodies frequented by fish.</p> <p>Potential acid generating and metal leaching waste rock could pose negative impacts on the environment if they are not managed adequately.</p> | <p>Please provide:</p> <p>1. Information on whether the waste rock from the basement rock is potentially acid generating and metal leaching;</p> <p>a. Confirm that any borrow material to be used for construction will be characterized for potential ARD/ML.</p> <p>b. Confirm that the part of waste rock recovered from the basement rock, will also be tested for potential ARD/ML.</p> <p>2. Criteria for segregating the potential acid generating and metal leaching waste rock, if it exists, from clean waste rock; and,</p> <p>3. A plan to manage the potential acid generating and metal leaching waste rock, if it exists.</p> | <p>1. The waste rock from the basement is potentially acid generating due to localized pyrite mineralization. Select and systematic assays are conducted to characterize pyrite distribution throughout the deposit and adjacent geological units. Rock recovered from basement during drilling will be further characterized prior to or during drilling activities.</p> <p>1a. Borrow pit area selection was based on geotechnical program completed in 2021 which did not identify any potential for ARD/ML. Further explorative works are ongoing part of ongoing Engineering activities and with confirmation of characterization through assays of representative samples.</p> <p>1b. Basement rock will be tested for potential for acid generation. It is expected that a portion will be potentially acid generating. Select and systematic assays are conducted to characterize pyrite distribution throughout the deposit and adjacent geological units.</p> <p>2. All basement rock will be stored on the special waste pad. Waste rock from the sandstone will also be characterized primarily based on geological and geochemical characteristics, and if a portion of the waste rock is potentially acid generating, it will also be stored on the special waste pad. See also response to IR-04</p> <p>3. Clean waste rock will be generated as sandstone cuttings from drilling activities. Clean waste rock will be stored on the clean waste rock pad. The clean waste pile will be assayed and tested for Potential Acid Generation (PAG) during operations to ensure the material can be reused when required. Potentially acid generating waste rock will be stored on the special waste pad. Special waste is defined as mineralized materials that cannot be disposed of in the clean waste pile. It is primarily made of drill cores and cuttings from wellfield construction. A double-lined process water pond with leak detection has been designed to capture water from various areas, including the process precipitates storage pad and special waste pad. The pond will be designed to hold up to 30,000 m³ of water and will be located next to the processing plant. The pond has been designed to hold a probable maximum precipitation event. The pond will be able to receive water from all site ponds and monitoring wells.</p> <p>The ponds that are designed to receive materials recovered during drilling activities are all lined with a leachate collection pond that will be monitored for water quality. The environmental monitoring program that will be presented during licensing will cover characterization of materials placed in the clean and special waste ponds to ensure environmental protection.</p> | <p>Section 2 of the final EIS will be updated per below:</p> <p>2.2.4.7 Special Waste and Special Waste Pad</p> <p>During Operation, the special waste pad is expected to contain special waste that is primarily mineralized core, and cuttings from wellfield development, basement rock, and any waste rock determined to be potentially acid generating (PAG). Special waste from drilling activities is defined as uranium containing materials that cannot be disposed of in the clean waste pile, including PAG waste rock. Special waste will be determined by Denison geologists based on ore zone intersection expectations, and probe reading taken during wellfield drilling activities, and results of systematic assays to characterize the acid generating potential of the waste rock. Based on the current wellfield and freeze wall design, approximately 150 2,000 m³ of special waste rock will be generated.</p> <p>Denison will examine opportunities to reprocess the mineralized core and cuttings generated during wellfield development to recover uranium. This reprocessing may be done by placing the material in tanks with mining solution or placing the material underground into the mining area at the end of a well's production.</p> <p>The special waste pad may be used to temporarily store other materials that may be radioactive (e.g., contaminated soil) prior to final disposal in the industrial landfill or a licensed off-site facility.</p> <p>The special waste pad is estimated to be 2,500 m2 in size and will be constructed with a double composite liner system with leak detection capabilities (Figure 2.2-25). Any contact water coming off the special waste pad will be directed to the wellfield runoff pond (Section 2.2.3.5).</p> <p>2.9.1.3.3 Waste Management Program</p> <p>The Waste Management Program would include requirements and processes to ensure that Denison's activities that involve planning for, handling, transporting, processing, storage, and disposal of wastes are performed in a manner that complies with applicable regulatory and licence requirements and protects workers, the public, and the environment.</p> <p>The Waste Management Program would include identification of waste inventory and the characteristics of the waste (radiological and hazardous non-radiological), waste segregation, waste packaging and transfer requirements, and the plan for storage or disposal of the wastes. The Waste Management Program will detail the plans for waste rock segregation based on mineralized content and acid generating potential.</p> |

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| IR-14 | CNSC | Wastes and Decommissioning | Section 2.3.3.1.3 Decontamination, Demolition, and Disposal (p. 2-82) Table 4.3-2: Key Issues and Concerns from English River First Nation (p. 4-33) | <p>Context: The EIS states “Concrete foundations will be left in place. Any portions of concrete foundations remaining above grade will be levelled and rebar will be cut-off at grade. Large slabs will be perforated on a 2-m grid to permit drainage. Concrete slabs will be covered with 0.5 m of development rock or locally stockpiled till.” (p. 2-82)</p> <p>Further, Denison notes that “Concern about responsible authority for restoring the environment, including contaminants when mining concludes. How long will it take to have the environment fully restored and, if Denison is no longer the operator, how will this be completed?” (p. 4-33). This comment status is noted as <i>Complete</i>.</p> <p>Rationale: Permanent structures will remain following decommissioning, according to the excerpt above. It’s unclear how engagement activities influenced Denison’s planned decommissioning approach, or how the comment above has been addressed or received.</p> | How has the proposal to leave these foundations in place been received by the Indigenous Nations and communities during engagement sessions? Have engagement activities influenced Denison’s planned decommissioning approach? Describe in additional detail how the comment from p. 4-33 has been addressed and how this has been received by those who expressed this concern? | <p>Denison understands the importance of demonstrating to the CNSC how issues and concerns raised by Indigenous nations and communities have been resolved, or where this has not been achieved, how Denison can demonstrate its efforts towards doing so and/or rationale for where agreement has not been reached. Please see response to IR-28 for information on how Denison will provide this information as the EA process advances.</p> <p>The option to leave concrete foundations in place will be discussed with Indigenous Nations and communities as decommissioning plans become more defined.</p> <p>The conceptual decommissioning plan (CDP) included in the draft EIS contains the appropriate level of detail for this stage of the Project. As described in Section 2.3.3, the details of the decommissioning plan will evolve and become more specific as the Project advances. The subsequent iteration of the plan is the preliminary decommissioning plan (PDP). The PDP will be submitted to regulators as part of Project licensing and permitting and will provide additional detailed information with respect to site decommissioning. The PDP would reflect input that will be solicited from Indigenous Nations and communities and others prior to its submission. Prior to executing decommissioning activities, Denison shall prepare and submit a detailed decommissioning plan (DDP) to regulators for acceptance, which builds on the PDP. In this case the DDP would reflect input that will be solicited from Indigenous Nations and communities and others prior to its submission and would also be informed by conditions on the ground at the site at that time, operational experience that has been gained and the regulatory landscape at that time. As is highlighted above, the decommissioning plan will evolve over time and the plan will become more refined as the Project advances. Denison is committed to continue to engage with Indigenous Nations and communities to solicit input.</p> <p>The comment in Section 4 on page 4-33: "Concern about responsible authority for restoring the environment, including contaminants when mining concludes. How long will it take to have the environment fully restored and, if Denison is no longer the operator, how will this be completed?" was addressed in the draft EIS in the following manner:</p> <p>- Concern about responsible authority for restoring the environment, including contaminants when mining concludes: Denison is responsible for decommissioning. Denison’s decommissioning commitment is to return the land back to the Province of Saskatchewan for unrestricted surface land use post-closure.</p> <p>- How long will it take to have the environment fully restored: Based on best practice and technical studies completed for the Project, the active decommissioning phase is anticipated to be 5 years. The Post-Decommissioning phase extends from the end of physical decommissioning until transfer of the site into the provincial Institutional Control Program (Government of Saskatchewan 2009) or direct release of the land back to the Crown. Post-Decommissioning is expected to last 15 years and during this phase, monitoring will be conducted until the site-specific decommissioning and reclamation objectives for the Project are met.</p> <p>- if Denison is no longer the operator, how will this be completed?: The financial assurance process provides certainty that the Project can be decommissioned as planned. The Project will not be issued an approval to operate until the decommissioning plan and associated cost estimate are accepted by the Minister of Environment and the financial assurance is in place. If Denison is unable to complete the decommissioning for any reason (e.g., bankruptcy), the finances are available for the Province of Saskatchewan to complete the activities as planned. The PDP will include an associated estimate for the decommissioning costs and Denison will provide financial assurance to confirm the identified decommissioning activities can be completed as planned. Updates to the financial assurance are done in conjunction with updates to the decommissioning plan, on a frequency of every five years during operations.</p> <p>References: Government of Saskatchewan. 2009. <i>Institutional Control Program: Post Closure Management of Decommissioned Mine/Mill Properties Located on Crown Land in Saskatchewan</i>. Ministry of Energy and Resources. December 2009.</p> | Refer to IR-28 for information on EIS updates related to issues and concerns. |
| IR-15 | ECCC | Fish and fish habitat | Section 2.2.3.4 Project Description Section 8.1.3.4.2, Aquatic Environment | <p>Context: In Section 2.2.3.4 it is stated that the estimated PMP event for Project infrastructure planning is 483.3mm. In Section 8.1.3.4.2 it is stated that the PMP is 489.3 mm.</p> <p>Rationale: It is unclear which value is the correct PMP value and if Project infrastructure has been planned correctly.</p> | Provide the correct PMP value and verify that Project infrastructure has been designed utilizing the correct value. | <p>The PMP event used for feasibility engineering designs is 493 mm. The PMP value has been extrapolated from Key Lake data presented in the Canadian Climate Program (1994). Denison reviewed the update to the Canadian Climate Program (1994) report provided in Atmospheric Environment Branch (1999) which shows PMP at the approximate Wheeler River Project location at 489.3 mm. Denison retained the higher of the two PMP values, i.e., 493 mm, for design purposes.</p> <p>The PMP value in Section 2 will be updated from 483.3 mm to 493 mm in the final EIS. The PMP value used in Section 8 (489.3 mm) will not be updated because it is less than the design PMP and, as such, was conservative.</p> <p>References: Canadian Climate Program. 1994. Point Probable Maximum Precipitation in Northern Saskatchewan. R.F. Hopkinson Scientific Services Regina Operations Building, Regina Airport. Regina, Saskatchewan. Report No. CSS – R94 – 01. Atmospheric Environment Branch. 1999. Environment Canada Prairie and Northern Region – Point Probable Maximum Precipitation for the Prairie Provinces. Atmospheric Environment Branch, Atmospheric and Hydrologic Sciences Division. Regina, Saskatchewan. Report No. AHSD – R99 – 01.</p> | Section 2.2.3.4 of the final EIS will be updated as follows: “The pond will be surrounded by a 2.0 m berm, have capacity for 0.5 m storage from a probable maximum precipitation (PMP) event estimated to be 483.3 mm 493 mm, and allow for maintenance of 1.0 m of free board.” |

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| IR-16 | CNSC | Human health with respect to hazardous contaminants | Section 2.2.3.8 | <p>Context: The EIS and technical supporting documents do not provide sufficient justification for the selection of the proposed wastewater treatment systems for the industrial wastewater treatment plant or the domestic wastewater treatment plant.</p> <p>In addition, it is not clear how the upper bound of the industrial wastewater treatment plant effluent quality was obtained.</p> <p>Rationale: Draft REGDOC-2.9.2 formally documents the CNSC’s expectations to licensees for controlling releases to the environment. For proposed new facilities, these expectations include conducting a best available technology and techniques, economically achievable (BATEA) Assessment, and determining key parameters necessary to support the EIS. These include identifying:</p> <ul style="list-style-type: none"> environmental release targets to inform the design of wastewater treatment systems to constrain the quantity and concentration of contaminants and physical stressors released into the environment, the best available technology and techniques through an options analysis; and the anticipated influent characteristics, overall treatment efficiencies, and maximum predicted design release as the output of the assessment. <p>Consideration of the principle of pollution prevention and BATEA is also a requirement of REGDOC-2.9.1.</p> <p>CNSC staff have met with Denison to discuss the expectations in draft REGDOC-2.9.2.</p> | <p>Please provide a summary of the BATEA assessment to justify the selection of the wastewater treatment plant system.</p> <p>As part of the summary, please identify the anticipated environmental release targets used to inform the design, as well as the maximum predicted design release concentrations and loadings to the receiving environment. The maximum predicted design releases should be used in the ERA to demonstrate protection of people and the environment.</p> | <p>Denison is undertaking a sequential EA and licensing process under the NSCA. For context, the EA process for a Project under CEAA 2012 and the Saskatchewan Environmental Assessment Act is long and complex. As such, the inputs and outputs (e.g., effluent quality) needed for the EIS were developed by Denison’s Project engineers early in the EA process to allow for the biophysical and human assessments to advance. An example of one of these outputs is the IWWTP effluent quality. The effluent quality predictions in the EIS provide a bounding scenario of the basis of the assessment of Project effects.</p> <p>As stated in the Draft REGDOC 2.9.2 Denison understands that a BATEA assessment be conducted to determine the predicted design release characteristics as part of the licence application for a new facility or activity.</p> <p>Outside of the EIS process, the Project detailed engineering is progressing, including the design of the IWWTP and associated refinement of effluent quality predictions. Denison is following Draft REGDOC 2.9.2 to arrive at a treatment option that remains within the bounds of the EA, which ultimately predicts no significant impacts to the receiving environment. The maximum design release characteristics for the IWWTP will be provided as part of Denison’s licence application to the CNSC.</p> <p>Denison met with the CNSC specialist from the Health Sciences and Environmental Compliance Division on December 7, 2022 to discuss the approach associated with a sequential EA and Licensing, and it was agreed that the above approach is acceptable.</p> <p>Denison is committed to completing the BATEA and providing the details to the CNSC.</p> | No EIS updates are anticipated to address this IR. |
| IR-17 | CNSC | Human health with respect to hazardous contaminants | Section 2.2.3.8 | <p>Context: It is also acknowledged that Denison stated in meetings with CNSC staff that Denison intends to propose final release targets to the CNSC as part of the licence application submission.</p> <p>Rationale: It is not clear in the submission whether Denison has considered whether any applicable technology-based performance standards exist in Canada or internationally, and would be relevant as effluent discharge targets, in order to ensure principles of pollution prevention are applied. Consideration of this would help ensure that the proposed effluent discharge targets harmonize with existing federal, provincial/territorial, and/or municipal requirements. For example, there are release limits for radium-226, TSS, and pH outlined in the federal Metal and Diamond Mining Effluent Regulations, which have been demonstrated to be achievable in the uranium mine and mill industry.</p> <p>In addition, countries like the United States, where in-situ recovery has been conducted in the past, have specific technology-based limits. These are known as New Source Performance Standards and are identified in US Code of Federal Regulations (US CFR) 40, Chapter 1, Subchapter N, Part 440 - Ore Mining and Dressing Point Source Category. It is not clear whether these have been considered in Denison’s assessment. These should be considered when identifying suitable achievable technologies.</p> | Denison should harmonize their proposed Effluent Release Targets with the technology-based performance standards that exist in the Metal and Diamond Mining Effluent Regulations where applicable, or other suitable international regulations. | <p>Denison appreciates the comment and is committed to meeting all MDMER release targets.</p> <p>The effluent quality predictions in the EIS provide a bounding scenario of the basis of the assessment of Project effects. Denison is undertaking a sequential EA and licensing process under the NSCA. For context, the EA process for a Project under CEAA 2012 and the Saskatchewan Environmental Assessment Act is long and complex. As such, the inputs and outputs (effluent quality) developed for the IWWTP were necessary and determined by Denison’s Project engineers early in the process to allow for the EIS biophysical and human assessments to advance.</p> <p>Proposed effluent release to the environment starts at Operation phase and BATEA information will come with the application for the license to operate. Please also see response to IR-117.</p> <p>The anticipated effluent quality of constituents of potential concern during normal operations presented in the EIS is based primarily on lab tests conducted by Denison with a safety factor of three added. Section 3.1.1.2 of the ERA (Appendix 10-A) states: "The reasonable upper bound treated effluent was derived using a combination of information available from lab tests conducted by Denison as well as derived effluent quality based on not exceeding water and sediment quality guidelines in Whitefish Lake. Effluent treatment feed solution was prepared by leaching drill core material from the Phoenix deposit, and further processing that solution through two steps (process precipitate removal and yellowcake precipitation) prior to effluent treatment testing. Effluent treatment tests incorporated three stages: low pH, high pH, and neutralization. A combination of reagents (iron sulphate, barium chloride, lime, and sulphuric acid) was used to facilitate precipitation of constituents. After each stage, solid-liquid separation was conducted by mixing flocculant with solution to settle solids to the bottom of the test vessel. The supernatant liquid was used for the following stage. The solids were washed, filtered, and dried to determine solids mass generation for mass balance purposes. For each stage, the liquids and solids were assayed for various COPCs. The reasonable upper bound effluent was usually an expected effluent quality from Denison multiplied by a safety factor of three."</p> <p>Denison intends to continue to refine effluent quality predictions as part of the BATEA assessment and licensing phase of the Project (see IR-16). The effluent quality predictions provided in the EIS will continue to bound the assessment, and provide a conservative representation of risk to human health and the environment.</p> | No EIS updates are anticipated to address this IR. |
| IR-18 | ECCC | Change to an environmental component due to hazardous contaminants | Section 2.2.3.9, Project Description Appendix 8-E | <p>Context: In Table 2.2-1 the upper bound Industrial Wastewater Treatment Plant (IWWTP) effluent quality final discharge targets for Constituents of Potential Concern (COPCs) are provided. General parameters (e.g., temperature, pH, etc.), and several Schedule 4 Substances with maximum authorized concentrations (lead, nickel, suspended solids, and un-ionized ammonia) under the Metal and Diamond Mining Effluent Regulations (MDMER) have not been provided in this table. There are several COPCs (aluminum, mercury, iron, nitrate, thallium, phosphorus and manganese) for effluent characterization under Schedule 5 Section 4 of the MDMER that have not been provided in this table. Additionally, no information on water quality guidelines has been provided in this table.</p> <p>Furthermore, it is stated that the final effluent quality discharge target for uranium is 0.057 mg/L. However, the Canadian Council of Ministers of the Environment (CCME) water short term (acute) water quality guidelines for the protection of aquatic life is 0.033 mg/L. The</p> | <ol style="list-style-type: none"> Update Table 2.2-1 and Appendix 8-E to include all general parameters required for environmental effects monitoring: pH, temperature, hardness, alkalinity, and conductivity. Update Table 2.2-1 and Appendix 8-E to include missing Schedule 4 Substances under the MDMER with maximum authorized concentrations: lead, nickel, suspended solids, and un-ionized ammonia. Update Table 2.2-1 and Appendix 8-E to include missing Schedule 5 Section 4 parameters required for effluent characterization under the MDMER: aluminum, mercury, iron, nitrate, thallium, phosphorus and manganese. Include all acute and chronic water quality thresholds for each parameter in Table 2.2-1 and Appendix 8-E. | <p>Denison fully understands its obligations with respect to the MDMER and will comply with the MDMER end of pipe effluent discharge criteria and other requirements of the regulations. The lack of the MDMER general parameters and Schedule 4 substances in the draft EIS table 2.2-1 should not be misconstrued to mean Denison was not intending to meet these requirements. Rather these tables were developed based on rigorous screening to identify COPCs and then model these in the receiving environment. Table 2.2-1 in the draft EIS is not reflective of the proposed monitoring parameters during effluent release. Regardless, Denison will update the table; please see the response below.</p> <p>1) Please see attachment IR-18 for updated Table 2.2-1 which is consistent with the updated Table 8.2-10 (as updated for IR-114). Parameters specific to Schedule 4 have been assessed and predicted. Schedule 5 parameters are included where available. As Schedule 5 parameters do not have screening criteria, they will be monitored by Denison consistent with the MDMER upon falling under this regulation.</p> | Table 2.2-1 and Appendix 8-E will be updated in the final EIS; the updated version of the table is provided in attachment IR-18. |

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| | | | | <p>proposed effluent discharge target for uranium exceeds the acute water quality guidelines, indicating effluent may pose the risk of being acutely lethal to aquatic biota at end-of-pipe.</p> <p>Rationale: ECCC requests the Proponent include the general water quality parameters that influence water quality thresholds, parameters in Schedule 4 and Schedule 5 Section 4 of the MDMER, and their respective water quality guidelines for consideration and transparency.</p> <p>Discharges from the proposed Project will alter water quality in the immediate receiving area, and this may include some sublethal effects on aquatic biota, which must be minimized. It remains the Proponent’s responsibility to adhere to the MDMER to ensure that effluent at the end-of-pipe from all final discharge points be non-acutely lethal and meet requirements for prescribed deleterious substances under Schedule 4 of the regulations.</p> | <p>5. Describe additional mitigation measures that can be considered to minimize impacts to aquatic biota from uranium concentrations in effluent.</p> | <p>2) Please see attachment IR-18 for updated Table 2.2-1 which is consistent with the updated Table 8.2-10 (as updated for IR-114). Parameters specific to Schedule 4 have been assessed and predicted.</p> <p>3) Please see attachment IR-18 for updated Table 2.2-1 which is consistent with the updated Table 8.2-10 (as updated for IR-114). Parameters specific to Schedule 4 have been assessed and predicted. Schedule 5 parameters are included where available. As Schedule 5 parameters do not have screening criteria, they will be monitored by Denison consistent with the MDMER upon falling under this regulation.</p> <p>4) Please see attachment IR-18 for updated Table 2.2-1 which is consistent with the updated Table 8.2-10 (as updated for IR-114). Applicable screening criteria have been updated to identify most applicable acute or chronic thresholds for the protection of aquatic life.</p> <p>5) As noted in response to IR-16 and IR-17 effluent discharge criteria as depicted in the draft EIS provide a bounding scenario of the basis of the assessment of Project effects and final effluent quality will meet prescribe limits developed through licensing and permitting, as informed by the BATEA evaluation process. In that context, it is expected that the uranium concentration in effluent would be lower than assumed for the purpose of the evaluation in the draft EIS and it is understood that uranium concentrations (or concentrations of other constituents) that resulted in acute toxicity would be not be permitted. Accordingly, the need for and types of mitigation measures as might be needed for uranium (or other constituents) would be developed as part of the process of developing final effluent quality limits in the permitting and licensing processes.</p> | |
| IR-19 | ECCC | Change to an environmental component due to radiological contaminants | Section 2.2.4 Project Description | <p>Context: In this section, it is proposed that the IWWTP precipitate pond will have a single geosynthetic composite liner system, which is used for ponds/pads that only store non-radioactive materials.</p> <p>However, from Section 2.2.3.9 on industrial wastewater treatment, it is unclear if the precipitates from the stage three neutralization process that are pumped to the IWWTP precipitates pond will have any residual radioactivity.</p> <p>Rationale: For the protection of the surrounding environment, it is important that any ponds/pads that are expected to store radiological contaminants be designed to have proper controls (i.e., liners with monitoring systems) in place.</p> | <p>1. Confirm the characterization of the precipitates that are to be stored in the IWWTP precipitate pond.</p> <p>2. If radiological constituents are expected within those precipitates, update the draft EIS to ensure the proposed geosynthetic liner system for the IWWTP precipitate pond will be adequate to ensure the protection of the surrounding environment.</p> | <p>1. The IWWTP precipitate pond will contain non-radiological, gypsum-like material. As outlined in Section 2.2.4.5 and 2.2.4.6, any radioactive precipitates generated during the first stage of the IWWTP will be directed to the process precipitate pond, not the IWWTP precipitate pond. Waste segregation and management will be important for Denison during Operation. The Waste Management Program will be established and approved by the CNSC as part of licensing. Denison will conduct regular assays of slurry sent to the IWWTP precipitate pond during Operation to confirm the quality of these precipitates.</p> <p>2. In consideration of the above, radiological constituents are not expected within the IWWTP precipitate pond.</p> | No EIS updates are anticipated to address this IR. |
| IR-20 | NRCan | Fish and fish habitat | Section 2.3.3.1.1 Appendix 7-C | <p>Context: The proponent’s objective for mining area remediation is to restore the groundwater within the confines of the freeze wall to an acceptable remediation target (EIS, sec. 2.3.3.1.1). The proponent’s acceptable decommissioning objectives for groundwater quality are provided in EIS Table 2.3-3 and in Table 3-5 of Appendix 7-C. These objectives were based on laboratory core flood tests performed by flushing samples of ore with groundwater and groundwater amended with sodium hydroxide or sodium bicarbonate. The composition of the remediated groundwater observed in the core flood tests serves as the source term for the post-decommissioning reactive transport modeling presented in section 4 of Appendix 7-C.</p> <p>Rationale: In NRCan’s opinion, it is important for reviewers to be able to assess the level of remediation achieved in order to reach the proponent’s decommissioning groundwater quality objectives. Therefore, the proponent should provide complete water quality data for the pregnant lixiviant that remains in the ore zone after the end of mining and prior to any remediation.</p> | <p>NRCan requests that the proponent revise Table 3-5 of Appendix 7-C to show the water quality in lixiviant remaining in the ore zone at the end of mining, prior to remediation activities.</p> | <p>Please see response to Attachment IR-20, IR-67, IR-69.</p> | In the final EIS, Table 3-5 in Appendix 7-C will be updated. The updated table is provided here as Appendix B to Attachment IR-20, IR-67, IR-69. |
| IR-21 | ECCC | Change to an environmental component due to hazardous contaminants | Section 2.3.3.1.3, Project Description | <p>Context: The decommissioning process for the wellfield and associated infrastructure is discussed, however there is no information provided on the potential risk for subsidence of the ground above the depleted uranium deposit. After the uranium has been dissolved and pumped to the surface, a cavity will be formed in the area where the uranium used to exist. This could destabilize the overlying substrates, causing the ground at the surface to sink in the future. There is currently no information regarding this risk, and how it may alter the overlying environment, surface water features, runoff, or existing nearby waterbodies.</p> <p>Rationale: From a surface water and sediment quality perspective, it is important to understand how potential subsidence in the future post-decommissioning may affect the existing environment. It is currently unclear if there is any risk to the aquatic environment if subsidence were to occur and alter existing waterbodies, create new surface water features, or if there will be any risk to the decommissioned onsite industrial landfill and industrial wastewater treatment plant precipitate pond.</p> | <p>Provide further information on the potential risks from subsidence including the probability of occurrence, how it may affect surface water features, and if there exists any risk to the planned decommissioning of waste management infrastructure.</p> | <p>To clarify, the portion of the deposit being mined is never truly a void and what remains after mining will be a honeycomb texture with water-filled interstices. The mined area is filled with a fluid at all times, whether it be a mining solution, groundwater, or the neutralizing solution. This is different from a more traditional underground operation such as Cigar Lake, where there is physical excavation of the orebody, leaving a temporary air-filled space. Although the uranium ore is high-grade by global standards it is not entirely massive in nature. As such, the uranium will be leached in a 'honeycomb' texture leaving behind a structure of partial intact rock mass with the remaining area being filled by fluid. This retains the pressure balance of the mining zone with the adjacent water-saturated rock masses.</p> <p>Although the above provides context on the absence of true, air-filled voids remaining post-mining, the risk of subsidence has been assessed appropriately (included in the draft EIS as Appendix K to Appendix 7-C; see also draft EIS Section 7 Geology Valued Component - Terrain Morphology and Stability Key Indicator and draft EIS Section 9 Terrain Valued Component - Terrain Morphology Key Indicator and Terrain Stability Key Indicator). The analysis shows there is negligible risk of subsistence and the magnitude of subsistence, if it were to occur, is the range of 7.5 cm at surface. Subsequent to the filing of the draft EIS, Denison undertook additional modelling with refined, more granular inputs including consideration of subunits within the altered zone (RESPEC 2023). With this more refined analysis, the potential surface subsidence has been reduced from 7.5 cm to 2.4 to 2.8 mm (RESPEC 2023 is included here as Attachment: IR-21).</p> <p>Further, this potential subsidence, if it were to occur, would be limited to the footprint directly above the deposit which will not contain any decommissioned waste management infrastructure. Two main Project components containing waste in the Post-Decommissioning</p> | No EIS updates are anticipated to address this IR. |

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| | | | | | | <p>period will be the IWWTP precipitate pond (which will contain non-radioactive gypsum-like material) and the Industrial Landfill. All other wastes will be disposed of off-site. Spatially, the mining area is about 500 m from the IWWTP precipitate pond and about 800 m from industrial landfill.</p> <p>Given the negligible risk and magnitude of surface subsidence (2.4 to 2.8 mm) which would be limited to the footprint directly above the deposit, along with the distance from this area to on-site decommissioning wastes, there is negligible risk for effects of subsidence to the planned decommissioning of waste management infrastructure.</p> | |
| IR-22 | NRCan | Fish and fish habitat | Section 2.10 Appendix 2-C, section 1.1.1.4 | <p>Context: With respect to the choice of In-Situ Recovery (ISR) mining solution, two alternatives were assessed: alkaline and acidic lixivants (Appendix 2-C, sec. 1.1.1.4). In the consideration of technical and economic feasibility of the alternatives (Table 2, Appendix 2-C), the proponent concludes that: Option 1 (alkaline) is not technically feasible based on the uranium deposit geochemistry. Option 2 (acidic) is technically and economically feasible based on the uranium deposit geochemistry and ability to dissolve uranium. Accordingly, the alkaline alternative was not carried forward into the Environmental Assessment (EIS, Table 2.10-1; Appendix 2-C, Table 3).</p> <p>While acidic ISR solutions are widely used internationally (e.g., Kazakhstan), in the United States, where the environmental regulatory regime is more strict, alkaline solutions have been used exclusively since 1970.</p> <p>Rationale: In NRCan's opinion, the proponent should provide a more thorough technical justification for adopting an acidic ISR lixiviant.</p> | <p>In the Alternative Means Assessment (Appendix 2-C), NRCan requests that the proponent provides a more thorough technical justification for selecting an acidic ISR lixiviant rather than a less environmentally problematic alkaline leach used exclusively in the USA.</p> | <p>The following additional information will be added to Appendix 2-C Alternative Means Assessment, Section 1.1.1.4 Mining solution:</p> <p>In 2017, Denison completed core testing at a laboratory in the United States that was familiar with in situ recovery (ISR) mining and processing methods. The two lixiviant or leach solutions were 1) an alkaline solution and 2) an acidic solution. The alkaline solution was comprised of 2,000 ppm sodium bicarbonate and 500 ppm hydrogen peroxide. The sodium bicarbonate is a complexing agent and the hydrogen peroxide is an oxidant. This alkaline leach solution used in the laboratory is similar to lixiviant solutions used for ISR mining in the US. The acidic solution was prepared with sulfuric acid and hydrogen peroxide, in varying concentrations as the testing proceeded. After 30 pore volumes, the alkaline leach had recovered less than 1% of the uranium in the core. For comparison, the acidic leach recovered around 30% of the uranium in the core after 30 pore volumes and just under 90% of uranium was recovered after 120 pore volumes.</p> <p>At the Phoenix deposit, carbonate and organic concentrations are quite low, which makes acid leach for uranium much more amenable at reasonable concentrations. Moreover, the ISR test work completed in 2017 highlighted alkaline leach would be ineffective and uneconomical. An excerpt below from the 2017 ISR laboratory report highlights the challenges with alkaline leach, pointing to the deposit specifics (depth, grade, location) which inhibit the ability to leach via alkaline methods:</p> <ul style="list-style-type: none">• “Bicarbonate is limited in practice by the chemical cost and physical ability (chemical addition rates) to increase wellfield concentrations appreciably above 2-3 g/L as HCO₃.”• “Field oxygen additions are limited by injection well depths (i.e., depth to ore) which, along with injection pressures, determines the maximum concentration of O₂(g) which could be successfully introduced to the wellfield.”• “pH control is critical to prevent potential calcium carbonate (Calcite, CaCO₃) precipitation within the wellbore and/or ore-body.” <p>In 2018, Denison contracted a third-party consultant with expertise in Australia's ISR industry to complete a desktop review of various ISR test work completed for the Phoenix deposit, including the 2017 study described above. The third-party review of the alkaline and acid leach test work noted that for the alkaline bottle roll leach, it was unsurprising that the uranium extraction, 0.8%, was so low. Assuming the formation of the UO₂(CO₃)₂- complex, the sodium bicarbonate consumption by the uranium would be ~188 kg/t, not including any potential bicarbonate consumption by any other phases present in the ore. The amount of sodium bicarbonate added in the test is calculated to be 7.2 kg/t, which was grossly inadequate. It is likely that given sufficient carbonate/bicarbonate and oxidant, alkaline leaching of the ore would technically be feasible, but it is likely in practice that the carbonate consumption would be excessively high. The rate of carbonate leaching is also much slower than acid, and the introduction of oxidant is also more difficult in an alkaline system.</p> <p>Alkaline leach is commonly used in the United States due to the primary components that make up their ore bodies. They are rich in carbonates and organics, which makes uranium quite difficult and costly to mine via acid leach as the acid is consumed by these constituents prior to any uranium being liberated and leached itself. These issues are not of concern with alkaline leach. There is currently one operation in the United States (Lance Uranium Project – Eastern Wyoming) that uses acid leach. The company had switched to acid leach after a failed trial of alkaline leach/mining due to high carbonates in the ore body that were not previously examined in detail.</p> <p>As noted in Table 2 of Appendix 2-C, the alkaline leach option for mining solution was determined to not be technically and economically feasible based on the uranium deposit geochemistry and ability to dissolve uranium.</p> | <p>Appendix 2-C Alternative Means Assessment, Section 1.1.1.4 Mining solution will be updated as follow (additions in bold, deletions in strikethrough):</p> <p>Two options were considered for mining solution: Option 1: alkaline solution and 2. acidic solution.</p> <p>Factors determining the choice between acid or alkaline ISR technology are: composition of the host rock and ores, reagent cost and consumption, the degree of uranium recovery, and the intensity of the process (IAEA 2001). The leach intensity is determined as the sum of the leach duration, solution ratio (liquid/solid), and average uranium concentration in the recovery solution.</p> <p>1. Alkaline solution Alkaline or high-pH mining solutions are used at a number of uranium ISR operations. The mining solution is typically made with carbonate or bicarbonate. The single most important factor in the process is the rock composition within the productive aquifer, and in particular, the concentration of calcium carbonate. Ores with a higher carbonate content normally require alkaline (bicarbonate) leaching.</p> <p>2. Acidic solution Acidic or low-pH mining solutions are used at a number of uranium ISR operations. The acidic mining solution is typically made with dilute sulfuric acid. The single most important factor in the process is the rock composition within the productive aquifer, and in particular, the concentration of calcium carbonate. For economic sulphuric acid leaching, the carbonate content should not exceed 2% CO₂.</p> <p>In 2017, Denison completed core testing at a laboratory in the United States that was familiar with in situ recovery (ISR) mining and processing methods. The two lixiviant or leach solutions were 1) an alkaline solution and 2) an acidic solution. The alkaline solution was comprised of 2,000 ppm sodium bicarbonate and 500 ppm hydrogen peroxide. The sodium bicarbonate is a complexing agent and the hydrogen peroxide is an oxidant. This alkaline leach solution used in the laboratory is similar to lixiviant solutions used for ISR mining in the US. The acidic solution was prepared with sulfuric acid and hydrogen peroxide, in varying concentrations as the testing proceeded. After 30 pore volumes, the alkaline leach had recovered less than 1% of the uranium in the core. For comparison, the acidic leach recovered around 30% of the uranium in the core after 30 pore volumes and just under 90% of uranium was recovered after 120 pore volumes.</p> <p>At the Phoenix deposit, carbonate and organic concentrations are quite low, which makes acid leach for uranium much more amenable at reasonable concentrations. Moreover, the ISR test work completed in 2017 highlighted alkaline leach would be ineffective and uneconomical. An excerpt below from the 2017 ISR laboratory report highlights the challenges with alkaline leach, pointing to the deposit specifics (depth,</p> |

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| | | | | | | | <p>grade, location) which inhibit the ability to leach via alkaline methods:</p> <ul style="list-style-type: none">• “Bicarbonate is limited in practice by the chemical cost and physical ability (chemical addition rates) to increase wellfield concentrations appreciably above 2-3 g/L as HCO₃.”• “Field oxygen additions are limited by injection well depths (i.e., depth to ore) which, along with injection pressures, determines the maximum concentration of O₂(g) which could be successfully introduced to the wellfield.”• “pH control is critical to prevent potential calcium carbonate (Calcite, CaCO₃) precipitation within the wellbore and/or ore-body.” <p>In 2018, Denison contracted a third-party consultant with expertise in Australia's ISR industry to complete a desktop review of various ISR test work completed for the Phoenix deposit, including the 2017 study described above. The third-party review of the alkaline and acid leach test work noted that for the alkaline bottle roll leach, it was unsurprising that the uranium extraction, 0.8%, was so low. Assuming the formation of the UO₂(CO₃)₂ complex, the sodium bicarbonate consumption by the uranium would be ~188 kg/t, not including any potential bicarbonate consumption by any other phases present in the ore. The amount of sodium bicarbonate added in the test is calculated to be 7.2 kg/t, which was grossly inadequate. It is likely that given sufficient carbonate/bicarbonate and oxidant, alkaline leaching of the ore would technically be feasible, but it is likely in practice that the carbonate consumption would be excessively high. The rate of carbonate leaching is also much slower than acid, and the introduction of oxidant is also more difficult in an alkaline system.</p> <p>Alkaline leach is commonly used in the United States due to the primary components that make up their ore bodies. They are rich in carbonates and organics, which makes uranium quite difficult and costly to mine via acid leach as the acid is consumed by these constituents prior to any uranium being liberated and leached itself. These issues are not of concern with alkaline leach. There is currently one operation in the United States (Lance Uranium Project – Eastern Wyoming) that uses acid leach. The company had switched to acid leach after a failed trial of alkaline leach/mining due to high carbonates in the ore body that were not previous examined in detail.</p> |

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| IR-23 | CNSC | Alternative Means | Section 2.10.2 Alternative Means Appendix 2-A PD Engagement Tables Appendix 2-C Alternative Means Assessment (p. 3) | <p>Context: There are multiple rows in the Indigenous Tables for Appendix 2-A where comments and concerns raised by Indigenous Nations and communities and other members of the public were taken into consideration in the Alternative Means Assessment. However, it is unclear how these were considered.</p> <p>A few examples:</p> <ul style="list-style-type: none">16-EN-DesNd-101.1: Interested in any future business opportunities that may be available as Denison advances their Wheeler River Project.16-EN-ERFN-100.15: In that territory near the Wheeler River there are a lot of spawning and calving areas for moose, caribou; those creeks are for whitefish spawning. There's lots of heavy muskeg there. A lot of us have been there, and we'd like to know there'll still be access to the area.6-EN-ERFN-100.17: Today because of climate change, things are starting to happen that normally didn't happen. Even the permafrost is now further down. In the Wheeler River area, where there's some permafrost, have your environment guys seen a change? Will there be a change? These are some of the questions that need to be answered in order to come out with a positive spin. <p>Rationale: Appendix 2-C, Alternative Means assessment, states (p.3): "Engagement with Interested Parties naturally included alternatives means and the engagement input was included in the evaluation of alternative means. Refer to the references list below and <i>Appendix 2-A Engagement Database Summary – Project Description</i> for details of engagement information referenced in this alternative means assessment."</p> <p>It is unclear in section 2.10.2 of the EIS, Appendix 2-A or Appendix 2C how the comments documented by Denison have been considered or influenced the alternative means assessment.</p> | Please explain how comments and concerns collected during Denison's engagement sessions were considered or influenced the alternative means assessment. Please include this information in the EIS and/or it's appendices. | <p>Denison's specific engagement initiatives on Project alternatives are outlined in Appendix 2-C for the 1) mining method, 2) freeze design for tertiary containment of mining solution, 3) treated effluent discharge location to surface water, and 4) access road alignment. In addition to these targeted engagement topics, information gathered more broadly during engagement was also considered in Project alternatives through the consideration of general concerns or statements. Two main areas where comments and concerns fed into and informed the Alternatives Assessment are: 1) Appendix 2-C, Section 1.2 Consideration of Technical and Economic Feasibility along with Land Use Screening, and 2) Appendix 2-C, Section 1.4 Evaluation of Alternative Means.</p> <p>The comparative evaluation of alternative means is presented in Appendix 2-C, Table 6 to Table 22. The evaluation considered the relative residual effects of each of the technical and economically feasible alternatives for each of the evaluation criteria identified in Appendix 2-C, Table 5, following the application of mitigation measures described in Appendix 2-C, Table 4. In each case, the preferred alternative and rationale for its selection were identified. In addition, specific input received from Indigenous groups and other Interested Parties that contributed to the selection of the preferred option was highlighted, when applicable. The alternative means assessment provided in the tables in this section was conducted at a screening level, appropriate for the stage of the Project when the alternatives were considered. The assessment considered both quantitative (where possible) and qualitative information as available. The comparative evaluation identified more preferred versus less preferred alternatives.</p> <p>To follow-up on one of the examples listed in the context and rationale section of this IR, 16-EN-DesNd-101.1 was a comment related to interest in business opportunities. As noted in Appendix 2-A, this comment factored into the comparative evaluation of alternative means for waste management, domestic waste disposal in the section outlining input received from Interested Parties. For additional background, two options were under evaluation: Option 1 was collection and disposal off-site by a third-party contractor and Option 2 was collection and disposal in an on-site domestic landfill. The following text is available in Appendix 2-C, Table 17: Waste Management – Domestic Waste Disposal - Alternative Means Assessment:</p> <p>During seven years of engagement activities for the Project, Denison has understood the importance of designing a project that minimizes interactions with the biophysical environment and the importance of continued land use by Indigenous groups. Looking at domestic waste disposal options, the option to transport domestic waste off site to a nearby licensed facility may generate a local economic opportunity (16-EN-DesNd-101.1, 19-EN-VB-132.5, 21-ENSUR-446.48). However, the transport of material off site would increase traffic, which may have a negative effect on traditional land use, infrastructure and services, and wildlife (16-EN-ERFN-100.15) (21-EN-SUR-446.68). Increased traffic would also increase greenhouse gas emissions. Concerns related to climate change were raised during engagement and consultation activities completed by Denison (e.g., 22-EN-ERFN-621.15, 22-EN-SUR-652.57). It should be noted that these concerns pertain to climate change rather than GHG emissions specifically. The concerns included observations of climate-related changes that have been noticed by the English River First Nation (e.g., depth of permafrost; 16-EN-ERFN-100.17) and observations by the English River First Nation Trapper who provided local knowledge in support of the EIS (19-LK-ERFNTrap-134.232). While no specific feedback was received on the domestic waste disposal options, the above provides context on how Denison's fulsome engagement activities have influenced the selection of a preferred alternative for domestic waste disposal.</p> <p>Based on the evaluation of alternative means, a preferred alternative means for each respective Project component or activity was selected. Rationale for the selection based on the comparative evaluation of alternatives is provided and input received by Interested Parties is presented. As shown in the above example, the input received from Interested Parties was an important part of the multifaceted evaluation.</p> | See attachment IR-24 for proposed content for final EIS Section 2.10, which, relative to the draft EIS, includes the addition of Section 2.10.3 Summary of Influence of Indigenous Knowledge, Local Knowledge, and Engagement on the Alternative Means Assessment. |
| IR-24 | CNSC | Alternative Means | Section 2.10.2 Alternative Means | <p>Context: While Appendix 2-C (Alternative Means Assessment) is detailed and includes all aspects of the Alternative means assessment that are required, the summary of the analysis and conclusions in Section 2.10.2 of the EIS lacks the level of detail required to understand the methodology used, and how Denison arrived at these conclusions.</p> <p>Rationale: As noted in the Agency's Operational Policy Statement on Addressing "Purpose of" and "Alternative Means" under the CEAA 2012: "If a preferred means is selected, the analysis and the rationale for the choice should be explained from the perspective of the proponent, and be documented in the EIS in sufficient detail to provide context for public and technical comment periods during the project EA, and ultimately to allow the decision maker to understand the choice."</p> | Please summarize the analysis of the alternative means assessment within the body of the EIS, in sufficient detail that a reader of the EIS has adequate information to understand the methodology used, and how Denison arrived at these conclusions. | Additional details from Appendix 2-C will be provided in Section 2.10 of the final EIS. Also, an example of alternative means evaluated for mining method will be added into Section 2.10.2 in the final EIS. It is noted that no new information would be presented in the final EIS Section 2.10.2 beyond that which was presented in the draft EIS Appendix 2-C. | See Attachment IR-24 for proposed updates to Section 2.10.2. |
| IR-25 | CNSC | Current use of lands and resources for traditional purposes | Section 3, Sections 4, Section 5, Section 11 (and all other applicable once Métis Knowledge Use Study is completed) | <p>Context: The EIS states that Denison is currently negotiating an agreement with MN-S and no traditional land use information is included throughout the EIS given no agreement was signed or Traditional land use information was shared at the time the EIS was being drafted.</p> <p>As noted in the EIS Denison has committed that: "As information becomes available from the agreed-upon process between the Métis Nation – Saskatchewan and Denison, it will be incorporated into the final EIS." (p. 11-36)</p> | Please update the revised Draft EIS to reflect the integration of the Métis Use and Knowledge Study in the Draft EIS where applicable, when this study is completed and provided to Denison. | <p>A study agreement was signed with the MN-S to complete a Metis Knowledge Study by the end of October 2023. Denison has met with the MN-S to discuss the next steps and anticipated timeline, however no information has been provided to Denison, to date. When the study is completed within the agreed upon timeframe, Denison will update the final EIS to include relevant information in the assessment.</p> <p>It is important to note that Denison has incorporated Metis land use information and perspectives into the draft EIS, through the funding of the Kineepik Metis Land and Occupancy information along with the KML VEC statement, of which relevant information has been incorporated directly into the draft EIS to determine effects to the human environment.</p> | The final EIS will be updated with applicable information pertaining to the effects assessment from the Metis Knowledge Study when provided within the agreed upon timeframe (end of October 2023). |

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| | | | | <p>Rationale: More information is required to better understand the issues and concerns, valued components, and current use of lands and resources for traditional purposes by MN-S near the project area.</p> <p>Requirements are detailed in CNSC’s Generic EIS Guidelines, section 8.9: Indigenous land and resource use.</p> | Should this information not be made available to Denison at the time of revising the draft EIS, the next version of the EIS and the response to this IR should provide a status update on discussions and engagement with MN-S and next steps. | | |
| IR-26 | CNSC | Precautionary principle and approach | Section 3.4.8 Lands Taken Up from an Indigenous Perspective (p. 3-14) | <p>Context: Denison states: “Discrepancies among IK and western scientific information provide an opportunity for Denison to take a precautionary approach. Examples of concrete actions to address uncertainty in cases where IK and LK have differing conclusions on predicted Project effects include addressing uncertainty through monitoring and follow-up programs and communicating results of those monitoring and follow-up programs to demonstrate they have been responsive to the IK shared.” (p. 3-14)</p> <p>Rationale: CNSC’s Generic Guidelines for the Preparation of an EIS state: “In documenting the analyses included in the EIS, the proponent will demonstrate that all aspects of the project have been examined and planned in a careful and precautionary manner in order to avoid significant adverse environmental effects.</p> <p>A document by Canada’s Privy Council Office, A Framework for the Application of Precaution in Science-based Decision Making About Risk, sets out guiding principles for the application of precaution to science-based decision making.” (Section 2.5)</p> | Please clarify how the precautionary principle, and the Privy Council Office’s, A Framework for the Application of Precaution in Science-based Decision Making About Risk, sets out guiding principles for the application of precaution to science-based decision making has been considered and incorporated into the EA described in the EIS. | <p>Page 3-14 of the EIS notes that "Discrepancies among IK and western scientific information provide an opportunity for Denison to take a precautionary approach."</p> <p>The precautionary approach to the evaluation of effects is described in Section 5.8.1.2.2 of the EIS, which specifically deals with the confidence of predictions and states:</p> <p>"In this EA, the precautionary approach to the evaluation of potential effects was adopted, recognizing areas of uncertainty and uses conservative assumptions and approaches within the assessment process. Areas of uncertainty in the process and in predictions for each VC are identified and discussed in each VC-specific section, or on a KI-specific basis as applicable."</p> <p>"Confidence predictions are defined as low, moderate, or high. Where a high degree of uncertainty regarding a residual adverse effect is evident, the confidence level may be low. A high level of confidence is assigned to predictions that have direct, site-specific quantitative data to support the predictions. Low or moderate degrees of uncertainty are manageable through monitoring and follow-up programs to confirm the absence, presence, and extent of residual adverse effects."</p> <p>The Privy Council Office’s, A Framework for the Application of Precaution in Science-based Decision Making About Risk was not specifically referred to in making decisions regarding discrepancies among IK and western scientific knowledge. Rather ERFN, KML/Pinehouse, and the YNLR were offered the opportunity to review select sections of EIS prior to its submission to regulators (see Section 4.3.2.1.4 for ERFN; KML/Pinehouse declined the invitation to review the EIS in advance of filing; Section 4.3.4.2.4 for the YNLR). An example of where greater precaution was exercised is found in the conclusions for effects on Indigenous Land and Resource Use, in which the overall confidence rating was moderate based on the communities’ previous experience with the uranium industry, but could not "be considered as high as the Indigenous COIs lack certainty about ISR mining technique" (Section 11.1.6.4).</p> | No EIS updates are anticipated to address this IR. |
| IR-27 | CNSC | Cumulative Effects Analysis | Section 3.4.8 | <p>Context: During an outreach and engagement trip by CNSC in October 2022, an abandoned exploration camp adjacent to the proposed Wheeler River site was observed. This site has not been identified within the EIS as part of the cumulative effects assessment. As noted in section 3.4.8, KML has also raised concerns with Denison related to abandoned camps and industrial waste left with no programs for clean-up.</p> <p>Rationale: Section 9.4.3 of CNSC’s Generic Guidelines for the Preparation of an EIS states that “The applicant shall assess any residual adverse environmental effects of the project in combination with other past, present or reasonably foreseeable projects and/or activities within the study area.”</p> | Please specify why abandoned exploration camps and industrial waste aren’t taken into consideration when completing cumulative effects assessment. | <p>Section 5.9 outlines the general methods and approach for cumulative effects assessments, while each biophysical and human environment assessment provides details on their Valued Component (VC)-specific approach. The inclusion list in Section 5 does include exploration and mining activities, and options for other projects and activities, as appropriate.</p> <p>With this approach the footprint of the abandoned exploration camp was considered within the terrestrial cumulative effects assessment.</p> <p>Section 11 Land and Resource Use notes that existing projects or activities were not considered as part of the cumulative effects assessment because they were captured and assessed within baseline conditions or existing conditions. This approach would include the abandoned exploration camp adjacent to the proposed Wheeler River site.</p> | No EIS updates are anticipated to address this IR. |
| IR-28 | CNSC | Current use of lands and resources for traditional purposes | Section 4, IER and engagement appendices, including: Appendix 2-A Appendix 6-B Appendix 7-B Appendix 8-A Appendix 9-A Appendix 10-B Appendix 11-A Appendix 12-A Appendix 13-A Appendix 14-B | <p>Context: The summary of issues tables do not appear to include all of the key issues identified by the Indigenous Nations and communities.</p> <p>For example, some Indigenous Nations and communities have shared concerns with respect to accident prevention and overall safety on the Key Lake road (Highway 914) due to increased traffic, impacts on treaty rights and section 35 rights due to cumulative impacts, and decommissioning, that were not captured in the issues and concerns and summary tables in Section 4.3.2 and in the IER.</p> <p>The tables in the engagement appendices include a column titled “Response (From Denison)”. The “Response” column does not include responses, but instead points the reader to where this comment or concern was considered. When navigating to the sections referenced, it is often unclear how this information was considered or influenced the assessment.</p> <p>Rationale: Additional detail is required in order to ensure the key issues are all identified and to understand the status of validation for each issue raised and the response provided.</p> | <p>1. Update the summary of issues and concerns tables to include all relevant issues and concerns raised by each of the Indigenous Nations and communities to date, including concerns raised in the Indigenous Knowledge studies provided, additional engagement, and Draft EIS comments.</p> <p>2. Please include a column in the issues and concerns tables to clearly articulate the specific mitigation/monitoring measures that Denison have committed to, or any other measures, in order to address the concerns raised by each Indigenous Nation and community during the engagement process to date.</p> <p>3. Denison must demonstrate that each Indigenous Nation and community has validated that the summary of issues and concerns table reflects their understanding or agreement, and/or a path forward to complete the validation throughout the EIS and the updated IER.</p> <p>Validation must be complete by the time the technical review is complete, prior to submission of a final EIS. Should Denison not be able to fully address issues, concerns or feedback raised by any Indigenous Nation or community, through mitigation and monitoring measures, this should be documented, and a rationale provided.</p> <p>3. Update the response column of the Engagement tables to describe how these were considered in the sections referenced. Consider renaming this column to reflect the nature of the content (i.e., how the information was considered).</p> | Please see response in Attachment IR-28. | <ul style="list-style-type: none">• Section 4 general updates since submission of the draft EIS, including updates to clarify the purpose of the Key Issues and Concerns tables and the Engagement Database Summary tables in various appendices• Table 4.3-2: Key Issues and Concerns from English River First Nation (and corresponding table in the IER)• Table 4.3-3: Key Issues and Concerns from Kineepik Métis Local #9 (and corresponding table in the IER)• Table 4.3-4: Key Issues and Concerns from Sipishik Métis Local #37 (and corresponding table in the IER)• Table 4.3-5: Key Issues and Concerns from Patuanak Métis Local #82 (and corresponding table in the IER)• Table 4.3-6: Key Issues and Concerns from Birch Narrows Dene Nation (and corresponding table in the IER)• Table 4.3-7: Key Issues and Concerns from Lac La Ronge Indian Band (and corresponding table in the IER)• Table 4.3-8: Key Issues and Concerns from A La Baie Métis Local #21 (and corresponding table in the IER)• Table 4.3-9: Key Issues and Concerns from Métis Nation – Saskatchewan (and corresponding table in the IER)• Table 4.3-10: Key Issues and Concerns from Ya’thi Néné Lands and Resources Office (and corresponding table in the IER) |

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| | | | | | | | <ul style="list-style-type: none">Table 4.4-1: Key Issues and Concerns from the Northern Village of PinehouseTable 4.4-2: Key Issues and Concerns from the Northern Village of BeauvalTable 4.4-3: Key Issues and Concerns from the Northern Village of Île-à-la-Crosse A new table will be included for Peter Ballantyne Cree Nation as well into the final EIS and in the IER. <ul style="list-style-type: none">Section 2 Project Description – Appendix 2-A: Engagement Database Summary Table for Project DescriptionSection 6 Atmospheric and Acoustic Environment – Appendix 6-B: Engagement Database Summary Table for Project DescriptionSection 7 Geology and Groundwater – Appendix 7-B: Engagement Database Summary Table for Geology and GroundwaterSection 8 Aquatic Environment – Appendix 8-A: Engagement Database Summary Table for Aquatic EnvironmentSection 9 Terrestrial Environment – Appendix 9-A: Engagement Database Summary Table for Terrestrial EnvironmentSection 10 Human Health – Appendix 10-B: Engagement Database Summary Table for Human HealthSection 11 Land and Resource Use – Appendix 11-A: Engagement Database Summary Table for Land and Resource UseSection 12 Quality of Life – Appendix 12-A: Engagement Database Summary Table for Quality of LifeSection 13 Economics – Appendix 13-A: Engagement Database Summary Table for EconomicsSection 14 Accidents and Malfunctions – Appendix 14-B: Engagement Database Summary Table for Accidents and MalfunctionsSection 15 Effects of the Environment – Appendix 15-A: Engagement Database Summary Table for Effects of the Environment on the Project |
| IR-29 | CNSC | Current use of lands and resources for traditional purposes | Section 4.3.2 and IER | <p>Context: In this section, Denison includes the engagement with BNDN and includes a summary of issues and concerns table for the Nation. Within the history of interactions (Section 4.3.3.2.1).</p> <p>Rationale: Denison states that they have been providing information on the project to BNDN in 2019, 2021 and again in 2022 and that Denison and BNDN have not responded to date in order to advance further engagement and dialogue.</p> | Please ensure updated information of any additional engagement activities that Denison has completed with BNDN related to understanding their current and traditional land use and potential interests near the proposed project is provided. | <p>Denison is able to provide the following information with respect to engagement with BNDN.</p> <p>Denison had a meeting with BNDN on February 14, 2023, to provide an overview of the Wheeler River Project. During the meeting, BNDN indicated they would share a traditional territory map and land and occupancy information in relation to the Wheeler River Project subject to reaching suitable confidentiality provisions.</p> <p>On April 25, 2023, Denison shared a draft confidentiality agreement with BNDN.</p> <p>On May 10, 2023, Denison met with BNDN again, to discuss a process for engagement going forward. During the meeting, Denison was advised that BNDN had proposed revisions to the confidentiality agreement, which they would provide to Denison. Also identified in the meeting was that Denison’s access to data BNDN previously referenced regarding land use activities in and around the Wheeler River Project would be limited and subject to further funding from Denison to BNDN. Denison continued to request the available site-specific information in order to better understand the potential for adverse impacts to rights from the Wheeler River Project to BNDN in order to potentially adjust engagement approaches with BNDN.</p> <p>On May 11, 2023, Denison was advised to communicate directly with the Chief of BNDN and was provided further information from BNDN that BNDN would connect with Denison in the future to determine next steps together.</p> <p>On June 16, 2023, BNDN contacted Denison to request a meeting toward the latter part of July 2023. Denison responded positively to this request and will be following up with BNDN accordingly.</p> <p>Subject to the development of a specific engagement process between Denison and BNDN, as identified above, Denison is committed to maintaining an open dialogue with BNDN regarding their interests in the Project. Denison will make sure the above information, and any further information in this respect, including potential resolution of issues, will be included in the final EIS and an update to the IER.</p> | Updates will be included in the final EIS Table 4.3-6: Key Issues and Concerns from Birch Narrows Dene Nation (and corresponding table in the IER) as part of response to IR-28. |
| IR-30 | CNSC | Indigenous physical and cultural heritage | Section 4.3.2.1.3, Table 4.3.2 | <p>Context: Concerns were raised during engagement sessions that “Elders are not being consulted as most of the engagement has been through online means and without a translator”.</p> | How has Denison adapted engagement with Elders from the ERFN since receiving this comment on March 31, 2021? | Since receiving the comment about the challenge with virtual engagement activities and associated translation for those requesting it, Denison has incorporated simultaneous Dene translation into the Zoom virtual meeting feature. This was used in a virtual meeting | No EIS updates are anticipated to address this IR. |

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| | | | | Rationale: There’s no indication that a translator has been employed to engage with Elders since 2021 in the engagement Table 4.3.2. | | undertaken for the Athabasca Basin First Nations and Communities, in September 2021. The feedback received was overwhelmingly positive. Going forward, should Denison have to deploy virtual meetings where translations are required, this tool will be deployed again. For all in person meetings, Denison provides a translator, who can assist with anyone requiring discussion to occur in their language. | |
| IR-31 | CNSC | Indigenous Engagement | Section 4.4.2.1.3, Key Engagement Activities (p. 4-88) | Context and Rationale: Regarding the following: “An open house for the general public was planned to be hosted in 2022 on preliminary effects and mitigation, but due to concerns identified by MN-S about hosting a public open house in a community with a significant Métis population, this meeting was postponed by Denison. Denison looks forward to rescheduling the meeting in collaboration with the MN-S.” (p. 4-88) | Please provide an update on the evolution or progress of this engagement with local communities, following collaboration with MN-S (or otherwise). | Denison continues to respect the delegated Duty to Consult to the Metis Nation - Saskatchewan for a number of communities with strong presence of Metis Citizens for engagement about the Wheeler River Project. As such, Denison will follow the Metis Nation - Saskatchewan direction in this regard until such time as this direction changes. Denison is pleased to report that on February 11 and 12, 2023, the MN-S coordinated a meeting for Denison, the CNSC, the Province of Saskatchewan and the Metis Locals from Northern Regions 1 and 3 to provide an overview of the Project and respond to questions and concerns. | Updates will be included in the final EIS accordingly. |
| IR-32 | CNSC | Current use of lands and resources for traditional purposes | Section 5.3 Section 9.0 Terrestrial Environment | Context: Some sections of the EIS (such as Fish and Fish Habitat, Indigenous Lands and resource use) indicate that Indigenous and/or local knowledge was considered when defining the spatial boundaries. However, this is not included in other sections, such as Terrestrial Environment. Rationale: Section 5.2.2 of CNSC’s Generic EIS Guidelines require that spatial boundaries be defined by considering, but not limited to, the following criteria: Community and Indigenous traditional knowledge, ecological and technical considerations. | Please provide any additional details about how any comments or concerns raised were considered in defining the spatial boundaries with Indigenous Nations and communities with respect to spatial boundaries, for the Terrestrial Section and which specific Indigenous Nations and communities were engaged on these topics and how their input and knowledge was incorporated into the EIS. If already presented in the EIS text body, please indicate where this information can be found or link to Section 4 of the EIS or in the IER. | The rationale for the definition of study areas for the purpose of the assessment of the Terrestrial Environment valued components (VCs) is described in Section 9.1.1 of the draft EIS. The Project Area and Local Study Area (LSA) were delineated based on the expected extent of potential direct (footprint) and indirect (sensory disturbance) Project effects; whereas, the Regional Study Area (RSA) considered an 8 km buffer around the Project Area to provide an appropriate spatial scale upon which potential Project effects could be evaluated at the landscape scale where key Terrestrial Environment VCs reside and move within and upon which cumulative effects could be assessed. No specific comments or concerns were raised on the spatial scale of the Terrestrial Environment study areas during engagement activities, though considerable input was solicited / received regarding many of the Terrestrial Environment VCs that helped to contribute how the assessment study areas were defined. This is especially true in consideration of the relatively high number of comments received through engagement regarding wildlife (as represented by ungulates, furbearers, woodland caribou, and birds in the draft EIS) and wildlife use by local and Indigenous people/ communities (see Sections 9.3.3.1.2, 9.3.3.2.2, 9.3.3.3.2, 9.4.3.1.2, 9.4.3.2.2, 9.4.3.3.2 in the draft EIS Appendix 9-A for details). Cumulatively, this input puts high importance on and speaks to the broad knowledge of wildlife in the vicinity of the Project, informing the need to define the RSA to an appropriate spatial extent, as was the case on the draft EIS. In addition, and within the context of the IR, it is appropriate to also consider the assessment of terrestrial environment from the perspective of Land and Resource Use per Section 11 of the draft EIS, since the two (Terrestrial Environment and Land Are Resource Use) are so intimately related. For context the Terrestrial Environment RSA, fits within the Indigenous Land and Resource Use RSA. Section 11 of the EIS is focused on Land and Resource Use and includes consideration for various terrestrial VCs and key indicators (KIs) as resources. With respect to Indigenous Land and Resource Use, the definition of spatial boundaries is offered in Table 11.2-2 which notes that the LSA is inclusive of direct and indirect effects to relevant VCs will occur, including the maximum combined extent of supporting VCs associated with the aquatic, terrestrial, noise, and health LSAs. It is inclusive of trapping, fishing, and travel through and adjacent to the Project Area. The RSA is inclusive of trapping block N-18, which represent a familiar reference for local Indigenous communities and capture the broad land usage patterns of local communities. Trapping blocks are defined regions and have membership that is regulated by a local trapping association and membership is generally only open to local Indigenous community residents though non-Indigenous trappers may also participate as members of the trapping association. If resource use activities were displaced, it is likely this would still occur within the N-18 trapping block area where individual resource users already have familiarity. | No EIS updates are anticipated to address this IR. |
| IR-33 | CNSC | Residual Effect Characterization | Section 5.8.1, Definitions for Residual Effects Characterization and Significance Section 5.8.1.1, Residual Effects Characteristics Section 8, Table 8.3-9: Fish and Fish Habitat - Surface Water Quality | Context: Denison uses specific criteria (Residual Effect Characteristics: Direction, magnitude, geographic extent, duration, frequency, reversibility, context and likelihood) and associated ratings (e.g., adverse/positive, low/moderate/high) for the predicted effects assessment. However, it is unclear whether an aggregation method was used in order to determine whether impacts will be significant or not significant, depending on the combination of rating categories (i.e., weightings that were calculated, use of decision rules). For example, medium term and long term are both used to represent the same time category: “Effects are expected to last between 3 to 38 years (i.e., effects expected during Construction through to the end of post-Decommissioning).” (See table 8.4-13 on p. 8-200 compared to table 8.4-12 on p. 8-199 and table 8.5-9 on p. 8-246). Rationale: The Generic Guidelines state: “The method used to describe the level of the adverse effect should be transparent and reproducible.” In Table 8.3-11, duration was moderate, but again uses same rationale. There is no ‘moderate’ in Table 8.3-8, and by the same rationale, this should be medium-term to be consistent with definitions provided and summary Table 8.3-12. It was noted that all three tables should be deemed medium-term | If an aggregation method was used and ratings (e.g., High, medium, low) were weighted, what weightings were used, how were these calculated? Please also describe any decision rules that informed the determination of significance. If no aggregation was used, how did Denison ensure that results were consistent, given the varying rankings for each of the key criteria, and varying combination? Regarding inconsistencies in ratings, please use consistent terminology for same rating. | Denison did not use an aggregation method with weighted ratings. The assessment approach and methodology was outlined in draft EIS Section 5, Approach and Methodology. Please note that Section 5.8 provided a guide for technical leads to conduct residual effects evaluation; however, Section 5.8 also recognizes that the specific definitions and ratings for some characteristics may be developed on a VC-specific basis as presented in each VC-specific section. Denison reviewed the draft EIS to ensure results were consistent. This included checks on the consistent application of characteristics and ratings along with any supporting rationale. Nevertheless, as pointed out by the CNSC, there appear to be some inconsistencies in Section 8 of the draft EIS. The final EIS will be updated, specifically Section 8 where inconsistencies were highlighted in IR-33 context and rationale text. Importantly, these are effectively editorial issues and do not change the assessment summaries or conclusions. | Ratings for duration and frequency in Section 8 of the final EIS will be updated. Residual effect characteristics and ratings will be consistent between definitions tables and subsequent summary (results) tables within a section. This will include consistent use of the ratings for the residual effect characteristic of duration, as follows: <ul style="list-style-type: none">• Short-term – Less than 3 years (i.e., effect happens during Construction only).• Medium-term – 3 years to 38 years (i.e., effect happens from Construction through to the end of Post-Decommissioning).• Long-term – More than 38 years (i.e., effect extends beyond Post-Decommissioning). |

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| | | | | based on definitions of ratings outlined in Table 8.3-8. Frequency was also showing up as "continuous" and "continuously" in these tables. | | | <p>This will include consistent use of the ratings for the residual effect characteristic of frequency, as follows:</p> <ul style="list-style-type: none"> Infrequent – Effect occurs several times at sporadic intervals. Frequent – Effect occurs many times on a regular basis. Continuous – Effect occurs continuously. |
| IR-34 | CNSC | Cumulative Effects Analysis | Section 5.9.2.2 (p. 5-41) | <p>Context: Denison identifies the Gryphon deposit as a project that is not reasonably foreseeable. The direct quote from the EIS indicates that the “Development of the Gryphon deposit as an underground mine was evaluated at the prefeasibility level in 2018 but has not advanced to feasibility study or EA. Denison has not announced an intent to proceed with the development of the Gryphon deposit.” (p. 5-41)</p> <p>Rationale: The guidance Assessing Cumulative Environmental Effects under the CEAA, 2012 defines <i>Reasonably Foreseeable</i> as a “physical activity [that] is expected to proceed, e.g. the proponent has publicly disclosed its intention to seek the necessary EA or other authorizations to proceed.”</p> <p>In a press release by Denison Mines (2018: Denison announces decision to advance Wheeler River Project following positive PFS results), Denison publicly disclosed intention to seek the necessary EA for Gryphon to proceed: “After careful consideration of the risks and opportunities associated with permitting and concurrent advancement of project engineering activities, the Company has decided to submit a PD and initiate the EA process in early 2019 for the Phoenix ISR operation, and to bring the Gryphon operation forward, at a later date, as required to achieve the PFS plan of Gryphon first production by 2030.”</p> <p>Further, Denison’s Wheeler River Webpage references a “start of pre-production activities for the Gryphon operation in 2026”</p> | Please update the cumulative effects assessment in the EIS to include the Gryphon deposit as a Present or Reasonably Foreseeable Project. | <p>Denison has not publicly disclosed its intention to seek the necessary EA or other authorizations to proceed with mining the Gryphon deposit on the Wheeler River property at this time and does not meet any of the criteria for a reasonably foreseeable project as per the guidance for Assessment Cumulative Effects under the CEAA 2012 (below). A future physical activity could be considered reasonably foreseeable and should generally be included in the cumulative effects assessment if one or more of the following criteria are met:</p> <ul style="list-style-type: none"> The intent to proceed is officially announced by a proponent. This information could be found in news media, the proponent’s website or via an announcement from the proponent directly to regulatory agencies. The physical activity is under regulatory review (i.e., the application is in process). This can be known, for example, if information about the review or application is available on a government website, or an EA notice has been made public. The submission for regulatory review is imminent. This could be known if the collection of data has already commenced, regulatory authorities have been contacted about information requirements, or through an announcement from the proponent. The physical activity is identified in a publicly available development plan that is approved or for which approval is anticipated (e.g., a wastewater treatment plant in a city’s long term development plan). The physical activity supports – or is consistent with – the long-term economic or financial assumptions and engineering assumptions made for the project’s planning purposes. A physical activity is required in order for the project to proceed (e.g., rail or port transportation facilities, or a transmission line). The economic feasibility of the project is contingent upon the future development. The completion of the project would facilitate or enable the future development. <p>The Gryphon deposit is an exploration phase property and is inherently captured as such in the cumulative effects assessment because the levels of disturbance from these activities to date are captured with the characterization of existing conditions. It would be inappropriate to consider mining of the Gryphon deposit within the cumulative effects assessment as a mining operation as Gryphon cannot be considered a reasonably foreseeable activity. As is widely understood, very few exploration phase projects become operating mines.</p> <p>We note that the press release and the prefeasibility study referenced in the IR were from 2018. The Wheeler River Project Provincial Technical Proposal and Federal Project Description used to initiate the provincial and federal EA processes was submitted in February 2019. This represents Denison’s most recent plans for development and the Project scope does not include underground mining of the Gryphon deposit. Denison acknowledges that, if development of the Gryphon deposit as an underground mine is proposed in the future, this would require additional regulatory review and approval.</p> | No EIS updates are anticipated to address this IR. |
| IR-35 | CNSC | Change to an environmental component due to hazardous contaminants | Section 6, Chemicals of Potential Concern | <p>Context: The use of petroleum products (e.g., propane, gasoline, and diesel) at the Denison Mines Wheeler River site is associated with vehicles and periodic operational testing of emergency generators as well as stationary pumps for emergency power or fire water systems. Thus, the air emissions will contain acrolein.</p> <p>Rationale: This chemical of potential concern (COPC) poses potential risks to human health via inhalation, but acrolein appears to have been missed or deemed insignificant. However, its consideration in the assessment will provide information on the significance of the associated risk.</p> | Please consider acrolein in the assessment or provide a rationale for its exclusion. | An analysis of acrolein risks is provided in Attachment IR-35. | The analysis provided in Attachment IR-35 will be appended in its entirety to Appendix 6-A in the final EIS. |
| IR-36 | CNSC | Other | Section 6, Table 6.1-11 Baseline External Gamma Monitoring | <p>Context: For one of the exposures in the summary table for baseline external gamma monitoring (Table 6.1-11), the cell states "Destroyed in Field".</p> <p>Rationale: No rationale or indication as to why or how it was destroyed is provided.</p> | Please provide any additional info available as to how equipment was destroyed. | Gamma monitor 8 was destroyed in the field by wildlife. | Table 6.1-11 in the EIS will be updated to say "Destroyed in Field by Wildlife" |
| IR-37 | CNSC | Air Quality | Section 6.1.1.1, CALPUFF model | Context: "The Saskatchewan Ministry of Environment (SK MOE) has developed the Saskatchewan Air Quality Modelling Guideline (SK MOE 2012a) to assist proponents in conducting air dispersion modelling assessments in a consistent manner. The guideline defines the recommended approach for dispersion modelling assessments in Saskatchewan, including model selection, emission source characterization, and the determination of compliance criteria to apply." | Please confirm and provide a summary of the consultation with the Saskatchewan MOE on the use of CALPUFF model for the Wheeler River EIS as per provincial air quality guidelines. | As described in Section B.1 of Appendix 6-A, staff at the Saskatchewan Ministry of Environment (Air Quality Branch) were consulted on the selection of CALPUFF and developing the CALMET meteorological data set, beginning in 2019. The CALMET consultation included an initial discussion about the general approach, and once the CALMET run was completed, two technical memos were produced and reviewed by Ministry staff including: 1) a memo completed in March 2020 summarizing the general CALMET approach and results (e.g., wind roses, temperature data, precipitation data); and 2) a follow-up memo completed in May 2021, which answered specific questions posed by Ministry staff. Ministry staff also completed a review and provided feedback on the CALPUFF model setup in August 2021. | No EIS updates are anticipated to address this IR. |

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| | | | | <p>Rationale: Saskatchewan air quality guideline requires consultation on use of CALPUFF model, where it states" The ministry acknowledges that there will be situations where specialized air dispersion models such as CALPUFF, CALQ3HCR and others may be applicable. The use of specialized models requires consultation with the ministry" OR "Pre-consultation with the ministry must be undertaken prior to the facility conducting specialized modelling (p. 3)." It is not clear if Denison Mines consulted with Saskatchewan MOE on use of CALPUFF model.</p> <p>Noted that Section 6.1.4.2 is again referring to Saskatchewan MOE guidance for justification, but no indication that they consulted with them (a requirement).</p> | | | |
| IR-38 | ECCC | Change to an environmental component due to hazardous contaminants | Section 6.1.4.1, Potential Interactions Between the Project and Valued Component / Key Indicators | <p>Context: In this section, the Proponent identifies primary interactions between Project activities and air quality valued components and their associated key indicators. These primary interactions may result in an adverse effect on the valued component. Among the primary interactions are the use of emergency generators in a backup role should there be an interruption of the provincial electrical grid. However, it is not evident what is the anticipated frequency and duration of interruption to grid power.</p> <p>Rationale: The Proponent states in the conservative operation scenario that while the site will be powered from the provincial grid at the operations stage, the back-up power generators were assumed to be operating under emergency conditions as a worst-case scenario. ECCC acknowledges the positive impact of extending the electrical grid to the Project site with resultant reduction in generator emissions. The impact of an interruption in grid power would be greatest during the winter months when energy use would be greatest and surface-based temperature inversions, which vertically trap emissions, would be strongest.</p> | Provide an evaluation of a worst-case scenario of grid power interruptions (i.e., average aggregate length of power outages) during the winter months for this section of the electrical power grid. | <p>Denison expects an average of six outages per year based on information provided by SaskPower. An outage would be anticipated to last a few hours per event.</p> <p>The air quality assessment conservatively assumed that the generators would be in operation 24/7 to predict worst-case concentrations in all months of the year, including the winter months. Given the above, Denison can confirm it has evaluated an appropriately conservative worst-case scenario for use of the diesel generators in the air quality assessment.</p> | No EIS updates are anticipated to address this IR. |
| IR-39 | ECCC | Change to an environmental component due to hazardous contaminants | Section 6.1.4.2, Potential Project-Related Effects | <p>Context: In this section, the Proponent discusses the approach taken for air dispersion numerical modelling. Using their CALMET data set, the Proponent's CALPUFF model runs indicated exceedances for 24-hour total suspended particulates, 24-hour particulate matter (PM10), 1-hour nitrogen dioxide, and 24-hour uranium concentrations. However, there is no mention of possible diurnal and seasonal occurrences of the exceedances.</p> <p>Rationale: Adequate assessment of the modelling results requires knowledge of the temporal characteristics for the exceedances. For example, wintertime exceedances may be due to strong temperature inversions, especially during the overnight to morning hours. These strong inversions are challenging for numerical models to capture. Exceedances during warmer months may be due to specific wind directions, which transport emissions directly to downwind receptors.</p> | Provide additional information on any diurnal and seasonal influences of the modelled exceedances. | Additional information on diurnal and seasonal influences of the modelled exceedances is provided in Attachment IR-39 in this document. | No EIS updates are anticipated to address this IR. |
| IR-40 | CNSC | Air Quality | Section 6.1.6.2.1, Air quality significance determination | <p>Context: Significance determination was not conducted for air quality due to interconnectedness with other assessment endpoints.</p> <p>Rationale: It is not clear where and how these air quality assessment endpoints were factored into the assessment.</p> | Please provide additional information to demonstrate where and how these air quality assessment endpoints were factored in. | Noted in Section 6.1.1.1 of the draft EIS, Air Quality was identified as an intermediate Valued Component (VC) (i.e., does not have an assessment endpoint). Air quality assessment endpoints and the significance of potential effects of Project-related changes to ambient air quality were considered in Section 9 (Terrestrial Environment), Section 10 (Human Health) and Section 11 (Land and Resource Use). For additional reference, Figure 6.1 2 of the draft EIS is a graphic representation of the main linkages among the Air Quality VC and other VCs, illustrating the flow of assessment information from the Air Quality VC. By way of example, the habitat alteration effects considered for avian and wildlife VC and Key Indicators (KIs) included dust deposition, which could change avian and wildlife use through an indirect effect. | No EIS updates are anticipated to address this IR. |
| IR-41 | CNSC | Air Quality | Section 6.1.6.2.2, Background concentrations | <p>Context: The EIS states that "Conservative regional background concentrations from the Saskatchewan Air Quality Modelling Guideline (SK MOE 2012a) and based on the La Loche monitoring station were used for particulate matter, NO2, SO2, and CO. The La Loche monitoring station is located near anthropogenic sources, while the Project is in a remote area removed from anthropogenic sources."</p> <p>Rationale: If La Loche monitoring station is located near anthropogenic sources and the project is not, use of this data is not a conservative or realistic representation of background.</p> <p>For a realistic approach, background data considered should be upper 95th percentile (or max if n<10) from an area representative of project location</p> <p>For a conservative approach, background data from an area located even further from anthropogenic sources (if this exists) should be used, or an upper limit of background less than upper 95th should be applied as the background.</p> <p>Upper limit of background is used to screen out COPCs or often subtracted from total to ascertain relative contribution / impact from source, so using a higher upper limit may result in COPCs screening out or appear to have a lower relative contribution. If background was</p> | Please provide additional rationale to justify the appropriateness of La Loche monitoring station concentrations as background for project location. | <p>The Saskatchewan Ministry of Environment requires that background concentration data be added to air model predictions and an accepted set of data is provided in the Saskatchewan Air Quality Modelling Guideline. Following Ministry requirements, the northern regional data set was selected, which is based on monitoring data from the La Loche station. Because the La Loche station is located near anthropogenic sources, the background values are likely higher than background in the Project Area. This means that the total air model predictions (modelled + background) are likely more conservative than would necessarily have been the case had a similar data set been available that was free of any anthropological influence.</p> <p>Further consideration of the use of the La Loche data set is provided in Appendix 6-A, Section 6.0 of the draft EIS.</p> | No EIS updates are anticipated to address this IR. |

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| | | | | added to source, then approach used would be conservative. If this is the case, confirmation and reference to where this is discussed in methodology should be provided. | | | |
| IR-42 | Health Canada (HC) | Physical stressors (noise and vibration) | Section 6.2.4.2.2, (p. 6-66) Section 6, Section 6.2.9, (p. 6-72) | <p>Nighttime noise impacts are not adequately considered for human receptors.</p> <p>Context: The EIS states in Section 6.2.9 that, “While the predicted sound levels were less than the guideline values, the increase from baseline was predicted to be noticeable” (p. 6-72). No information is provided on individual noise events occurring during the nighttime period.</p> <p>Rationale: While the increase from baseline is predicted to be noticeable, it is important to also consider that changes to the characteristics of the sound from baseline (e.g., a change in frequency, changes in sound modulation, increased impulsiveness or tonality, or a shift in noise from the daytime to being more at night) may cause noise to be even more noticeable. Consult ANSI S12.9-2005/Part 4, clause A.1.3 for further information.</p> <p>In particular, consideration should be given to potential impacts on sleep, where adverse impacts are reported to begin when sound levels inside bedrooms exceed 30 dBA for continuous noise sources and 45 dBA LMax for discrete noise events (WHO, 1999).</p> | <p>1. Provide a description of the project- related nighttime noise sources that may impact human receptors as well as a qualitative discussion of the resulting potential impacts on perception considering not only changes in sound levels but also sound characteristics (e.g., tonality, impulsivity).</p> <p>2. Confirm whether individual nighttime noise events exceeding 45 dBA LAMax outdoors (or 30 dBA indoors) are expected to occur more than 15 times over the nighttime period at any nearby potentially noise-sensitive human receptor location(s). This may be of particular concern if some construction and/or operations activities occur during sleeping hours.</p> | <p>1. During Construction, the nighttime noise sources that are the highest contributors to sound levels at the nearest human receptor location are expected to be construction equipment (bulldozers, trucks, cement mixing and crusher). During Operation, the primary contributors are truck traffic and drilling in the wellfield. As these are not impulse or tonal sources, no adjustments were made to the source sound levels per ANSI S12.9-2005 Part 4.</p> <p>2. For Construction, the crusher was modelled at its maximum sound output. The diesel-powered equipment (dozers, drill rigs) was adjusted for partial operation. When adjusted to provide maximum sound levels instead, the predictions at the nearest human receptors did not exceed 45 dBA Lmax during the nighttime hours for either Construction or Operation.</p> <p>The draft EIS will be updated to include the additional supporting discussion outlined above.</p> | <p>Section 6.2.4.2.2 will be clarified as follows: The nighttime sound levels were not predicted to exceed the PSL of 36 dBA at any of the identified receptors during Construction or Operation. As with the daytime sound levels, the maximum predicted nighttime sound levels were predicted at the property identified as 302586/Risk2. The predictions at this location were 35.9 dBA and 34.0 dBA for Construction and Operation, respectively, and were similarly primarily attributable to drilling activity in the wellfield, concrete batching (during Construction), and movement of trucks on the access road. During Construction, the nighttime noise sources that were the highest contributors to sound levels at the nearest human receptor location consisted of construction equipment (bulldozers, trucks, cement mixing and crusher operation). During Operation, the primary contributors at night were truck traffic and drilling in the wellfield. As these are not impulse or tonal sources, no adjustments were made to the source sound levels. The crusher was modelled at its maximum sound output, while the diesel-powered equipment (e.g., dozers, drill rigs) were adjusted for partial operation over the respective daytime and nighttime periods. To account for potential issues resulting from equipment operating at maximum levels (as opposed to daytime and nighttime averages), the models were run with the partial operation adjustments removed, for comparison to the Health Canada recommended criteria value of 45 dBA Lmax at night. The predictions at the nearest human receptors did not exceed 45 dBA Lmax for either Construction or Operation."</p> |
| IR-43 | HC | Physical stressors (noise and vibration) | Section 6.2.5, (p. 6-66) Section 6.2.5, (p. 6-71) | <p>Mitigation measures for project-related noise were not identified for the Construction phase.</p> <p>Context: The mitigation measures provided in Section 6.2.5, including a complaint management system is also to be implemented as part of the EMS, are only proposed for the operations phase.</p> <p>However, construction activities are predicted to last more than one year. Construction noise will involve the use of equipment operating at the site, construction of surface facilities, drilling, and partial operation of the freeze plant. It will also include regular truck trips and air traffic for personnel changes.</p> <p>Rationale: It is unclear if listed mitigation measures also apply to the construction phase (or only to the operations phase).</p> | <p>1. Clarify whether mitigation measures and the proposed EMS apply to the Construction phase. If not, identify mitigation measures for noise impacts related to Construction phase activities, and consider applying the EMS to the Construction phase and implementing the community complaints and response procedure from the beginning of construction activities.</p> <p>2. Health Canada suggests that construction noise lasting longer than 1 year be assessed as operational noise, and that noise mitigation measures be applied also to the construction phase. Special consideration should be given to mitigation measures for construction noise that occurs at night, in order to minimize impacts on sleep (i.e., avoiding tonal or impulsive noise sources at night).</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends use of Appendix H of Health Canada (2017), which identifies additional construction noise mitigation measures that could also be considered to reduce project- related noise.</p> | <p>1. Mitigation measures and the proposed EMS apply to both Construction and Operation. As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison will collaborate with English River First Nation (ERFN) and Kineepik Metis Local (KML) on a community specific monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous communities of ERFN and KML will be sharing information in an agreed-upon fashion. If noise from construction activities form part of the interests for each of these Indigenous communities.</p> <p>2. See response to IR-42 regarding nighttime work and potential for sleep disturbance.</p> <p>The draft EIS will be updated to include the above clarifications.</p> | <p>The first paragraph of Section 6.2.5 will be revised to clarify the applicability of mitigation measures as follows: "Strategies to reduce the likelihood and magnitude of the predicted effects include source elimination and utilizing planning measures to counter the conditions that contributed to the predicted effects. Mitigation measures to be applied during both Construction and Operation include:..."</p> <p>The first paragraph of Section 6.2.8 will be revised to clarify the applicability of the EMS as follows: "An EMS will be implemented and include air quality and noise management and monitoring plans to confirm that the Project is compliant with the federal and provincial guidelines that have been adopted for this assessment during both Construction and Operation."</p> |
| IR-44 | HC | Physical stressors (noise and vibration) | Section 6.2.8, (p. 6-71) | <p>The noise complaints resolution and response procedure is not sufficiently described in the EIS.</p> <p>Context: Section 6.2.8 discusses Monitoring and Follow- up. The proponent indicates: “The EMS will also include a community complaints and response procedure” (p. 6-71).</p> <p>Rationale: Details have not been provided regarding how the complaints would be received, addressed or what the timelines will be for providing a response or resolution. It is important to provide information to potentially affected communities in advance of particularly noisy activities. Community consultation and advanced notification of noisy activities has been shown to reduce complaints (see Health Canada, 2017).</p> | <p>1. Provide the details of the noise complaints resolution and response procedure as per Health Canada (2017).</p> <p>2. Consider conducting community consultations and/or implementing an advanced community notification system to pro-actively reduce the probability noise-related impacts and complaints.</p> | <p>1. Denison is undertaking sequential EA and licensing processes with the CNSC. As such, a detailed management system based on the CNSC’s safety and control areas and focused on anticipated compliance verification criteria will be developed over the upcoming months to support licensing activities.</p> <p>Further to this, a framework for monitoring and follow up was presented for each technical EIS discipline in the respective draft EIS section. Environmental monitoring and follow up will fall within the scope of the Environmental Management System (EMS) for which document preparation is ongoing, and as indicated will be fulfilled during licensing. As noted elsewhere in the IR responses the EMS hierarchy will follow a three-tiered system comprising Program, Plan and Procedure level documentation, with detail associates with each becoming more granular and prescriptive at each successive tier.</p> <p>As noted in Section 6.2.8 of the draft EIS, a commitment to have a community complaints and response procedure for noise has been made by Denison. Consistent with Denison’s approach to sequential EA and licensing and as highlighted above the specific details associated with this complaints and response procedure, consistent with provincial and federal guidelines, will be developed at that time. Nevertheless, further information concerning the framework / approach to the community complaints and response procedure is provided below for reference.</p> | No updates to the EIS in response to this IR. |

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| | | | | | | <p>Denison is committed to designing the noise monitoring and follow-up plan and an associated procedure in accordance with provincial and federal guidelines and industry best practice.</p> <p>The plan will identify:</p> <ul style="list-style-type: none">• Project-related noise sources and control measures;• How complaints will be filed, acknowledged, investigated, and resolved, including general timeframes for each phase;• How confidentiality of a complainant’s identity will be respected, if requested, how anonymous complaints can be filed and how assistance for those who may face barriers to the procedure can be accommodated;• How those involved in executing the plan will receive training and be made aware of the plan;• How potentially affected communities will be engaged;• How complaints and their resolutions will be tracked and recorded;• How the performance of the plan will be monitored and evaluated and how this information shall be communicated; and• How the plan will be updated. <p>It is anticipated that the following procedure specific to noise complaints is expected to be applied:</p> <ul style="list-style-type: none">• Each complaint would be logged/recorded and include the following information:<ul style="list-style-type: none">○ the name, address and contact information of the complainant (if provided);○ the time and date of the complaint;○ the nature of the complaint; and○ meteorological conditions at the time of complaint (i.e., wind direction).• Determine the specific cause(s) of the complaint and take short-term and immediate actions to resolve the cause of the complaint;• Provide a prompt response to the complainant (within 24-hours) and follow-up as needed based on the required actions to resolve the complaint; and• Prepare and retain on-site a written report that:<ul style="list-style-type: none">○ identifies the cause of the complaint;○ identifies the actions taken to appropriately deal with the cause of the complaint; and○ identifies any recommendations for remedial measures, and managerial or operational changes to reasonably avoid the recurrence of similar incidents. <p>2. Denison has committed to working with its Indigenous Communities of Interest with reserves and or / residential communities most proximal to the Project (English River First Nation and Kineepik Metis Local), to understand the issues and concerns they have relative to the Project, and resolution of some specific items of interest or concerns may be resolved through the negotiation process of private contractual arrangements or agreements. The noise complaint mechanism will be one area that will be raised specifically with the Indigenous Communities of Interest with reserves and or / residential communities most proximal to the Project (English River First Nation and Kineepik Metis Local).</p> | |
| IR-45 | HC | Change to an environmental component due to hazardous contaminants | Section 6 Air Quality Technical Supporting Document Section 6.3.1 | <p>The carcinogenic risks of diesel exhaust from the project should be assessed.</p> <p>Context: Section 6.3.1 discusses modelled predictions of exceedances for Particulate Matter (PM). TSD p. 22 states: “concentrations of 24-hour PM2.5 are also elevated around the standby generators at the freeze plant, which emit fine particulate matter from combustion of diesel fuel”. However, diesel particulate matter is not evaluated for the whole project in the air quality model or the air quality assessment.</p> <p>Rationale: Health Canada has determined that diesel exhaust is carcinogenic in humans which is consistent with the conclusion of the International Agency for Research on Cancer (IARC), and that diesel exhaust is associated with significant population health impacts in Canada.</p> <p>To characterize the carcinogenic risk of diesel exhaust from a project, HC has published a report (2022)¹ which provides a quantitative assessment of the relationship between ambient PM2.5 exposure and lung cancer risk. Specifically, this report quantifies the increase in risk of lung cancer mortality (over the baseline rate in the Canadian population) due to PM2.5 exposure.</p> <p>This quantitative assessment is considered appropriate to characterize risks from diesel PM given the contribution of diesel exhaust to ambient PM2.5 in Canada, and that the carcinogenicity of diesel exhaust has generally been evaluated based on the respirable PM fraction^{1,2,3}.</p> <p>References: [1] HC. 2022. Lung Cancer and Ambient PM2.5 in Canada: A Systematic Review and Meta-analysis. Available at: https://publications.gc.ca/site/eng/9.907038/publication.html</p> | 1. Evaluate the carcinogenic risk of all potential diesel exhaust from the project based on the approach proposed by Health Canada (2022). Additional guidance ("Additional Lung Cancer Mortality from PM2.5: Recommended Approach and Sample Calculation") is provided as an appendix to this comment table. ¹ | An evaluation of carcinogenic risk of all potential diesel exhaust from the project based on the approach proposed by Health Canada (2022) is provided in Attachment IR-45. | No updates to the EIS in response to this IR. |

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| | | | | <p>[2] HC. 2016. Human Health Risk Assessment for Diesel Exhaust. Available at: http://publications.gc.ca/collections/collection_2016/sc-hc/H129-60-2016-eng.pdf</p> <p>[3] IARC. 2013. IARC monographs on the evaluation of carcinogenic risks to humans. Volume 109. Outdoor air pollution. https://publications.iarc.fr/Book-And-Report-Series/iarc-Monographs-On-The-IdentificationOf-Carcinogenic-Hazards-To-Humans/Outdoor-Air-Pollution-2015</p> | | | |
| IR-46 | HC | Physical stressors (noise and vibration) | Appendix 6-A Table A-1 | <p>Low-frequency noise and associated potential human health effects were not assessed.</p> <p>Context: Some equipment that may emit low-frequency noise (LFN) have been listed in Table A-1: Assessment Scenarios and Sound Level Data (Section 6 Appendix A); however, no information describing potential impacts of this type of sound on nearby human receptors are presented.</p> <p>Rationale: Low frequency noise can be associated with the introduction of noticeable vibrations and rattles in nearby structures. Research indicates that annoyance related to noise is greater when low-frequency noise is present (ISO 1996-1:2003). As sound environments are usually characterized using A-weighted decibel levels (dBA) that reflect the frequencies most audible to the human ear, the impacts of low- frequency noise may need to be assessed separately.</p> | <p>1. Clarify whether any project-related activities (construction, operation and/or decommissioning) may produce LFN that could impact off-site human receptors. Evaluate LFN in the noise assessment, if and where applicable. See Appendix C of Health Canada (2017) for a discussion of LFN.</p> | <p>Appendix C.2 of Health Canada (2017) identifies an approach to assessing LFN from ANSI, which states that the energy sum of the 16-63 Hz octave bands should be less than 70 dBZ to avoid rattles due to LFN. The energy sum of the 16-63 Hz octave bands at the nearest human receptors is expected to be well below 70 dBZ (predictions indicate the values are in the order of 44 dBZ at the nearest human receptor).</p> <p>The draft EIS will be updated to include the additional supporting discussion outlined above.</p> | <p>The following paragraph will be appended to the end of Section 5.1 of Appendix 6-E:</p> <p>"In addition to the Ldn and %HA assessment methods, Health Canada (2017) also recommends assessing the potential for low frequency noise (LFN) impacts such as noise-induced vibration or rattles in building structures. The recommended approach from ANSI is to combine the predicted receptor sound levels in the 16 to 63 Hz octave bands and compare the total to a criterion of 70 dBZ. The maximum prediction for this assessment was 44 dBZ, and, therefore, LFN is not predicted to be a concern for the Project."</p> |
| IR-47 | ECCC | Air Quality | Appendix 6-A, A.1 | <p>Context and Rationale: Verification of the following calculation is required for assessing predicted emissions of dust from general construction. It appears the result of 0.70 ton/acre/month is incorrect and should instead be 0.314 ton/acre/month.</p> <p>Appendix 6-A, Appendix A, A.1 (p. A4) TSP Emission Factor for General Construction:</p> $EF\ (TSP) = 0.11\ \frac{\text{ton}}{\text{acre}} \times 1.2\ \frac{\text{ton}}{\text{acre}} \div 0.42\ \frac{\text{ton}}{\text{acre}} = 0.70\ \frac{\text{ton}}{\text{acre}}$ | <p>Explain how the emission factor total suspended particulates (EF (TSP)) result was obtained or rectify if it is incorrect and update the draft EIS to reflect the correction.</p> | <p>The formula incorrectly displayed the wrong units. It is 0.314 ton/acre/month, which converts to 0.70 tonnes/hectare/month. Denison confirms that this was a typographical error, and the result of the calculation is unchanged.</p> | <p>In Appendix 6-A, the formula will be changed to:</p> $EF\ (TSP) = 0.11\ \frac{\text{ton}}{\text{acre}} \times 1.2\ \frac{\text{ton}}{\text{acre}} \div 0.42\ \frac{\text{ton}}{\text{acre}} = 0.314\ \frac{\text{ton}}{\text{acre}} = 0.70\ \frac{\text{tonnes}}{\text{ha}}$ |
| IR-48 | HC | Physical stressors (noise and vibration) | Appendix 6-E, Figure 6.2.3, p. 6-57 | <p>Noise-sensitive receptors are not included on noise contour maps.</p> <p>Context: Noise-sensitive receptors are identified in the acoustic model report in Section 6 Appendix 6-E but not presented on any maps in the atmospheric and acoustic sections of the main report (Figure 6.2-3).</p> <p>Rationale: The noise assessment typically includes a map illustrating modelled noise levels from the project at receptor locations in the study area.</p> <p>Certainty regarding the presence of human receptors in the regional study area is also recommended in order to assess cumulative impacts.</p> | <p>1. For more clarity, identify noise-sensitive receptors on Figure 6.2-3: Noise Assessment Study Area as well as on contour maps showing the baseline and predicted noise levels.</p> | <p>A new figure will be added to Section 6.2 of the final EIS showing the Project Area, Local Study Area, the receptor locations, and nearby land leases (both traditional and recreational). A copy of this new figure has been included with this IR response.</p> <p>As noted in the context and rationale for this IR, Denison included the receptor locations on the contour maps with the predicted noise levels (Appendix 6-E, Figures 8 to 15); as such, no edits to the Appendix 6-E figures are proposed in response to this IR.</p> | <p>A new figure will be added to Section 6.2 and a copy of the figure has been included with this IR response in Attachment: IR-48. The new EIS Figure will be 6.2-4; figure numbering will shift and Figure 6.2.4 Baseline Monitoring Locations for Noise in the draft EIS will become Figure 6.2.5 in the final EIS.</p> |
| IR-49 | HC | Physical stressors (noise and vibration) | Appendix 6-E, 4.0 Table A.1 | <p>The Noise Source Characterization is incomplete.</p> <p>Context: Section 3.0 of the Draft EIS Section 6 Appendix 6- E discusses Source Characterization. There is no detail regarding potential tonal or impulsive noise sources in Section 3.0.</p> <p>Rationale: The draft EIS should include a description of sound source characteristics (e.g., tonal, impulsive, highly impulsive) in order to properly inform the quantitative noise assessment and which assumptions/adjustments need to be applied and to properly evaluate impacts of project noise on health of affected receptors.</p> | <p>1. Identify any tonal, regularly impulsive, highly impulsive, or high-energy impulsive noises likely to be produced during project activities that could be audible at noise sensitive receptors. Furthermore, describe the timing (e.g., hours of night-time activities), frequency and duration of noise events, and their sound characteristics, including frequency spectrum. See Health Canada (2017) for details.</p> | <p>No tonal or impulse sources were identified for either assessment scenario. Construction activity was assumed to occur 24-hours per day as a conservative measure. The frequency spectrum data for each source is included in Table A.1 of Appendix 6-E.</p> <p>Appendix 6-E will be updated to include discussion of ISO 1996-1 adjustments and rational for inapplicability to sources identified.</p> | <p>The following paragraph will be appended to the end of Section 3.0 of Appendix 6-E:</p> <p>"Upon establishing the source sound levels for inclusion in the predictive modelling, the list was reviewed to determine whether there were any sources with special sound characteristics such as tonality or impulse noise. Health Canada (2017) recommends the application of source adjustments in accordance with ISO 1996-1 for such sources as these are associated with increased annoyance. No tonal or impulsive noise sources were identified in the Construction or Operation scenarios."</p> |
| IR-50 | HC | Physical stressors (noise and vibration) | Appendix 6-E, 4.0 Table A.1 | <p>The description of noise modelling does not document or justify the use of sound level adjustments.</p> <p>Context: ISO Standard 9613-2 has been used for the sound level modelling; however, it is unclear if all applicable adjustments have been considered as per ISO 1996-1:2016 (Table A.1).</p> <p>Rationale: When modelling techniques are used to estimate present (baseline) or future (construction and operational) sound levels, these techniques and any accompanying assumptions, including the use of sound level adjustments, it is important to provide appropriate documentation and justification.</p> <p>Note that in situations where more than one source characteristic</p> | <p>1. Clarify whether ISO-1996-1:2016 has been considered in the modelling to account for any applicable sound level adjustments. Adjustments should be considered when calculating Ln (night- time sound level) and Ldn (day-night sound level). In addition, if applicable, adjustments can be applied depending on the noise characteristic (impulsive, highly impulsive, etc.), and because the project location is considered to be in a quiet rural area. See: ISO 1996-1:2016 and Health Canada (2017) for details.</p> | <p>No tonal or impulse sources were identified for the assessment scenario. As discussed in Section 6.2.1.2.1 of the draft EIS, the assessment did include the 10 dBA nighttime penalty inherent in the calculation of Ldn, and also included the HC recommended adjustment of +10 dBA to the Ldn levels to account for the Project location being in a quiet rural area.</p> <p>Appendix 6-E will be updated to include discussion of ISO 1996-1 adjustments and rationale for inapplicability to sources identified. The noted time-of-day and rural adjustments are already discussed in the draft EIS and applied in the assessment.</p> | <p>Appendix 6-E will be updated, per the paragraph outlined in the response to IR-49, which is expected to resolve the comment about tonal and impulse noise.</p> <p>The comment regarding the adjustment to account for the Project being in a quiet rural area was already accounted for in the draft EIS as outlined in Section 6.2.1.2.1.</p> |

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| | | | | adjustment is applicable (e.g., impulsive or tonal), only the higher of the adjustments is used. However, all time-of-day adjustments and the quiet rural area adjustment are to be added to the highest of the applicable source adjustments. | | | |
| IR-51 | CNSC | Geology and Groundwater | Section 7, Figure 7.8-1 Appendix 7-C | <p>Context: Figure 7.8-1 (p. 7-107, main EIS report) shows monitoring well cluster outside of the freeze wall.</p> <p>Rationale: It is not clear what the targeted hydro-stratigraphic units of each monitoring well cluster are. In addition, it is not clear how the establishment of the freeze wall and any leakage from the brine solution will be monitored. If there is any “window” within the freeze wall (i.e., the freeze wall is not continuous), is there any way to identify that?</p> | <p>Please clarify the targeted hydro-stratigraphic units of each monitoring well cluster in Figure 7.8-1 (p. 7-107, main EIS report).</p> <p>Please clarify how the establishment of a continuous freeze wall will be monitored.</p> | <p>1: The information in the legend of Figure 7.8-1 will be updated to indicate that 2 well clusters target the Lower Sandstone Aquifer and the Intermediate Sandstone Aquitard. The target hydrostratigraphic units for the 4 well clusters are the Lower Sandstone Aquifer, the Intermediate Sandstone Aquitard, the Upper Sandstone Aquifer, and the overburden aquifer.</p> <p>2: The alignment of the freeze wall is located 25 m offset from the lateral extent of the recoverable ore and the freeze wall will grow in thickness both towards the ore and away from the ore. The freeze wall will solidify all liquid porewater and develop into a contiguous impermeable barrier many metres thick. Ground temperature monitoring will be installed through a series of continuous fiberoptic temperature and pressure wells from surface to the depth of impermeable basement rock below the unconformity. Such monitoring wells/systems will be installed on both the ore (inside) and non-ore (outside) sides of the freeze wall to confirm the thickness of frozen ground. There will be sufficient operational controls in place to verify that the freeze plant is operating, to measure the temperature in the ore zone, and to measure the temperature on opposite sides (inside and outside) of the freeze wall so that early detection of any upset conditions can be identified and addressed. Options for addressing issues include: lowering the temperature of the freeze system to draw more heat out; increasing the freeze coolant flow rates in freeze wells nearer to active ISR cells; and/or to adaptively manage the lixiviant injection and recovery rates in cells located nearest to the freeze wall.</p> | <p>1: Figure 7-8.1 has been provided in Attachment IR-51 and will be updated in the final EIS to provide information in the legend on the hydrostratigraphic units being monitored in each well cluster.</p> <p>2: The following text will appear in Section 2 (2.2.1.5 Monitoring Well Network) regarding monitoring to demonstrate a continuous freeze wall.</p> <p>The alignment of the freeze wall is located 25 m offset from the lateral extent of the recoverable ore and the freeze wall will grow in thickness both towards the ore and away from the ore. The freeze wall will solidify all liquid porewater and develop into a contiguous impermeable barrier many metres thick. Ground temperature monitoring will be installed through a series of continuous fiberoptic temperature and pressure wells from surface to the depth of impermeable basement rock below the unconformity. Such monitoring wells/systems will be installed on both the ore (inside) and non-ore (outside) sides of the freeze wall to confirm the thickness of frozen ground. There will be sufficient operational controls in place to verify that the freeze plant is operating, to measure the temperature in the ore zone, and to measure the temperature on opposite sides (inside and outside) of the freeze wall so that early detection of any upset conditions can be identified and addressed. Options for addressing issues include: lowering the temperature of the freeze system to draw more heat out; increasing the freeze coolant flow rates in freeze wells nearer to active ISR cells; and/or to adaptively manage the lixiviant injection and recovery rates in cells located nearest to the freeze wall.</p> |
| IR-52 | ECCC | Fish and fish habitat | Section 7, Geology and Groundwater Appendix 7 | <p>Context: According to the Proponent, “an acidic or low pH mining solution will be used to leach uranium ores from the ground. Mining solution may be a mixture of sulphuric acid, hydrogen peroxide, ferric sulphate, and freshwater (from shallow groundwater well or surface waterbody) or recycled water.</p> <p>Wellfield will consist of a combination of injection and recovery wells, in the general the arrangement of one recovery well in the centre surrounded by four injection wells (5-spot pattern) with about 5 to 10 m between wells. The final wellfield is expected to include approximately 300 wells over an area measuring 90 m wide x 750 m long”.</p> <p>As the components/contaminants mentioned in the description of the hydrogeologic contaminant transport processes above may be transported to Whitesfish Lake through groundwater, the injection and recovery wells should be included in the model.</p> <p>Rationale: The hydrogeologic contaminant transport processes described above are an important part of the proposed Project and it is not clear why numerical modelling results and a sensitivity analysis for the above processes was not presented.</p> | <p>1. Explain why 3D hydrogeology and contaminant transport numerical modelling of the injection and extraction wells was not presented.</p> <p>2. Alternatively, provide simulation results and a sensitivity analysis for the injection and extraction of the acidic solution in the mining area.</p> | <p>Denison used the ISR mine design and the 3D hydrogeology and contaminant transport numerical modelling of the injection and extraction wells to determine the potential interactions between mining activities and the environment. Two key outputs from the ISR mine design and 3D hydrogeology modelling work were used as inputs for the hydrogeologic assessment in the EA. The extent of mining solution migration away from the injection and recovery well screens, as defined by the mining area (50m above the ore zone and within the freeze wall) and groundwater quality of the mining zone following remediation.</p> <p>During the operation phase, and under normal operational conditions there is no interaction between the mining zone and surface or down gradient environment, and the assessment focuses on post removal of the freeze wall, once the groundwater flow returns to pre mining conditions.</p> <p>The injection and recovery wells will be set up such that they are within the confines of the ore itself. Migration of fluids towards the freeze wall and through non ore ground between the ore and freeze wall are minimized because hydraulic gradients will induce preferential flow to recovery wells and away from the freeze wall. If significant excursion of lixiviant were to occur and it were to contact the freeze wall, it is not expected to chemically dissolve the in situ ice and would be contained therein limiting any excursion outside of the mining horizon.</p> <p>Additionally, continuous 3D modelling has been conducted for the purposes of mining operations beginning in 2019 through 2023, which has successfully demonstrated control of the mining solutions and recovered uranium bearing solution to the ore zone depth and not beyond the mining zone within the confines of the freeze wall. Furthermore, modelling had demonstrated that mining solutions will be maintained within the deposit area laterally and not contact the freeze wall, which is located at a 25 m stand-off distance.</p> <p>For more information on how Denison’s extensive field testing and lab informed the design of the ISR mine and the mining zone remediation objectives please see the response to IR-6.</p> | No updates to the EIS in response to this IR. |
| IR-53 | CNSC | Geology and Groundwater | Section 7.3, Table 7.3.-2 Appendix 7-C | <p>Context: The field-based hydraulic conductivity values (referred to as K values hereafter) in Table 7.3-2 (p. 7-32, main EIS report) indicate that the K value ranges of upper and lower sandstone aquifers have a significant overlap with those of the intermediate sandstone aquitard.</p> <p>However, the calibrated K value in Table 2-2 (p. 2.7, Appendix 7-C)) for the intermediate sandstone aquitard is close to the lower end of the field-based K value range, while the calibrated K values for the upper</p> | Please provide additional information to support the representativeness of the calibrated K values (for example, use graph to present the measured K values and the calibrated K values). | The calibrated hydraulic conductivity values are consistent with observed data. The calibrated K value for the intermediate aquitard was 1×10^{-8} m/s, which is in the middle of the range of values reported from point testing within this unit (Range: 10^{-10} to 3.8×10^{-6} m/s), and similar to the geomean value (8.4×10^{-9} m/s). Thus, the calibrated K value is within a factor of 1.2 of, and higher than, the geomean value. The hydraulic conductivity value for the Intermediate Aquitard is similar to that applied by AECL at Cigar Lake (5×10^{-8} m/s). Similarly, the K values applied for the Upper and Lower Sandstone Aquifer units are consistent with the field measured values, particularly for this fractured rock environment. The high end of the | No updates to the EIS in response to this IR. |

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| | | | | <p>and lower sandstone aquifers are close to the upper end of the field-based K value range.</p> <p>Rationale: It is not clear how representative the calibrated K values are of the field-based K values for each hydro-stratigraphic unit, and if the significant difference between the K values for the upper and lower sandstone aquifers and those for the intermediate sandstone aquitard is supported by the geological properties of the corresponding stratigraphy units.</p> <p>It is stated in the report (p. 7-36, main EIS report) that “Vertical fracture or fault zones that hydraulically connect the Local (upper) and Semi-Regional (lower) groundwater flow regimes are present throughout the Athabasca Basin”. But fractures and fault zones are not explicitly considered in the model. There is possibility that these features could increase the hydraulic connection between the upper and lower sandstone aquifer.</p> | | <p>packer tested range of K values varied by 2 orders of magnitude between the aquifer and aquitard units, which is consistent with the definition of aquifer / aquitard differentiation. The interpretation of an aquifer-aquitard-aquifer sequence is consistent with the AECL interpretation of the Athabasca Sandstone at the Cigar Lake mine.</p> <p>When packer testing in fractured rock, the hydraulic conductivity associated with any test depends on whether the packed zone contains a continuous fracture set. However, for the unit as a whole, it is important that the model represent the hydraulic conductivity (or transmissivity) representative of the interconnected fracture network. Thus, it is appropriate that the applied hydraulic conductivity values within the aquifers are consistent with the higher end of tested conductivity values within those units. Within aquitard units, having singular higher conductivity fracture values from packer tests that test local fractures only, does not necessarily indicate large-scale transmissivity.</p> <p>A fault feature is suspected along the western perimeter of the Lower Sandstone Aquifer near Kratchkowsky and Williams Lake, located 1.5 km west of the mine site (also as depicted on the Hydrogeological Conceptual Site Model). This feature was interpreted to exist based on the similarity in groundwater levels between deep and shallow aquifers in that particular area (c.f., water levels along the creek south of Williams Lake and within GWR-029, as well as water levels recorded in open boreholes near Kratchkowsky Lake), as well as geochemistry in GWR-029. The geochemistry and water levels show in the vicinity of GWR-029 are different, however, than conditions within the Lower Sandstone aquifer further east of this area, above and east of the Phoenix deposit.</p> <p>The effect of the fault feature along the western edge of the Lower Sandstone aquifer was incorporated within the numerical model both through enhanced hydraulic conductivity parameters, as required to match observed water levels, and boundary conditions applied to introduce as much inflowing water to the Lower Sandstone Aquifer as the water level data suggest is reasonable.</p> | |
| IR-54 | CNSC | Geology and Groundwater | Section 7.3.1 | <p>Context: EIS states: “The most important associated topographic features in the region are the northwest to southeast trending drumlins and eskers....” This is not the trend shown on the provided maps, nor described elsewhere in the report, e.g., Section 7.3.2.1</p> <p>Rationale: Inaccurate information in the EIS</p> | Please update the EIS where required to accurately describe the topographical features. | Acknowledged. The typo in the draft EIS, Section 7.3.1 will be corrected in the final EIS. | <p>In Section 7.3.1. the text will be updated to say the following:</p> <p>“The most important associated topographic features in the region are the northeast to southwest trending drumlins and eskers...”</p> |
| IR-55 | NRCan | Fish and fish habitat | Section 7.3.3.1; Appendix 7-A, sections 3.4, 3.5, 3.8, 4.2; Appendix 7-C, section 2.8 | <p>Context: According to the proponent's conceptual hydrogeological model (EIS, sec 7.3.3, Figure 7.3-7, Table 7.3-2; Appendix 7-A, sec. 3.4, Table 3-4), the horizontal hydraulic conductivity of the Intermediate Sandstone (Iss) aquitard is 8.4 E-09 m/s based on field measurements. The proponent further assumes a 10:1 anisotropy ratio for the unit (Appendix 7-A, sec. 3.5.1) such that its estimated vertical conductivity is 8.4 E- 10 m/s. Based on this information, structural geology and groundwater quality data, the proponent concludes that the connectivity between the Upper sandstone aquifer and the Intermediate Sandstone aquifer (sic) is limited (EIS sec. 7.3.3.3; Appendix 7-A, sec. 4.4). While acknowledging the paucity of conductivity data and the proponent's attempt to mitigate this by leveraging collateral information on fracture frequency and clay content (Appendix 7-A, sec. 3.3.1), NRCan considers that the hydraulic conductivity assigned to the Iss aquitard is unrealistically low and inconsistent with the following lines of evidence: a) The conductivity value for the Iss is based on the geometric mean of 18 field measurements, 12 of which are from the same borehole (WR-695) located in the Gryphon zone, beyond the domain of the numerical model (Appendix 7-A, Appendix C, Table C-1). If the conductivity data were weighted equally, with one value per borehole, the geometric mean would be approximately 1.5 E-07 m/s, or two orders of magnitude higher; b) The proponent notes that vertical fracture or fault zones that hydraulically connect Upper and Lower aquifer systems are present throughout the Athabasca Basin including in the Phoenix area (EIS, sec. 7.3.3.2.2; Appendix 7-A, sec.3.8.1); c) The proponent notes that groundwater chemistry data (major ions) corroborate the presence of structurally controlled vertical hydraulic connections between the Upper and Lower aquifer systems (EIS, sec. 7.3.3.2.2, sec. 7.3.3.3; Appendix 7-A, 4.3.3); d) Groundwater chemistry data (Appendix 7-A, sec. 4.2, Table 4-1) also indicate the presence of detectable levels of "bomb" tritium (indicating recharge waters < 50 years old) in the Lower Sandstone Aquifer (GWR-025, GWR-008, GWR-033) and in the Iss (GWR-009, GWR-034), outside the area of U mineralization. This is also evidence of vertical hydraulic connection through the Iss. In summary, whereas the proponent conceptualizes the Iss as a very low-permeability unit with localized vertical hydraulic connection (WS Shear), NRCan interprets the Iss as a "leaky" aquitard with pervasive fracture-controlled and much higher vertical hydraulic conductivity.</p> <p>Rationale: The significance of NRCan's alternative interpretation of the Iss hydrostratigraphic unit is that deep groundwaters, including mining-impacted waters, may represent a greater proportion of baseflow discharge to Whitefish Lake than the 1% currently estimated</p> | In the "Parameter Uncertainty Assessment" for the numerical groundwater flow model (Appendix 7-C, sec. 2.8), NRCan requests that the proponent develop a calibrated numerical model with an alternate conceptualization of the Intermediate sandstone as a "leaky" aquitard with a horizontal hydraulic conductivity on the order of 1 E-07 m/s and a much lower anisotropy ratio. This should involve modifying the model lateral boundary conditions to allow for groundwater inflow/outflow across the entire thickness of the Athabasca Sandstone Group rather than just the Lower Sandstone aquifer. | <p>Denison acknowledges the IR from the review and based on feedback from the assessment team who conducted the hydrogeological modelling for the EA the following is provided in response.</p> <p>The viewpoint from the third-party assessment team does not align with the conceptual model proposed by the reviewer; however, an alternative calibrated groundwater flow model with a hydraulic conductivity of 1.0E-7 for the Intermediate Sandstone unit has been developed. This higher hydraulic conductivity scenario allows more water to flow laterally through the Intermediate Sandstone unit. Specified head values applied at the model boundaries are employed, such that the amount of water entering / leaving the domain is only limited by the simulated transmissivity and hydraulic gradients. Under this revised calibration, the simulated flow to Whitefish Lake from the Lower Sandstone aquifer would be 0.57% (i.e., < 1%, similar to the model presented in the draft EIS) of the discharge to Whitefish Lake, and the simulated travel time from the ore zone to Whitefish Lake is approximately 250 years. The results of this revised calibrated scenario, with a hydraulic conductivity of 1.E-07 within the Intermediate Sandstone unit, are very similar to those obtained in the base calibrated model. This is the case because the higher flow through the Intermediate Sandstone unit migrates laterally until it reaches the desilicified zone, where it merges with flow from the Lower Sandstone Aquifer travelling upward toward Whitefish Lake. The additional flow contribution through the ISS contemplated by the reviewer would enhance dilution within the desilicified zone and thereby reduce concentrations reaching Whitefish Lake.</p> | No updates to the EIS in response to this IR. |

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| | | | | in the proponent's groundwater flow model (EIS, sec. 7.4.2.1, p.7-51; Appendix 7-C, sec. 2.6.3). | | | |
| IR-56 | CNSC | Geology and Groundwater | Section 7.3.3.2 | <p>Context: It is stated in Section 7.3.3.2 (p. 7-37, main EIS report) that “Exploration boreholes drilled in the Phoenix area, where left unplugged, have the potential to provide preferential flow paths between the Overburden and Upper and Lower Sandstone Aquifers. Exploration holes were reportedly grouted approximately 10 to 20 m above and below the ore zone, resulting in open holes remaining throughout the overlying materials. These portions of the open holes may act as open conduits for groundwater flow through the 400 m of Athabasca Group Sandstone.”</p> <p>Rationale: It is not clear why the exploration boreholes have not been decommissioned.</p> | Please clarify why the exploration boreholes have not been decommissioned and the timeline to decommission the boreholes according to appropriate guidelines/procedures. If it is not decommissioned before the ISR operation, what is the potential impact of the unplugged boreholes on the mining solution migration? | <p>All historic exploration boreholes drilled to date containing a mineralized intersection, with grades higher than 1% U3O8, have been grouted a minimum 25 m above and below the mineralized intersection. The addition of grout to these depths is within the defined depths of the hydrogeologically modelled areas from operational mining scenarios conducted to date. The extent of the mining solution migration (i.e. the mining area) for the purpose on the EA extends 50 meters above the ore zone depth.</p> <p>During Operation, select exploration boreholes will be re-utilized for narrow diameter injection wells that will be developed with monitoring devices for the determination of excursions and water levels. Exploration boreholes not selected for the use of narrow injection wells will be grouted to surface to seal off any remaining conduit. Many of the exploration boreholes previously installed through the desilicified zone that overlies the deposit have collapsed, sealing the zone and acting akin to previous and natural state of the desilicified zone itself.</p> <p>The potential impact of the open, unplugged boreholes was evaluated as part of the numerical model sensitivity simulations performed and presented in Appendix 7-C. In general, while these open boreholes have the potential to create preferential flow paths, they were not found to create a meaningful differences in the groundwater flow paths, or mass transport conditions. This is partially because the simulated groundwater gradients are downward above the ore zone where the open coreholes are most prevalent. Further east, within the desilicified zone, unplugged coreholes are interpreted to have collapsed, such that they do not represent preferential transport pathways in the future</p> | No updates to the EIS in response to this IR. |
| IR-57 | NRCan | Fish and fish habitat | Section 7.3.3.2 Appendix 7-A, sections 3.1.2 and 3.7 Appendix 7-C, section 2.5.2 | <p>Context: The proponent's conceptual model of groundwater flow in the Local Study Area (EIS, sec 7.3.3, Figure 7.3-7) involves an unconfined Upper system hosted by overburden and the Upper sandstone aquifer, and a Lower confined system hosted by the Lower Sandstone Aquifer. The Intermediate Sandstone aquitard acts as a confining unit. Vertical heads gradients are directed downwards west of the Phoenix deposit and upwards beneath surface water receptors including Whitefish Lake (EIS, sec. 7.3.3.2).</p> <p>Using head data from nested monitoring wells (Appendix 7-A, sec. 3.1.2, Table 3-1) the proponent calculates upward gradients in cluster WR-607, between the Lower Sandstone aquifer and the Upper Sandstone aquifer. In cluster LA-5, an upward gradient is calculated between the Upper Sandstone and the overburden unit (Appendix 7-A, Table 3-5). In areas west and south-west of the Phoenix deposit, groundwater is estimated to flow downward under a vertical gradient of approximately 0.015 m/m (Appendix 7-A, p.3-15).</p> <p>Rationale: In NRCan's opinion, the proponent's interpretation of vertical head gradients in the LSA is not fully accurate. For the "Up-Gradient" monitoring well cluster, the tabulated head data (Appendix 7-A, Table 3-1) and data logger hydrographs (Appendix 7-A, Appendix B) indicate a downward gradient (0.014 m/m) from the overburden unit to the Intermediate Sandstone and an upward gradient (0.056 m/m) from the Lower Sandstone to the Intermediate Sandstone. Head data from the "NW" monitoring well cluster indicate a similar pattern of downward (0.016 m/m) and upward (0.014 m/m) gradients converging in the Intermediate Sandstone. In the "Downgradient" and "SE" monitoring well clusters, head observations and data logger hydrographs indicate downward gradients from the shallow aquifer system but essentially equal heads in the Intermediate and Lower Sandstones. This more complex picture of groundwater flow systems in the LSA does not appear to have been captured in the proponent's conceptual model. Given the importance of the baseline hydrogeological regime for predicting the transport and fate of COPCs in the post-decommissioning period, the proponent needs to demonstrate that the numerical groundwater flow model accounts for observed vertical head gradients.</p> | In section 2.5.2 of Appendix 7-C (Calibration Results), the proponent should demonstrate that the numerical groundwater flow model reproduces quantitatively or at least qualitatively the vertical head gradients calculated from observations in the nested monitoring well clusters (Appendix 7-A, Table 3-1). | Please see response in Attachment IR-57. | In the final EIS, Section 2.5.2 of Appendix 7-C will be updated to include information provided in Attachment IR-57. |
| IR-58 | ECCC | Fish and fish habitat | Section 7.3.2.4, Ore Deposit | <p>Context: The Proponent states that the Phoenix ore bodies are long and narrow (approximately 25 to 50 m wide) and are located within or near a graphitic pelite unit. Hydrothermal alteration associated with the ore zone is a discontinuous envelope of clay alteration and a sulphide-cemented rock zone that extends into the overlying sandstone and the underlying basement (Figure 7.3-3). This black, clay-rich zone is approximately 3 m thick on average and locally hydraulically isolates the ore zone from the overlying sandstones and underlying weathered basement rock.</p> <p>Rationale: As indicated by the Proponent, a 3 m black clay rich zone isolates the ore zone from the overlying sandstones and underlying weathered basement rock. It is, however, unclear whether this discontinuous clay layer will prevent downward migration of uranium-bearing solution into the Paleo-weathered basement rock or horizontal flow along the unconformity surface to escape into the</p> | <p>1. Verify that there will be no downward migration of mining solution into the paleo- weathered basement rock or that there is no flow along the unconformity surface.</p> <p>2. If downward migration of the mining solution occurs, explain how it will be mitigated.</p> | <p>1. A portion of the paleoweathered zone is comprised of high grade mineralization of the deposit and will be subject to mining activities controlled by the inward hydraulic gradient induced by pumping. As is discussed in Section 4.1 of Appendix 7-C, potential exists for downward migration of the solubility enhancing fluids used during mining operation and the UBS because of the density and specific gravity of these fluids (greater than that of sea water). However, the downward migration will be limited by the competent unaltered basement rocks below the paleoweathered zone, which is characterized as having very low hydraulic conductivity (Section 2.3 of Appendix 7-C).</p> <p>2. As discussed above, some migration of mining fluids in the paleoweathered zone is expected and groundwater quality in this zone remediated post-mining. The entire thickness of the paleoweathered zone beneath the ore zone was included in the numerical model (Appendix 7-C) as having water quality represented by the "Restored Solution" (Figure 4-1 of Appendix 7-C). That assumption is inherent in the conservative source zone applied to all mass transport simulations. Further conservatism within the numerical model was exclusion of low permeability natural barrier zones (i.e., clays) identified in the geological model for the</p> | No updates to the EIS in response to this IR. |

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| | | | | environment. Escape of uranium-bearing solution into the environment will have a negative effect on the receiving environment. | | ore zone - meaning, it was not assumed that these zones would serve to mitigate against migration of mining fluids into the paleoweathered zone. If downward migration of the mining solution were to occur this would be under an upset condition where monitoring wells placed below the mining horizon would collect these solutions via installed groundwater pumps preventing further migration away from the mining horizon. | |
| IR-59 | CNSC | Fish and fish habitat | Section 7.4 Assessment of Project-related Effects, Figure 7.4-2 (p. 7-56) | Context: Figure 7.4-2: Simulated Change in Groundwater Discharge and Flow through Whitefish Lake Over the Life of the Project appears to be missing information. Rationale: Legend is included below the image, but the Legend box is blank. The green dotted line is not represented by anything in the legend. | Please update this Figure to ensure it is complete, and that features are properly indicated in the legend. | Acknowledged. Figure 7-4.2 in the EIS and Figure 2-18 of Appendix 7-C will be replaced for clarity. | The updated figure provided in Attachment IR-59 will replace Figure 7-4.2 in the final EIS and Figure 2-18 of Appendix 7-C. |
| IR-60 | NRCan | Fish and fish habitat | Section 7.4.2.1 Appendix 7-C, section 5.2.1, Appendix B | Context: In the discussion of the limitations of the numerical groundwater flow model (Appendix 7-C, sec. 5.2.1), the proponent invokes the well known modeling principles of "Occam's razor" and "Parsimony" which guided the parametrization of hydraulic conductivity in model layers. The proponent states that hydrogeologic property values were applied uniformly for, among other units, the Lower Sandstone aquifer beyond the immediate area of desilicified materials. However, in the layer parametrization for the Lower Sandstone aquifer (Appendix 7-C, Appendix B, Figure B-5), NRCan notes a large zone of enhanced conductivity (1 E-05 m/s) extending south from Kratchkowsky Lake, which contrasts with the value (2 E-07 m/s) assigned elsewhere outside the desilicified zone. NRCan also notes the extremely detailed parametrization of hydraulic conductivity in the clay cap overlying the ore zone where borehole control is dense (Appendix 7-C, Appendix B, Figure B-6). Rationale: In NRCan's opinion, these model features appear to violate the principle of "Parsimony" and require greater justification supported by field observations. | NRCan requests that the proponent provide justification based on field evidence for the multiple hydraulic conductivity zones assigned to the Lower Sandstone aquifer and the clay cap above the ore zone. | We reaffirm that the hydraulic conductivity zones applied are consistent with the principles of parsimony and Occam's Razor. The hydraulic conductivity along the western portion of the model area within the Lower Sandstone Aquifer reflects the identified fault zone discussed in IR-53. This zone was added to better represent observed water levels within that portion of the model area. Further, this high hydraulic conductivity zone permits additional water inflow into the Lower Sandstone Aquifer than would otherwise exist if a lower hydraulic conductivity zone were applied here, resulting in conservative modelling predictions of flow through the Lower Sandstone Aquifer (which is consistent with the requests in IR-55). The high-resolution representation of the clay cap zones is consistent with other contemporaneous work within the ore zone completed by Petrotek (2020) and subsequently by Denison. This resolution of parameter values is consistent with the high data density contained at the Phoenix ore body. Extensive hydrogeologic core logging and permeameter sampling were conducted on over 3,000 mineralized and lower sandstone drill cores to demonstrate and identify the spatial distribution of the various hydrogeologic units contained within the ore zone itself, for purposes of optimizing mining scenarios and flow pathways for recovery. Each hydrogeological unit has specific hydraulic conductivity values based on this extensive test work in addition to various field packer and pump/injection test work. | No updates to the EIS in response to this IR. |
| IR-61 | CNSC | Geology and Groundwater | Section 7.4.2 | Context: There is no discussion of potential induced seismicity from mining processes. Rationale: Induced seismicity may lead to a loss of process as identified for natural seismicity. | Please provide information on the potential mining-induced seismicity. | Natural seismic activity in Northern Saskatchewan is quite rare with no significant events in recorded history (refer to draft EIS Section 15.2 Seismic Events). Compared to conventional mining techniques, the potential for mining-induced seismicity from ISR mining is quite low. Potential for mining-induced events for the Project could be postulated to occur as the result of a few sources: 1. collapse of cavity voids from leaching, 2. hydraulic fracturing, and, 3. use of permeability enhancement techniques, and each is discussed further below. <ol style="list-style-type: none">Collapse of cavity voids. To clarify, the portion of the deposit being mined is never truly a void (as in a large empty underground cavern); rather, what remains will be a honeycomb textured environment with water filled interstices. The mined area is filled with a fluid at all times, whether it be a mining solution, groundwater, or the neutralizing solution. This is different from a more traditional underground operation such as Cigar Lake where there is physical excavation of the orebody, leaving a temporary air-filled space. Although the uranium ore is high-grade by global standards it is not entirely massive in nature. As such, the uranium will be leached in a 'honeycomb' texture leaving behind a structure of partial intact rock mass with the remaining area being filled by fluid. This retains the pressure balance of the mining zone with the adjacent water-saturated rock masses. In terms of void space creation and collapse of the overlying strata, modelling has demonstrated that only 0.05% by volume of desilicified material immediately overlies the ore zone and would be subject to collapse (RESPEC 2023; included here as Attachment IR-21). This low volume and percentage is determined to not be of significant seismic concern.Hydraulic fracturing. Draft EIS Section 2.2.1.4.2 Wellfield Operation provides a comparison of ISR mining pressures to conventional fracking pressures used in the oil and gas industry. Conventional fracking pressures used in the oil and gas industry can vary; however, common pressures to induce fracturing can range up to 15,000 psi and require injection of fracking fluids of up to 16,000 liter per minute over periods of three to four days. Fracking fluids are comprised of a slurry of water, proppant (generally silica sand), and chemical additives to support and maintain the open fracture system after fracking is conducted. Conversely, ISR mining for the Project is planned at nominal pressures of 100 psi, intermittent pressures of up to 250 psi, and average flow rates of 30 liters per minute within a recovery well. The ISR mining method proposed for the Project is markedly different than fracking. For example, looking at intermittent pressures alone, ISR pressures are anticipated to be 60 times lower than fracking pressures.Permeability enhancement techniques. Draft EIS Section 2.2.1.4.3 Permeability Enhancement outlines the three types of techniques being considered for the Project: mechanical, Propellant, and hydraulic options. Propellants are classified as a low hazard explosive (S.1 special-purpose explosives, low hazard explosives, per Explosive Regulations, section 36). Propellants technically do not explode (like classic mine explosives which detonate) but rather burn through a process called deflagration. Deflagration means the material burns slower than the speed of sound, thus no shock waves are generated. Propellant permeability enhancement methods reach injection pressures of up to 8,000 psi and are near instantaneous over periods of milli seconds. Neither ISR mining or permeability enhancement is expected to produce mining-induced seismicity. | No updates to the EIS in response to this IR. |

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| IR-62 | ECCC | Fish and fish habitat | Section 7.4.2, Potential Project-related Effects | <p>Context: The Proponent indicates that the mining area includes:</p> <ul style="list-style-type: none"> the ‘active mining area’, which is the target ore zone; a zone extending between 11 and 13 m above the active mining area that represents the maximum vertical height over which the injected mining fluids will migrate upwards from the ore zone during active mining; and a zone extending 50 m vertically upwards from the active mining area (that incorporates the active mining area and the 11 to 13 m zone defined in the previous bullet) that was selected to account for potential upset conditions. <p>Rationale: It is not clear to ECCC how the Proponent would be able to limit the mining solution migration within 11 & 13 m above active mining as the maximum vertical height over which the injected mining fluid will migrate. As the mining fluid will be injected under pressure into zones with possible presence of fractures, the pressure may also cause additional fractures and given that the solution is warm/hot will possibly dissolve the other cementing material in the sandstone above, making it difficult to accurately predict where the solution will migrate to.</p> | <p>1. Explain plans to limit the upward migration of mining solution into the overlying layer to 11 and 13m above the ore zone.</p> <p>2. Explain what impacts will occur if the mining solution migrates beyond the predicted height.</p> | <p>1. More detail on engineered controls for containment of mining solution is provided in the draft EIS, Section 2.2.1.4.2 Wellfield Operation; see also the response to IR-08. Continuous monitoring of pump and injection wells will confirm containment of mining solutions to the lower 11 to 13 m above the ore zone during active operations.</p> <p>2. Additional monitoring wells located above this elevation will be installed to make sure this depth is achieved. These monitoring wells can be retrofitted to be pumping wells if needed to provide additional control of mining solutions. Denison has established a conservative mining area of 50 m above the ore zone in the EIS, which will be remediated to acceptable criteria post mining. Additionally, the freeze wall will be in place throughout Operations and will provide horizontal containment of solutions.</p> | No updates to the EIS in response to this IR. |
| IR-63 | CNSC | Geology and groundwater | Section 7.4.2.1, Potential Effect #1: Groundwater Quantity – Construction to Decommissioning Appendix 7-C, Section 2.7, Groundwater Conditions During Mine Operations | <p>Context: The numerical groundwater model described was calibrated to observed water level and stream baseflow data. Table 7.4-3 in the EIS indicates that Denison recognizes the potential for freeze wall operation to impact groundwater quantity. To simulate this impact, the model was adapted to reduce recharge (to 50%) within the freeze wall area, reduce hydraulic conductivity associated with the vertical freeze walls, and simulate pumping within the freeze wall area. Recovery from pumping and effects on discharge to groundwater discharge to Whitefish Lake are discussed in the potential effects section.</p> <p>Rationale: Although this assessment considered drawdown of the water table and discharge to Whitefish Lake, the discussion did not address the potential effects of operating the freeze wall on the local and semi-regional groundwater regimes. What would the pathway be for groundwater to pass around the freeze wall? What is the basis for the parameters selected, e.g., 50% recharge and lower hydraulic conductivity for freeze well? These factors need to be considered when evaluating the potential impacts of freeze well operations on groundwater flow conditions and corresponding receptors.</p> | Please provide a more fulsome discussion on the impact of freeze wall operations on local and semi-regional groundwater regimes and potential receptors. Please provide the rationale for assumptions made for key model parameters (e.g., selection of 50% recharge, hydraulic conductivity value used to represent freeze wall). In addition, please discuss the potential pathways for groundwater flow around the freeze wall, complete with figures demonstrating these pathways. | See response in Attachment IR-63. | The information provided in Attachment IR-63 will be attached to Appendix 7-C in the final EIS. |
| IR-64 | ECCC CNSC | Fish and fish habitat | Section: 7.4.2.2, Potential Effect #2: Terrain Morphology and Stability – Operation Appendix 7-A, Appendix K (p. 12) | <p>Context: The Proponent stated that the geological assessment predicted maximum vertical displacement in altered sandstone immediately above the mining area (17.5 cm). A very minor change in elevation at ground surface (of less than 7.5 cm) was predicted within a discrete and localized area overlying the ore body. The modelling work is considered to provide a worst-case bounding scenario. If subsidence were to occur over the lifetime of the Project, or in the years following mining, the extent of vertical displacement is not expected to exceed that predicted in the modelling, which is based on an assumed volume extraction.</p> <p>Rationale: ECCC notes that the thickness of the ore zone has an average thickness of 5 m with a range of 2 to 17 m, and is 25-50 m wide and that the overburden rock above the ore zone measures about 400 m. Therefore, it is not clear how the Proponent determined that the surface expression of a subsidence on the surface if it occurs will be limited to 7.5 cm and localized. A subsidence greater than 7.5 cm, implies that the void in the ore zone will be narrower, and will affect the amount of water migrating through the zone.</p> <p>It was the recommendation of the consultant who conducted the work in Appendix K that more accurate material properties should be used for future modelling.</p> | <p>Explain:</p> <ul style="list-style-type: none"> Will this be revisited with updated data based on extraction feasibility results? How will the surface expression of a subsidence will be limited to 7.5 cm and localized? <p>Suggestions for mitigation and follow-up measures: ECCC recommends that the Proponent consider implementing remediation measures immediately after mining to prevent subsidence from occurring in the first place.</p> | Subsequent to the filing of the draft EIS, Denison undertook additional modelling with refined, more granular inputs including subunits within the altered zone (RESPEC 2023; included as Attachment IR-21) and the surface subsidence has been reduced from 7.5 cm to 2.4 to 2.8 mm. Denison is not anticipating the need for remediation measures with the surface subsidence being negligible within the context of changes in terrain as it relates to decommissioning objectives. | No updates to the EIS in response to this IR. |
| IR-65 | CNSC | Geology and Groundwater | Section 7.4.2.2 | <p>Context: It is stated the maximum subsidence is 7.5cm based on modeling with an assumed volume extraction. Has subsidence from dewatering/pumping and from lack of inflow of groundwater due to freeze wall been considered?</p> <p>Rationale: Surface facilities and wells may be impacted if there is unaccounted for subsidence.</p> | Please provide additional details for any dewatering/pumping induced subsidence. | <p>No pumping and/or dewatering subsidence is anticipated to occur as the fluid balance will remain relatively stable during Operation with no additional stresses placed on the mining horizon. Refer also to response to IR-07.</p> <p>To clarify, the portion of the deposit being mined is never truly a void and what remains after mining will be a honeycomb texture with water-filled interstices. The mined area is filled with a fluid at all times, whether it be a mining solution, groundwater, or the neutralizing solution. This is different from a more traditional underground operation such as Cigar Lake, where there is physical excavation of the orebody, leaving a temporary air-filled space. Although the uranium ore is high-grade by global standards it is not entirely massive in nature. As such, the uranium will be leached in a 'honeycomb' texture leaving behind a structure of partial intact rock mass with the remaining area being filled by fluid. This retains the pressure balance of the mining zone with the adjacent water-saturated rock masses.</p> | No updates to the EIS in response to this IR. |

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| | | | | | | <p>Although the above provides context on the absence of true, air-filled voids remaining post-mining, the risk of subsidence has been assessed appropriately (included in the draft EIS as Appendix K to Appendix 7-C; see also draft EIS Section 7 Geology Valued Component - Terrain Morphology and Stability Key Indicator and draft EIS Section 9 Terrain Valued Component - Terrain Morphology Key Indicator and Terrain Stability Key Indicator). The analysis shows there is negligible risk of subsistence and the magnitude of subsistence, if it were to occur, is the range of 7.5 cm at surface.</p> <p>Subsequent to the filing of the draft EIS, Denison undertook additional modelling with refined, more granular inputs including consideration of subunits within the altered zone (RESPEC 2023). With this more refined analysis, the potential surface subsidence has been reduced from 7.5 cm to 2.4 to 2.8 mm (RESPEC 2023 is included here as Attachment: IR-21).</p> | |
| IR-66 | CNSC | Geology and Groundwater | Section 7, Table 7.5-1, Row 1, Column 6 | <p>Context: Column 6 in Table 7.5-1 indicates the mitigation measures for a valued component. For Row 1, Geology, there is no description of mitigation measures but only that contingency plans will be developed if based on monitoring.</p> <p>Rationale: Subsidence may impact wells and surface infrastructure.</p> | <p>Please provide additional details on monitoring and contingency plans related to the geological environment (e.g., subsidence), including triggers for implementing such plans.</p> | <p>Please see response to IR-64 for an updated analysis of surface subsidence (2.4 to 2.8 mm at surface; RESPEC 2023 included as Attachment IR-21). The predicted changes at surface related to subsidence is beyond the range of current Lidar technology with resolution at 10 cm. As such, Denison believes the level of risk for subsidence is negligible and that monitoring and contingency plans are commensurate with this low level of risk.</p> <p>Injection and recovery wells will be collared at surface and surveyed regularly to monitor for any changes in collar height over time. This monitoring will be added to Section 7 of final EIS for the Geology VC.</p> | <p>Update to Table 7.5-1 in Section 7 of the final EIS to note that subsidence estimates are in the mm range and mitigation measures are not required. Injection and recovery well collar height monitoring will also be added to Section 7 of the final EIS.</p> |
| IR-67 | CNSC | Geology and groundwater | Section 7.6.2.1 (Remediation Objectives) | <p>Context: Metallurgical testing, including batch reaction, coreflood testing and column tests are mentioned frequently throughout Sections 2 and 7 of the EIS. Outside of the composition of restored solutions from coreflood tests #2B and 3C, results from these various tests are not reported in the EIS or any associated Appendices.</p> <p>Rationale: The results from metallurgical testing are important to a number of items discussed in the EIS, including (but not limited to): evolution of hydrochemistry during remediation, source of salts in Lower Sandstone Aquifer porewaters, process plans, industrial wastewater treatment, estimating composition and volume of process precipitates, and composition of mining fluids and leachate. In particular, the EIS posits that mining area decommissioning objectives are achievable based on metallurgical testing and provides these objectives in Table 2.3-3. CNSC staff need to understand the specifics of this metallurgical testing, given its importance for the development and justification for mining and remediation activities. Denison must also provide information demonstrating that the proposed restoration actions and remediation targets are As Low As Reasonably Achievable (ALARA).</p> | <p>1. Please provide a summary of the results and the analysis of results of the metallurgical tests within the EIS, or provide the technical supporting document with this information, and ensure the documentation is appropriately referenced in the EIS. This should include sample information for cores (e.g., mineralogy, location, U content, depth), test conditions (e.g., duration, # of iterations, column length, flow rate, temperature, pressure, sample frequency, influent/effluent composition), as well as results and how they are pertinent to the development of ISR activities.</p> <p>2. Please provide further clarification/justification on how results from two singular coreflood tests (i.e., Coreflood #2B and Coreflood #3C) can justify large-scale remediation activities and targets following solution mining.</p> <p>3. Please provide material demonstrating that the proposed restoration actions and remediation targets are ALARA.</p> | <p>Please see response to Attachment IR-20, IR-67, IR-69.</p> | <p>No updates to the EIS in response to this IR.</p> |
| IR-68 | NRCan | Fish and fish habitat | Section 7.6.2.2.3 Appendix 7-C, sections 3.3, 4.1, 4.4.4 and 4.7 | <p>Context: Sources terms for the COPCs considered in 3D reactive transport modeling are given by the composition of "Restoration Solution #1", which the proponent believes is representative of groundwater quality in the ore zone after remediation at decommissioning (Appendix 7-C, sec. 3.3, Table 3-5; sec 4.0). The proponent considers COPC source terms as "initial conditions" for groundwater quality in the ore zone at the start of the model simulation period. During the simulation, no additional mass of COPCs is transferred to groundwater in the ore zone.</p> <p>Rationale: In NRCan's opinion, this representation of COPC sources is not conservative as it fails to account for various long-term slow mass release processes. These processes could include redissolution of secondary phases formed during ISR mining (e.g., radium-bearing gypsum or barite, jarosite, alunite) and migration of unrecovered lixiviant or restored solution from low-permeability regions or stagnant zones that were not fully swept during mining or remediation. NRCan notes that scenario #2 in the proponent's transport prediction uncertainty analysis (Appendix 7-C, sec. 4.7) does consider an extended source release period for protons (desorption from chlorite). However, in NRCan's opinion, additional modeling scenarios should consider extended-release periods for other COPCs as well.</p> | <p>NRCan requests that the proponent's reactive transport prediction uncertainty analysis (Appendix 7-C, sec. 4.7) consider extended source release periods for additional COPCs.</p> | <p>Please see response in Attachment IR-68, IR-94, IR-97.</p> | <p>No updates to the EIS in response to this IR.</p> |
| IR-69 | NRCan | Fish and fish habitat | Section 7.6.2.2.3 Appendix 7-C, sections 3.1 and 3.2 | <p>Context: For hydrogeological and geochemical assessments in support of ISR projects, the proponent identifies two aspects of primary importance (Appendix 7-C, sec. 3.1). These are a) groundwater remediation (Appendix 7-C, sec. 3.1.1); and b) the assimilative capacity of host rocks downgradient from the ore zone (Appendix 7-C, sec. 3.1.2). According to the proponent, the objective of groundwater remediation at decommissioning is to achieve water quality in the mined zone that does not pose a risk to receptors at the point of exposure. Assimilative capacity refers to the ability of groundwater-rock reactions to naturally sequester or attenuate COPCs migrating from the ore zone during the post-decommissioning period.</p> <p>Rationale: However, in NRCan's opinion, the proponent has neglected to mention the most fundamental aspect for hydrogeological and geochemical assessments in support of ISR projects. That aspect is the</p> | <p>NRCan requests that the proponent provide a detailed description of the expected mineralogical and hydrogeochemical changes occurring within the ore and barrier zones as a result of the injection of acidic lixiviant.</p> | <p>Please see response to Attachment IR-20, IR-67, IR-69.</p> | <p>No updates to the EIS in response to this IR.</p> |

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| | | | | choice of ISR lixiviant and its effects on the mineralogy and hydrogeochemistry of the ore zone during mining operations. The proponent provides information on the pre-mining mineralogy (Appendix 7-C, sec. 3.2.1) and hydrogeochemistry (Appendix 7-C, sec. 3.2.2) but no information on their expected changes as a result of ISR mining. This Information is important when considering source terms in reactive transport modeling. | | | |
| IR-70 | CNSC ECCC | Fish and fish habitat Geology and groundwater | Section 7.6.2.2.3, Evaluation of Geochemical Reactive Transport Appendix 7-C, Section 4.4.2, Sub-Domain Model Hydrogeologic Parameters | <p>Context: The EIS indicates that “changes to hydrogeological conditions within the mining area were considered during development of the 3D sub-domain model. Dissolution of ore within the active mining area is expected to enhance ... hydraulic conductivity”.</p> <p>In Section 4.7 (Prediction Uncertainty Analysis), predictive uncertainty scenarios are provided. For scenario 7, the hydraulic conductivity (K) of the ore zone was increased even further than initial model assumptions. The value used is not indicated in the text.</p> <p>Rationale: A hydraulic conductivity (K) value of 5x10⁻⁶ m/s, which is a factor of five (5) greater than the value assumed for the ore zone, was applied in the base case numerical model to account for this impact. It is unclear from the information provided in Section 7 of the EIS or associated Appendices what the basis of this five-fold increase in K value for the ore zone, and how this was judged to be conservative, or to adequately represent anticipated conditions. This parameter is important as it impacts the rate at which contaminants flow from the ore zone following mining activities. Due to of the dissolution of uranium, larger voids will likely be created, and the hydraulic conductivity may increase by more than a factor of 5 compared to pre-project material. Therefore, a variation of at least one or two orders of magnitude for hydraulic conductivity should be used in the sensitivity analysis. Having a representative, conservative value for hydraulic conductivity is essential for understanding groundwater as a pathway of contaminant transport to Whitefish Lake and potential impacts to aquatic life. The K value used in the predictive uncertainty analysis should be reported.</p> | Please provide a more fulsome discussion on the anticipated impacts of mining on permeability of the ore zone due to mining activities in the EIS or in an Appendix. The value used for scenario 7 of the prediction uncertainty analysis should be provided. The scientific rationale for the use of a K value only a factor of five greater than the value assumed for the ore zone in the 3D regional model should be provided, alternatively, provide simulation results for a more conservative scenario. Specifically, this discussion should address the potential effects of mechanical permeability enhancement with tools, dissolution of ore, gas plugging, chemical plugging, plugging due to ion exchange, and mechanical plugging. | <p>Based on coreflood and column tests performed in the laboratory, a modest increase in the flow rate through the core was observed post-leaching. This is described in more detail in the response to IR-69. Based on the available information, the hydraulic conductivity in the ore zone was raised to be a uniform value of 2E-07 m/s to be represent the effective dissolution of any clay cap materials.</p> <p>However, the post-mining conductivity of the ore zone is not important to the fate and transport of the COPCs in the restored solution towards Whitefish Lake, as it represents a small portion of the flow path. Key parameters controlling transport rates to Whitefish Lake were the hydraulic conductivity of the lower sediments and the desilicified zone. Scenarios 5, 6, and 7 of the parameter uncertainty assessment presented in Section 4.7, Appendix 7-C, systematically explore the highest parameter values consistent with the observed data used for model calibration. As indicated by these scenarios, the geochemical assimilation capacity outweighs the uncertainty in hydraulic conductivity values.</p> | No updates to the EIS in response to this IR. |
| IR-71 | CNSC | Geology and groundwater | Section 7.7.1, Climate Change Considerations | <p>Context: The report states that in a scenario of increased precipitation and decreased/constant evaporation, climate change may result in greater flows in the Wheeler River drainage system and increased recharge to groundwater, which would correspond to increased groundwater discharge to Whitefish Lake. Additionally, it is also stated that climate change was evaluated qualitatively.</p> <p>Rationale: It is not clear why the impacts of increased evapotranspiration associated with higher average temperatures were not considered, even though these are likely outcomes of temperature increases due to climate change in areas such as the Prairies (Climate trends and projections - Canada.ca). It is also not clear why climate change considerations were not assessed quantitatively.</p> | Please provide a discussion on potential effects of increased evapotranspiration, as well as decreased groundwater recharge for the study area. Provide justification for performing qualitative assessment of impacts of climate change rather than a quantitative one. | <p>The experience of the Project team regarding studies of climate change and the impacts on groundwater at other sites generally shows a range of potential positive and offsetting negative impacts. While warmer temperatures will lead to extended periods of summer drought conditions extending into early fall, warmer winters are predicted as well, resulting in less snowpack accumulation, more frequent snowmelt events, and more frequent rainfall during periods when evapotranspiration is negligible. These warmer winter conditions are often simulated to produce enhanced groundwater recharge during late fall, winter, and early spring conditions. In particular, the lack of enhanced snowpack is simulated to result in less severe spring run-off conditions, indicating that more of the winter precipitation that falls will infiltrate. Overall, this is anticipated to result in enhanced groundwater recharge in the mid- to late-century periods.</p> <p>If, however, lower groundwater recharge was to result from climate change, it would reduce the groundwater driving force for mass transport of mining related fluids, and reduce mass loading to receiving water bodies such as Whitefish Lake. In other words, lower groundwater recharge resulting from higher evapotranspiration would result in slower mass transport to the receiving water bodies, reducing the risk of exposure.</p> | No updates to the EIS in response to this IR |
| IR-72 | CNSC | Geology and groundwater | Section 7.8.2, Groundwater Monitoring | <p>Context: Monitoring seems to consider COPCs from surface facilities, and excursion of pumped mine fluid in the Lower Sandstone Aquifer. There does not appear any discussion on how the proposed monitoring program considers potential excursions of brine from freeze wells.</p> <p>Rationale: It is unclear how potential excursions of brine from freeze wells will be monitored. Would this be through the fiber optic cables installed within the freeze well network? Or would it be achieved in the monitoring well clusters? If this is the case, how would an excursion of brine from a freeze well be differentiated from an excursion of mining solution?</p> | Please provide further information regarding how potential excursions of brine from freeze wells will be monitored as part of the proposed groundwater monitoring program. | <p>Loss of freezing to the freeze wall is considered an accident and malfunction, and highly unlikely, although if it occurs, will be signaled earlier by operational monitoring than through monitoring of groundwater quality. Details of the monitoring of the integrity of the freeze wall are provided in IR-51 and include ground temperature monitoring achieved through a series of continuous fiberoptic temperature and pressure wells from surface to the depth of impermeable basement rock below the unconformity. Such monitoring wells/systems will be installed on both the ore (inside) and non-ore (outside) sides of the freeze wall to confirm the thickness of frozen ground and will provide early detection of any upset conditions can be identified and addressed.</p> <p>For more information on the freeze wall integrity see attached technical response IR-10</p> <p>The groundwater monitoring network and plan, as presented in the draft EIS, was designed primarily to detect excursions of mining fluids, but also considers upset conditions related to the freeze wall. The parameters being measured in groundwater include electrical conductivity (EC) and chloride, which is a key indicator of freeze wall brine (CaCl₂), but is not expected to be a key indicator of migration of mining fluids. It is acknowledged that there was an oversight in the description of groundwater monitoring in Section 7.8.2 in not including chloride as a key performance indicator related to freeze wall upset conditions and brine migration; it has, however, been included in the Groundwater Monitoring Plan being developed for Licensing. Groundwater monitoring in wells and well clusters detailed in Figure 7-8.1 of the draft EIS (see IR-51 for updates to Figure 7-8.1) will include sampling for chloride and other key indicator parameters as well as continuous monitoring of EC (and pressure) at target hydrostratigraphic depths. The number of wells targeting the Lower Sandstone Aquifer is highest, with one monitoring well placed every 125 to 150 m distance along the freeze wall. The higher frequency of wells in this hydrostratigraphic unit reflects this as the unit where an upset condition with the freeze wall has the highest potential to allow migration of chemical constituents associated with the mining fluids laterally from the mining zone. Monitoring of</p> | <p>No updates to the EIS in response to this IR.</p> <p>The groundwater monitoring plan that will be submitted for licensing includes chloride and EC as key indicator parameters for demonstrating freeze wall integrity and, under upset conditions, delineating migration of brine in groundwater.</p> |

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| | | | | | | these key parameters will also occur in wells in the overlying hydrostratigraphic units (Intermediate Sandstone Aquitard, Upper Sandstone Aquifer and Overburden Aquifer). The groundwater monitoring network serves as secondary means to demonstrate freeze wall integrity and, under upset conditions, delineate migration of brine in groundwater. In addition, changes in pressure and temperature will be monitored continuously in vibrating wire piezometers (VWPs) surrounding the freeze wall, again every 125 to 150 m along the freeze wall, and changes would be evaluated in terms of potential to signal a freeze wall upset condition. | |
| IR-73 | CNSC | Geology and groundwater | Section 7.8.2.2, In Situ Recovery Mining Area Appendix 7-A, Appendix C | Context: The EIS recommends that a follow-up study be carried out to supplement available data on hydraulic conductivity in the Desilicified Zone (DSZ). Rationale: Appendix C (Summary of Hydraulic Testing Data and Conductivity Values) of Appendix 7A indicates that only n = 6 hydraulic conductivity values are available for the DSZ, one of which appears unreliable due to a problem with packer sealing. This is relatively few values compared to the Intermediate and Lower Sandstones. Additionally, limited hydraulic head data from boreholes screened in the DSZ is available (GWR-037, GWR-012 and GWR-014; See Figures 16/17 in Appendix 7-A) – most information appears to originate from open core holes. The information presented in its current form is insufficient considering the importance of this zone as a preferential pathway for contaminants following remediation activities, and the heterogeneity of the unit due to intense hydrothermal alteration and fracturing. Further information regarding hydrogeological properties and groundwater flow would aid greatly in validating and refining the numerical groundwater model. | As per the EIS recommendations, please provide additional information to supplement available data on hydraulic conductivity in the DSZ. Please provide the following information as part of the follow-up study: <ol style="list-style-type: none">1. identification of the vertical conductivity (KV) as there is an upward flow component (isotropy was assumed in DSZ for numerical model, this assumption must be verified)2. quantification of the horizontal and vertical flow gradients in the DSZ; and3. identification and mapping of any structures with the potential to influence groundwater flow in the DSZ, such as fracture/fault zones. | The specific information being asked for will be included in the final EIS. The detailed Groundwater Monitoring Plan will be provided to support licensing. The need for additional data within the desilicified zone is recognized and Denison has committed to gathering that data during Construction. In the absence of such data, reasonable and conservative assumptions were made regarding the continuity, hydraulic conductivity, porosity and nature of the geochemically reactive solids of the desilicified zone. Conservatism on multiples levels provides confidence that conditions are likely more favourable than simulated within the draft EIS. | Section 7.8.2.2.1 of the final EIS will be updated to include these follow-up commitments related to the desilicified zone: <ol style="list-style-type: none">1. identification of vertical conductivity;2. quantification of horizontal and vertical flow gradients; and3. identification and mapping of any structures with the potential to influence groundwater flow in the DSZ, such as fractures/fault zones. |
| IR-74 | CNSC | Geology and Groundwater | Section 7.8.2.3 | Context: It is stated in Section 7.8.2.3 (p. 7-113, main EIS report) that, at the Post-Decommissioning Stage, “Excursion are signaled by a change in water quality that is outside of that bounded by modelling predictions”, and “The model predictions spatiotemporally bound COPC concentrations in the subsurface that do not pose a risk to the receiving environment. Water quality that is outside of this bounding is defined as representing a material increase over a meaningful period compared to the predicted values either in rate of change or magnitude of change of COPC concentrations.” Rationale: It is not clear in which locations (e.g., is it in the mining area, or downstream of the mining area, or anywhere else?) the water quality is used to compare with the model predictions to determine if excursion occurs. | Please clarify in which locations the water quality data is used to compare with the model predictions to determine if excursion occurs. | These comparisons refer to conditions at the proposed monitoring well locations. | No updates to the EIS in response to this IR. |
| IR-75 | CNSC | Geology and Groundwater | Appendix 7-A, Appendix K | Context: The geomechanical study showed that the stability of the remnant ore zone and surrounding rock mass is highly sensitive to the magnitude of the material properties. To quantify this risk, the proponent conducted a sensitivity analysis to assess the influence that material properties have on the stability of key stratigraphic layers. The results of the sensitivity analyses suggest that small variations in the cohesion magnitude and angle of internal friction may significantly influence the stability of the altered sandstone, ore zone, and upper and lower clays. Rationale: By considering the potential uncertainties and risks in association with the geomechanical study and the empirically derived rock mass strength parameters and the non-site specific physical parameters of different rock formations used for the modeling, the proponent’s consultant suggests to define a laboratory testing program to address data gaps in the current geotechnical data and increase confidence in the material properties, and use more accurate material properties to model the phased extraction of uranium-enriched rock and assess the associated risks for cavity collapse and failure in the steel casing. CNSC staff concurs with these suggestions. | Please provide a plan to implement recommendations for further detailed geomechanical studies to reduce the uncertainties and risks in association with the stability and deformation analyses of ore zone rock matrix and its overlying rock mass formations and assess their impacts on the mine operation. | Additional conservative modelling scenarios were undertaken to address this (and other IRs). The modelling results show that for altered sandstone properties, both ore zone and immediately surrounding rock is marginally stable (1.0 < factor of safety [FS] < 1.25), and no-failure conditions are apparent. The predicted surface displacement remains approximately 2.4 to 2.8 mm (RESPEC 2023; included here as Attachment IR-21). For desilicified sandstone properties, failure conditions are predicted in 12.6% of the modeled desilicified sandstone volume, which is located within 20 to 35 m of the ore zone. Notable observations from modelling include that, based upon the geological model of the Phoenix deposit, the volume of the desilicified sandstone is approximately 4% of the volume of altered sandstone. Approximately 0.05% volume of altered sandstone is desilicified sandstone that is located immediately above the low-grade ore zone. The vertical displacement of the rock mass immediately above the low-grade ore zone ranges between 42 and 49 cm, and quickly reduces to the range between 0 and 7 cm at a distance of 4 – 5 meters from the low-grade ore zone (RESPEC 2023). | No updates to the EIS in response to this IR. |
| IR-76 | CNSC | Geology and Groundwater | Appendix 7-A, Appendix K (p. 12) | Context: Based on the consultant’s report, the modeled vertical strain is approaching or exceeding the tensile and compressive yield limits for steel casing. Rationale: Failure of steel casing may result in process loss or alter groundwater flow and quality. | Please provide additional details on how casing integrity will be monitored and potential effects mitigated. | The well designs and operational monitoring of the wellfield will mitigate accidental release of mining solution or UBS in the sandstone above the mining area. Each well will have double containment: mining solution will travel inside an inner casing with the outer casing acting as secondary containment for the mining fluids. Wells will be continually monitored for operational parameters such as injection pressures, injection flow rates, and recovery flow rates. This data will be transmitted to the processing plant for remote monitoring through a master control system. Through the master control system, operators will be capable of controlling pumphouse production lines remotely. Wellfield monitoring will facilitate detection of any issues with the injection and recovery wells. Specific to the steel casing for the injection and recovery wells, the conservative estimate of vertical strain in the steel casing passing through the altered sandstone provided in Appendix 7-A of the draft EIS is approaching the tensile and compressive yield limits; however, these estimates are likely an over-estimate of the actual casing strains because of the simplified, conservative assumptions used in the analysis. Altered sandstone within 25 m from the boundary of the mined excavation experiences tensile vertical strain greater than the yield limit (0.0018 strain) such that the vertical strain is relatively higher because of the presence | No updates to the EIS in response to this IR. |

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| | | | | | | <p>of upper clay above the ore zone. The altered sandstone around the mined cavity similarly experiences compressive vertical strain greater than the yield limit (–0.0018 strain) for the radial span of 25 m. Where tensile strain exceeds the yield limit there is potential for well failure. These isolated areas that have been identified from the geomechanical study will need further assessment of well designs should a well be placed in these specific sub locations within the deposit area.</p> <p>A network of monitoring wells installed within the freeze wall area will be equipped with pressure instrumentation for the determination of the vertical strain/stresses placed on the formation to do mining zone space creation. This monitoring network is designed to detect if these strains may be approaching their acceptable levels prior to failure. The injection and recovery wells will also be equipped with devices for pressure and temperature that can detect a breach in the well casing if one were to occur. As a preventative measure, annual mechanical integrity testing is conducted on the wells to ensure their containment and compliancy.</p> <p>Active monitoring will allow for operational shutdown if a scenario is approaching a failure mode.</p> | |
| IR-77 | CNSC | Geology and Groundwater | Appendix 7-A, Appendix K Results of a Geomechanical Study Investigating the Influence of Uranium Extraction on Mining-Cavity Stability for the Wheeler River Uranium Project (Revision 1) | <p>Context: It is reported in the appendix K report, within Appendix 7-A, that both phase I scoping analysis and phase II detailed strip model were investigated by numerical modelling. The analysis discussed influence on host rock stability as a result of incremental increase in volumetric extraction and graded conservative treatment of material properties.</p> <p>Rationale: As critical components of a numerical geomechanical simulation, initial and boundary conditions are crucially important to the confidence and reliability of the modelling results. However, this information is absent from the current report. In-situ principal stresses largely affects the stability of the excavated host rock, and the vertical strain and surface subsidence. This information is also absent in current form.</p> | Please provide details on the boundary and initial conditions applied on stress loading and strain for the numerical analysis. In particular, the in-situ principal stresses, which are critical to correct understanding of the excavation disturbance to the host rock, should be provided and justified as appropriate. | <p>Several numerical models were conducted for material properties for altered sandstone. Presuming that the entire altered sandstone to be unconsolidated and desilicified.</p> <p>» For 0.0 MPa cohesion value, the numerical model reached equilibrium for friction angle greater than and equal to 27 degree.</p> <p>» For 0.1 MPa cohesion value, the numerical model reached equilibrium for friction angle greater than and equal to 27 degree.</p> <p>» For 0.5 MPa cohesion value, the numerical model reached equilibrium for friction angle of 20 degree.</p> | No updates to the EIS in response to this IR. |
| IR-78 | CNSC ECCC | Fish and fish habitat Geology and groundwater | Appendix 7-A, Section 3.5.2, Porosity Appendix 7-C, Section 2.3.2.1, Porosity Values | <p>Context: This section of the report outlines the estimated/assumed effective porosity values. The only reference provided is for permeameter testing on rock core samples (Scibek, 2019).</p> <p>Additionally, the report states that “As tracer test results to estimate effective porosity were unavailable at the time of modelling, effective porosity values for the sandstone bedrock and basement units were sourced from literature values”, where literature values are effective porosities from the Cigar Lake study (AECL, 1994), situated approximately 40 km NE of Wheeler River. No on-site Wheeler River field data was used to justify this value. Additionally, in the Cigar Lake study, the authors reported that, because results from tracer tests and pumping tests were unavailable, “a practical approach was adopted, i.e., to use the porosity values obtained from laboratory measurements made on core samples, and to assume that those numbers were close to the average field kinematic (effective) porosity values”.</p> <p>Rationale: The source of reported effective porosity values is unclear from Section 3.5.2 in Appendix A (e.g. literature review, field work, laboratory work).</p> <p>In Section 2.3.2.1 of Appendix 7-C, there is a lack of clarity regarding the effective porosity data used in the numerical model. It appears that no site-specific data derived from tracer tests or pumping tests is used in the numerical model. Given the that effective porosity directly correlates to seepage velocity and by extension transport time and distribution of COPCs in groundwater, it is an important parameter. Given its relative importance for contaminant fate and transport, effective porosity should be based on field measurements, or at the very least accounted for in the sensitivity analysis.</p> | <p>1. Please provide the reference for the data substantiating the assumed effective porosity values reported in Appendix 7-A, and used in the numerical model in Appendix 7-C.</p> <p>2. Please provide information on how the site-specific effective porosity values from tracer tests or pumping tests, were considered in the numerical models. Section 2.2.1.4 of the EIS asserts that tracer tests were carried out in 2021 – this information should thus be available for improving/updating models. Alternatively, provide a sensitivity analysis for the effective porosity in the Desilicified Zone, or contaminant transport simulation results with more conservative effective porosity values.</p> | <p>Effective porosity values applied in the numerical modelling are thoroughly discussed in section 2.3.2.1 and clearly presented in Table 2-4 of Appendix 7-C.</p> <p>Effective porosity values cannot be derived from packer tests, slug tests, or pumping tests. They can be inferred from core, although core is generally a very small sample of the subsurface and is generally limited to total porosity as opposed to the interconnected pore space. In fractured rock environments, the effective porosity is a combination of the fracture porosity and the portion of the total porosity interconnected with the fractures; thus, the effective porosity tends more toward the value of the fracture porosity. Effective porosity is rigorously determined using a successful tracer test; however, the success of a field based tracer test is not easily achieved as much of the tracer volume is often not intersected by downgradient wells. Consequently, most mass transport assessments use literature values for effective porosity (Anderson, Woessner and Hunt, 2015; pg 332). Further, the tracer test performed within a small portion (i.e., 10 m) of the ore zone, was not considered to be informative of the effective porosity values needed for the entire flow path between the ore zone and Whitefish Lake.</p> <p>For this study the effective porosity values applied in the Cigar Lake 3D model were used as a guide. Literature values suggested by Anderson, Woessner and Hunt (2015) would suggest higher values of effective porosity, which would be less conservative (i.e., result in slower groundwater velocities) than applied within this study.</p> <p>Reference: Anderson. M., W. Woessner, and R. Hunt. 2015. Applied Groundwater Modelling. Elsevier Inc.</p> | No update to the EIS in response to this IR. |
| IR-79 | CNSC | Geology and groundwater | Appendix 7-A, Section 4, Groundwater Chemistry | <p>Context: Table 4-1 in Section 4 of Appendix 7-A provides groundwater monitoring results from sampling activities carried out at 26 monitoring wells in 2019, 2020, and 2021. The majority of these wells were only sampled once (n = 8) or twice (n = 17). In some cases (Lower Sandstone Aquifer/Intermediate Sandstone Aquitard), the variability of results between sampling events is quite high. Data for the Paleoweathered Zone is sparse.</p> <p>Rationale: Insufficient information is presented in the EIS and associated Appendices to concretely define baseline groundwater chemistry for the different hydrostratigraphic units. As defined in the CNSC’s Generic Guidelines for the Preparation of an EIS: “Based on the scope of the project, the EIS will present sufficiently detailed baseline information to determine the effects the project could have on the VCs and analyze those effects”. This is particularly important given certain features of the study area (i.e., presence of zones of thermal alteration/desilicification, as well as hydraulically active fractures/faults), and the need to adequately characterize baseline</p> | Please provide the statistical basis (number of samples and variability) by which “baseline” is defined and the justification that the current information is sufficient to adequately characterize groundwater quality. In order to ensure sufficient baseline information is collected, further iterations of sample collection for groundwater monitoring wells in all defined hydrostratigraphic units may be required. In addition, groundwater quality downgradient from the proposed mining area should be further characterized to assess spatial influence of alteration and hydraulically active features, | <p>The statistical basis by which baseline groundwater data has been characterized, that is sample numbers included per hydrostratigraphic unit, median, maximum and minimum values, that describe the variability of the groundwater quality data were presented as Table 4-2 of Appendix 7A and Table 3-4 of Appendix 7C to the EIS. The primary purpose of the groundwater data collected as part of the baseline program is to provide a basis for evaluating the incremental change in groundwater quality with mining activities. The magnitude of any incremental changes in groundwater quality associated with the remediated groundwater, which was the focus of the modelling, was such that deviation in water quality from baseline conditions was possible to identify.</p> <p>Supplemental groundwater monitoring will be ongoing during all phases of the Project. Denison is committed to installing additional wells, with a focus on characterizing pre-mining conditions and monitoring through and post-mining immediately surrounding the freeze wall and downgradient of the mining zone, and will be re-initiating routine sampling that captures seasonal variability in 2024. A N288.7-compliant Groundwater Monitoring Plan is being developed to support permitting and licensing and will guide the aforementioned sampling.</p> | No updates to the EIS in response to this IR. |

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| | | | | conditions in the Desilicified Zone downgradient from the proposed mining area. As an example, the US Nuclear Regulatory Commission (NRC) typically requires a minimum of four (4) quarterly samples from (i) surficial aquifers, (ii) production aquifers, (iii) overlying aquifers, and (iv) underlying aquifers to characterize preoperational groundwater quality (E. Striz, pers. comm.). | | | |
| IR-80 | CNSC | Geology and groundwater | Appendix 7-A, Section 4.3.3, Hydrochemistry by Hydrostratigraphic Unit | <p>Context: This section provides data for groundwater samples collected during the Cigar Lake analogue study and Millennium Project for further regional context. The previous studies are heavily referenced to support interpretations made for the conceptual site model.</p> <p>Rationale: The Piper Plots in Figure 26 are difficult to interpret (many overlapping circles with variegated colors), and Cigar Lake samples plot predominantly as Na/K-Cl/SO4 groundwater facies. Conversely, samples collected as part of the Phoenix Project (current), plot either as Ca-HCO3 or Ca-SO4/Cl groundwater facies. No explanation is provided for the observed hydrogeochemical differences between groundwater from the Phoenix project and the Cigar Lake analogue study/Millennium Project.</p> | Please provide additional clarity to and interpretation of Figure 26 in Appendix 7-A, including a revision to the Figure to allow for easier interpretation. This could include clear identification of end members, as well as arrows indicating proposed evolution of groundwater chemistry. Further discussion should be provided describing observed differences between groundwater chemistry at the Phoenix project compared to Millennium/Cigar Lake. | Please see response in Attachment IR-80. | Figure 26 of Appendix 7-A of the draft EIS will be separated into Figures 26 and 27, and the Figure numbering updated accordingly in that Appendix. Also, the text on pages 4.17-4.18 and 4.20 of Appendix 7-A of the draft EIS will be updated. These revised figures and text are outlined in Attachment IR-80. |
| IR-81 | CNSC | Geology and groundwater | Appendix 7-A, Section 4.3.3, Hydrochemistry by Hydrostratigraphic Unit | <p>Context: The report states in the description of hydrochemistry of the Lower Sandstone Aquifer that, “On the basis of groundwater chemistry and tritium values in that groundwater, the authors (of the Cigar Lake analogue study in 1994) concluded that the groundwater reflected a younger water component that had penetrated to depth along hydraulically active fractures/faults. The same conclusion is made here (in the Wheeler River EIS) for the Phoenix study area – meaning that fracture/fault conditions are such that some areas of the MFa are characterized by younger/recharge groundwaters”.</p> <p>Rationale: Tritium results for most wells in the Lower Sandstone Aquifer (MFa) reported in Table 4-1 of Appendix 7-A exhibit tritium concentrations <15 Bq/L for the 2020 sample, and 0.1 or <0.1 Bq/L for the 2021 sample. Tritium in modern precipitation typically varies from 1 – 3 Bq/L. Conclusions made in the text are not supported by data, especially given that tritium values are not reported in the EIS for local precipitation or surface water. This is important in reinforcing the assumption from the conceptual model that modern meteoric water circulates at depth in the Lower Sandstone Aquifer.</p> | Provide a further discussion on the interpretation of tritium in groundwater, rather than echoing conclusions from the Cigar Lake analogue study. Consideration should be given to the assertion that modern meteoric water circulates at depth in the Lower Sandstone Aquifer. Collection and analysis of stable isotope (e.g., δ2H, δ18O) samples is a cost-effective solution which would greatly improve understanding of groundwater hydrology and support the development of a conceptual model. | Please see response in Attachment IR-81. | No updates to the EIS in response to this IR. |
| IR-82 | CNSC | Geology and groundwater | Appendix 7-A, Section 4.3.3, Hydrochemistry by Hydrostratigraphic Unit Appendix 7-C, Section 3.5 | <p>Context: A. In-field measurements of Oxidation-Reduction Potential (ORP) for three (3) out of twenty-six (26) groundwater samples are presented in Table 4-1 of Appendix 7-A. Although sparse, these values are also used to characterize redox conditions for representative groundwaters in Table 3-5 of Appendix 7-C.</p> <p>B. In Section 3.5.5 of Appendix 7-C it is stated that groundwaters in the PHREEQC model were allowed to equilibrate with atmospheric concentrations of oxygen, resulting in oxidizing subsurface conditions. In Section 3.7 of Appendix 7-C it states that input files for 3D reactive transport were generated based on outcomes for PHREEQC modelling. However, in reading Section 4 of Appendix 7-C, it is unclear whether this assumption (equilibration with atmospheric oxygen) was carried forward for the 3D model.</p> <p>C. As per p. 3.49 of Appendix 7-C, “A small amount of reactive pyrite was assumed for the first 500 m of transport away from the ore zone in the model, primarily in the desilicified sediments of the Lower Sandstone Aquifer, and deeper portion of the Intermediate Sandstone Aquitard”.</p> <p>Rationale: A. Given the importance of redox conditions for U mobilization and precipitation/dissolution of minerals (e.g., pyrite/metal oxyhydroxides) and the corresponding influence on contaminant transport from both a modelling and monitoring perspective, these should be further characterized. It should also be noted that the measurement of Oxidative-Reductive Potential (ORP) in natural waters can be complex and difficult due to the variability and disequilibrium of natural systems and issues inherent to electrode calibration (e.g., Schuring et al., 2000). Measurements of redox couples (e.g., As(III)/As(V); Fe(II)/Fe(III); S(-II)/S(VI)) are typically recommended to accurately characterize redox conditions in natural waters (Schuring et al., 2000).</p> <p>B. The assumptions regarding redox conditions for the 3D solute transport model should be clarified.</p> <p>C. The amount of pyrite (e.g., % by weight) assumed for the purposes of modelling should be clarified, given the potential role of pyrite as a reducing agent in limiting the transport of COPCs.</p> <p>Reference:</p> | <ol style="list-style-type: none">1. Provide further discussions and information (i.e., ORP measurements or analytical data for redox couples) on redox conditions at the Phoenix site. Particular focus should be given to the spatial heterogeneity of redox processes. Tools such as the reference provided [2] below provide an example of simplified framework for characterizing redox conditions in aquifers.2. Clarify assumptions regarding initial redox conditions for the 3D solute transport model.3. Provide the % reactive pyrite by weight assumed for models in the text. Justification for proportions used, such as analytical data, should also be provided. <p>Reference: [2] Jurgens, B.C., McMahon, P.B., Chapelle, F.H., and Eberts, S.M., 2009, An Excel workbook for identifying redox processes in ground water: U.S. Geological Survey Open-File Report 2009–1004 8 p.</p> | Please see response in Attachment IR-82. | No updates to the EIS in response to this IR. |

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| | | | | [1] Schuring J.; Schulz, H. D.; Fischer, W.R.; Bottcher, J.; and Duijnvisveld, M.H.W. 2000. Redox: Fundamentals, Processes and Applications. Springer: Berlin. | | | |
| IR-83 | CNSC | Geology and Groundwater | Appendix 7-A, Section 7.4.2.2 and Appendix K | <p>Context: Leaching of uranium from the ore zone will generate voids within the ore zone, which could fail and collapse. Failure of the voids would cause displacement in overlying rocks, which will lead to the eventual ground subsidence. Based on the developed geological model, a geomechanical study was conducted to assess potential maximum vertical displacement in the overlying rock formations and predict the ground subsidence. While a layer of altered sandstone is modeled above the ore zone, the desilicified zone, a zone that is comprised of completely to partially unconsolidated sands and has very low rock quality, high fracture intensity, and high friability, and low strength in the area overlying and east of the Phoenix deposit, appears not to have been included in the model for geomechanical modeling. The evaluated displacement/deformation in the overlying rock formation and the resulted ground subsidence would not be conservative without including the desilicified zone.</p> <p>Rationale: Stability of the ore zone rock matrix and the potential displacement/deformation in the overlying rock formations when voids in the extracted ore zone collapse are critical for protecting the overlying aquifers, preventing substantial ground subsidence, safeguarding casing integrity, and mitigating plug-off of the remaining ore as well as efficiently mining extraction. The deformed zone in the overlying rock formations will change in hydraulic conductivity that will impact on the assessment of potential effects on groundwater flow and contaminant transport in the zone. Therefore, the rock mass behavior including and above the ore zone should be adequately understood and the potential displacement/deformation should be assessed and quantified with adequately defined geological model.</p> | Please provide details whether and how the desilicified zone is considered in the geomechanical modeling of the detailed strip model. Such details should include figures and the linkage between the geomechanical model including the determination of strength parameters of the desilicified zone and the geological model including information on the core delineation of the desilicified zone. | Information requested here with respect to details of how the desilicified zone is considered in the geomechanical modelling is addressed in IR-75. Details linking the geochemical model with the geological model including core delineation of the desilicified zone above the mining zone is provided in RESPEC (2023), included here as Attachment IR-21. | No updates to the EIS in response to this IR. |
| IR-84 | CNSC | Geology and Groundwater | Appendix 7-C | <p>Context: It is stated in Section 2.5.2.4 (p. 2.35, Appendix 7-C) that “In addition to calibrating to water level elevations targets, the model was calibrated to estimates of groundwater discharge to Whitefish Lake. A match between simulated and observed flows helps to support that groundwater recharge rates are reasonable, and to provide validation for water budget assessments. Baseflow calibration targets were developed using point streamflow measurements collected upstream and downstream of Whitefish Lake. Figure 2-10 (p. 2.26, Appendix 7-C) shows the locations of the baseflow calibration targets, and Table 2-7 (p. 2.35, Appendix 7-C) illustrates the model-simulated groundwater discharge rates in relation to the estimated range of baseflow from stream measurements. The simulated baseflow to Whitefish Lake is in good agreement with the estimated representative baseflow”.</p> <p>Rationale: It is not clear in Figure 2-10 (p. 2.26, Appendix 7-C) where the point streamflow measurements were conducted upstream and downstream of Whitefish Lake. Additionally, it is not clear how the groundwater discharge to Whitefish Lake is simulated, since the model domain does not cover the whole Whitefish Lake.</p> | 1) Please clarify in Figure 2-10 where the point streamflow measurements were conducted upstream and downstream of Whitefish Lake. 2) Please clarify how the groundwater discharge to Whitefish Lake is simulated considering that the model domain does not cover the whole Whitefish Lake. | 1) As noted in Table 2-7 of Appendix 7-C of the EIS, under the heading "Surface Water Stations", the surface water stations used to evaluate baseflow to Whitefish Lake are stations SA-6 and SA-2. Both of these stations are demarked in Figure 2-10 of Appendix 7-C, illustrating the portion of Whitefish Lake that is monitored by these stations. 2) Stations SA-6 and SA-7 monitor upstream and downstream hydrologic conditions of the portion of Whitefish Lake adjacent to the Project. The difference in baseflow monitored between these stations is interpreted to be the contribution of groundwater to the portion of Whitefish Lake of interest. Within the report, the discharge between these stations has been referred to as "discharge to Whitefish Lake" although it is acknowledged that this refers strictly to the portion of Whitefish Lake adjacent to the Project. | No updates to the EIS in response to this IR. |
| IR-85 | CNSC | Geology and Groundwater | Appendix 7-C | <p>Context: Section 2.7.3 (Appendix 7-C) mentions Wells A, B and C, and Figure 2-17 (p. 2.43, Appendix 7-C) illustrates the predicted drawdown ranges at Well B and Well C.</p> <p>Rationale: It is not clear where Well A, Well B and Well C are located.</p> | Please provide the locations of Well A, Well B and Well C illustrated in a Figure. | These three wells (referred within Appendix 7-C as "A", "B", and "C") are proposed wells to supply water to the mining operations. They are not yet constructed but are planned to be screened within the Upper Sandstone Aquifer. These wells were demarcated as "Freshwater wells" in Figure 2.2-1 of Section 2 of the EIS but were not labelled. Well A is located 200m northwest of the Phase 5 ISR injection area, Well B is located approximately 600 m south of the Phase 5 ISR injection area, while Well C is located 200 m northwest of the Phase 3 ISR injection area. | Figure 2.2-1 has been updated to label the “Freshwater wells” as “A”, “B”, and “C”. The updated figure is included in Attachment IR-85 and will replace the existing Figure 2.2-1 in the final EIS. |
| IR-86 | CNSC | Geology and Groundwater | Appendix 7-C | <p>Context: It is stated in Section 2.7.3 (p. 2.41, Appendix 7-C) that “Both the pumping demand and the recharge changes were incorporated into a transient simulation performed using the calibrated groundwater flow model. The model simulation was started at the beginning of mine construction, with initial conditions taken from the calibrated model. The simulation period was extended for 40 years to include the entire period of construction, operation, and decommissioning, and extending through 17 years post decommissioning”.</p> <p>Rationale: It is not clear what is the difference between the calibrated model and transient model in terms of parameters (such as the K values for the mining zone), boundary conditions, etc.</p> | Please clarify the parameters, boundary conditions and any other aspects as used in the transient model that are different from the calibrated model. | As stated in draft EIS Appendix 7-C, Section 2.7.2 (page 2.41) the calibrated, steady-state model was used as the basis for the transient model used to evaluate drawdown during operations. Only conditions immediately within the mining zone were altered within the transient model to reflect the proposed changes during mine operations. All boundary conditions that drive regional groundwater flow were unchanged for the transient model, and all hydrogeologic properties outside of the mining area were left unchanged. Changes made to the hydrogeologic properties were implemented transiently to represent the phased implementation of the freeze wall. Groundwater recharge was changed to reflect alterations to surficial land use and the implication of that land use change to groundwater recharge; transient pumping boundary conditions were incorporated to simulate the planned pumping demand for camp and ISR water requirements. The transient version of the model was used to evaluate changes to the groundwater discharge occurring at Whitefish Lake as documented in Appendix 7-C Section 2.7. | No updates to the EIS in response to this IR. |
| IR-87 | CNSC | Geology and Groundwater | Appendix 7-C | <p>Context: In Section 2.8 (p. 2.45, Appendix 7-C) Parameter uncertainty assessment, only parameters for certain zones (part of each specific hydro-stratigraphic unit as shown in Figure 2-19, p. 2.46, Appendix 7-C) related to the pathway from the ore zone toward Whitefish Lake were allowed to vary in order to find combinations of parameter values that met statistical calibration criteria. If each hydro-stratigraphic units within the whole model domain were treated as parameter zones that can have varied hydraulic conductivity values, a different combination of parameter values could be obtained that</p> | It is recommended that the parameter zones in the Parameter uncertainty assessment include hydro-stratigraphic units in the whole model domain to investigate the possible combination of parameter values that could make the groundwater in the mined-out zone more active hydraulically. | As per the reviewer’s request, PEST++IES was applied to generate 50 calibrated realizations wherein all hydraulic conductivity parameter zones were allowed to vary. Of the 50 scenarios generated, the average contribution to Whitefish Lake from the Lower Sandstone Aquifer was 0.73%, with 48 of the 50 scenarios (96%) confirming the calibrated conceptualization. One of those scenarios is documented in the response to IR-55. It is noted that packer tests provide a small-scale sample indication of the representative hydraulic conductivity, but as shown in the literature (Bradbury and Muldoon, 1990), such local tests are rarely representative of large-scale (i.e., macro) hydraulic conductivities. Macro-scale hydraulic | No updates to the EIS in response to this IR. |

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| | | | | <p>meet statistical calibration criteria too.</p> <p>Rationale: The parameter values for parameter zones between the mining area and Whitefish Lake is important in determining the hydraulic connection between the mining area and Whitefish Lake. Parameter values in other parameter zones could also be important. For example, if the K values for the intermediate sandstone aquitard are significantly larger than in the current calibration results, the interaction between the upper sandstone aquifer and the lower sandstone aquifer could be more active, and the mined-out zone could be more active hydraulically and groundwater in the minded-out zone could have a shorter residence time than in the current calibrated model.</p> <p>Additionally, it is noted that Figure 2.19 (p. 2.46, Appendix 7-C) illustrates the parameter zone for the intermediate sandstone aquitard. However, Figure 2.20 (p. 2.49, Appendix 7-C) did not include the intermediate sandstone aquitard in the results.</p> | | <p>conductivities are best determined using long-term pumping tests, or a model and calibrating to observed water level trends.</p> <p>Please note that only parameter sets which are consistent with field observations (i.e., observed water level, baseflow, or geochemical observations) are considered relevant for prediction uncertainty analyses.</p> <p>References: Bradbury K. R., and M.A. Muldoon. 1990. "Hydraulic Conductivity Determinations in Unlithified Glacial and Fluvial Materials." Groundwater and Vadose Zone Monitoring. ASTM STP 1053. D.M. Nielsen and A. I. Johnson Editors., American Society for Testing and Materials. Philadelphia, 1990. pp. 138-151.</p> | |
| IR-88 | CNSC | Geology and Groundwater | Appendix 7-C | <p>Context: The conceptual hydrogeological model includes upper sandstone aquifer, intermediate sandstone aquitard, and lower sandstone aquifer. The desilicified zone above the ore zone have enhanced hydraulic conductivity. The boundary condition for the lower sandstone aquifer on the west (upstream) side was assigned to have specified head, which provide source of water for the lower sandstone aquifer.</p> <p>As a result of the conceptual model setup, the upper sandstone aquifer is hydraulically active and the groundwater residence time within the upper sandstone aquifer is relative short. In contrast, the lower sandstone aquifer (and the ore zone) is hydraulically inactive, and the groundwater residence time in the lower sandstone aquifer is relatively long (as shown in the particle tracking results in Figure 7.6-2 (p. 7-71, main EIS report), and the simulated plume for chloride in Figure 7.6-7(p. 7-86, main EIS report)).</p> <p>It is stated in Section 2.6.4 (Appendix 7-C) that “As noted above in section 2.6.3, it is estimated that 99% of the groundwater discharge to Whitefish Lake is derived from groundwater that has only flowed through shallow deposits (i.e., Overburden and Upper Sandstone Aquifers). Contribution of deep groundwater flow through the Desilicified Zone within the Intermediate Sandstone Aquitard is estimated to be < 1% of the groundwater discharging to Whitefish Lake”. This simulation result is reflective of the conceptual model.</p> <p>Section 7.3.3.3 (p. 7-42) states that “The Lower Sandstone Aquifer is characterized spatially by two types of groundwater. The first groundwater type is most like that observed in the Local Flow System. This reflects hydraulically active fractures and fault systems that allow fresh recharge water to penetrate and mix with deeper waters in the aquifer. The second type of groundwater is within the zone of thermal alteration around the ore zone”.</p> <p>The hydraulic connectivity of the ore zone with the upper sandstone aquifer has important implication on the groundwater restoration. The ore zone is not hydraulically active locally because it is enclosed by a clay zone before the mining operation. But if it is located within a hydraulically active area, or on a groundwater flow pathway that is hydraulically active, the mined-out zone (with much larger porosity and hydraulic conductivity) could become active hydraulically after mining operation is finished.</p> <p>Figure 7.6-7 (p. 7-86, main EIS report) shows that the chloride plume is most persistent within the mined-out mining area. This seems to indicate the mined-out zone is hydraulically inactive after the mining operation is finished.</p> <p>It is stated in Section 7.3.3.2 (p. 7-37, main EIS report) that “Exploration boreholes drilled in the Phoenix area, where left unplugged, have the potential to provide preferential flow paths between the Overburden and Upper and Lower Sandstone Aquifers. Exploration holes were reportedly grouted approximately 10 to 20 m above and below the ore zone, resulting in open holes remaining throughout the overlying materials. These portions of the open holes may act as open conduits for groundwater flow through the 400 m of Athabasca Group Sandstone.” So, there is possibility that the unplugged borehole could increase the hydraulic connection between the upper and lower sandstone aquifer.</p> <p>Rationale: It is important to understand if the larger area containing ore zone is hydraulically active. Additional confidence would be gained if there is any other evidence that support that the area containing the ore zone is not hydraulically active, and groundwater residence time in</p> | <p>It is recommended to conduct the following work to demonstrate if the mined-out zone is hydraulically active:</p> <ol style="list-style-type: none">1. Determine the groundwater residence time in the lower sandstone aquifer and compare it with the simulated residence time in the numerical model.2. Conduct additional particle tracking to demonstrate where groundwater originating from the mined-out zone flow towards (forward tracking) and where groundwater flowing towards the mined-out zone originates from. This would help determine why groundwater in the mined-out zone is not hydraulically active.3. Conduct sensitivity analysis to investigate the effect of higher K values for the intermediate sandstone aquitard and the K and porosity values of the mined-out zone on the plume migration. | <p>1) Denison believes that the best way to determine residence time as part of the EA is with the modelling approached used in the draft EIS. It is unclear how it would be possible to "determine the groundwater residence time within the Lower Sandstone Aquifer" other than by using a model. Available data (e.g., geochemistry) provide an indication of residence time, but not timing that can be compared to modelled results. The groundwater residence time within the Lower Sandstone Aquifer, downgradient of the ore zone, is simulated using the model to be 150 years or greater. Simulated residence time within the Lower Sandstone Aquifer upgradient of the ore zone is approximately 500 years.</p> <p>2) Particle tracking from the "mined-out" ore zone was incorporated within the EIS, as illustrated on Figure 4-4 of Appendix 7-C. The particle traces presented illustrate groundwater migration flow paths, path lengths, travel times, and velocities for water migrating from the mined-out ore zone. Reverse particle tracking indicates flow through the Lower Sandstone Aquifer flowing from upgradient areas flowing into the ore zone.</p> <p>3) The prediction uncertainty analysis (i.e., "sensitivity analysis") presented in Appendix 7-C included an evaluation of the change in the model prediction (i.e., plume migration) with respect to changes in the conductivity of materials along the flow path to the receptor, Whitefish Lake (i.e., Scenarios 4, 5, and 6) as well as regarding the hydraulic conductivity of the mined-out ore zone. As such we feel that the work requested by the reviewer has already been completed and reported upon within the draft EIS. In addition, the uncertainty of the Intermediate Sandstone Aquifer was evaluated (see IR55), where higher hydraulic conductivity within the Intermediate Sandstone Aquifer were found to reduce the proportion of water from the ore zone reaching Whitefish Lake, which would have the effect of further reducing (i.e., diluting) concentrations simulated and presented in the EIS documentation. As such, the conditions documented in the draft EIS are already conservative with respect to the uncertainty in these parameters.</p> | No updates to the EIS in response to this IR. |

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| | | | | <p>the lower sandstone aquifer surrounding the ore zone is comparable with the simulated results.</p> <p>Table 2-4 (p. 2.16, Appendix 7-C) shows the effective porosity (0.01-0.05) of the ore body. Figure B7 (p. B.8, Appendix 7-C) shows that the calibrated K values for the mined-out zone is 1x10-6 m/s. Section 3.5.2 (p. 3.24, Appendix 7-C) states that “The same average linear velocity was assumed for the mining area (source zone), following from the discussion in Section 4.4.2, where the hydraulic conductivity value in this zone following mining was set to 5x10-6 m/s, and a porosity of 0.2 is assumed for the ore zone (Table 4-2)”. It is not clear what the justification is for the selection of the porosity and K values for the mined-out area, and whether they are conservative. It is also not clear, what the potential impact on the groundwater flow and COPCs transport would be if the mined-out zones collapse.</p> | | | |
| IR-89 | ECCC | Fish and fish habitat | Appendix 7-C, Numerical Modelling: Post-Decommissioning Evaluation, Section 2.3.1.4, Desilicified Zone | <p>Context: The Proponent states that a hydraulic conductivity value of 5x10-6 m/s was uniformly assigned to the model layers representing the Desilicified Zone. They additionally state that this value is consistent with packer and pumping tests screened in this unit that have interpreted hydraulic conductivity values ranging from 1x10-6 to 3x10-5 m/s (Appendix C), with a geomean of 6.0x10-6 m/s.</p> <p>Considering that the Desilicified Zone is of particular interest because it is the main pathway for the COPC to reach Whitefish lake, and that hydraulic conductivities are not entirely understood, ECCC recommends that a larger range of hydraulic conductivities be simulated to understand potential effects on fish and fish habitat.</p> <p>Rationale: The Desilicified Zone is a critical layer in the hydrogeological model as it represents a key potential pathway of contaminants to Whitefish Lake. The base case hydraulic conductivity value (5x10-6 m/s) is even lower than the geometric mean, not to mention the highest value found. When simulating geochemical processes and contaminant transport within this important pathway a more conservative approach should be employed. Modifying this parameter will affect travel times and distribution of COPC in the subsurface.</p> | <p>1. Provide an in-depth rationale for choosing a value of 5x10-6 m/s as the base case for the hydraulic conductivity, in both the PH REDox EQUilibrium (PHREEQC) and Finite-Element Ground Water Flow (FEFLOW) models.</p> <p>2. Provide a rationale for keeping the sensitivity analysis within one order of magnitude considering the lack of physical data on the Desilicified Zone. Alternatively, provide contaminant transport simulation results with more conservative hydraulic conductivity (e.g., more than 3x10-5 m/s) values in the Desilicified Zone.</p> <p>See also related: IR-96.</p> | <p>1) Application of 5E-6 as the value for hydraulic conductivity within the desilicified zone is appropriate; the values of 5E-6 and 6E-6 are essentially the same number, particularly at the scale over which it is applied. We agree that the hydraulic conductivity of the desilicified zone is an important parameter to the fate and transport of dissolved minerals from the ore zone toward Whitefish Lake; that is why scenarios 4, 5, and 6 were designed to evaluate the prediction uncertainty related to the uncertainty of the desilicified zone, along with other hydraulic conductivity values along the transport migration pathway. Further, we recognize that packer tests provide a small-scale sample indication of the representative hydraulic conductivity, and as shown in the literature (Bradbury and Muldoon, 2000), such local tests are rarely representative of large-scale (i.e., macro) hydraulic conductivities. Macro-scale hydraulic conductivities are best determined using a large-scale pumping test or a model calibrated to observed water levels, which is the approach we completed; the value of 5E-6 for the desilicified zone hydraulic conductivity provides an excellent match to observed water levels and baseflow discharge. In addition, packer tests in fractured rock tend to bias the hydraulic conductivity to be higher than is representative on the large scale, as testing is generally targeted on observed fracture zones. Given all this, we reaffirm that the applied hydraulic conductivity of 5E-6 is representative for the conductivity of the desilicified zone.</p> <p>2) Calibration-constrained uncertainty analyses were performed (i.e., the state of the practice) to evaluate the range of potential hydraulic conductivity values that could exist within the desilicified zone while still maintaining calibration. That analysis is presented in section 2.8 of Appendix 7-C. The most conservative of the parameter scenarios that are consistent with the field observational data were used for the prediction uncertainty analyses presented in Appendix 7-C, section 4.7. Scenarios 4, 5, and 6 explore higher hydraulic conductivity values which are supported by the observation data (i.e., calibration-constrained uncertainty analysis). The range of desilicified-zone hydraulic conductivity incorporated within those scenarios (Figure 2-21) is 1.6 to 3.2 m/d (i.e., 1.8E-5 to 3.7E-5 m/s); 3.2 m/d was the highest conductivity value for the desilicified zone (referred to as the Altered Zone within the Intermediate Aquitard on Figure 2-21) for all 50 calibrated realizations generated using PEST. As such, the EIS presented the prediction uncertainty with the highest hydraulic conductivity values supported by the observation data. It would not be appropriate to test scenarios with even higher values of hydraulic conductivity which would not be supported by the field observed groundwater levels. Thus, we do not feel it is appropriate to test scenarios where the hydraulic conductivity of the desilicified zone is orders of magnitude greater than suggested by field observations.</p> <p>References: Bradbury K. R., and M.A. Muldoon. 1990. "Hydraulic Conductivity Determinations in Unlithified Glacial and Fluvial Materials." Groundwater and Vadose Zone Monitoring. ASTM STP 1053. D.M. Nielsen and A. I. Johnson Editors., American Society for Testing and Materials. Philadelphia, 1990. pp. 138-151.</p> | No EIS updates are anticipated to address this IR. |

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| IR-90 | ECCC | Fish and fish habitat | Appendix 7-C, Section 2.4 and 2.6 | <p>Context: Hydraulic conductivities and hydraulic gradients play an important role in groundwater flow, geochemical modeling, and contaminant transport for the PHREEQC and FEFLOW models. Although there is an important vertical component to the contaminant transport, there is no distinction made between lateral and vertical hydraulic conductivities of hydraulic gradients.</p> <p>Rationale: According to the conceptual model, there is an important vertical aspect to the groundwater flow thus incorporating any vertical hydraulic gradient or hydraulic conductivity information into the calibration would increase confidence in the results.</p> <p>Providing a distinct value for vertical hydraulic conductivity will improve the accuracy of the model in regards to the transport of contaminants to Whitefish Lake through the Desilicified zone, which is important to understand potential impacts to aquatic life.</p> | <ol style="list-style-type: none">1. Explain if the vertical and lateral hydraulic gradients and hydraulic conductivities are assumed to be equivalent.2. Provide a rationale for not distinguishing between vertical and lateral hydraulic gradients.3. Alternatively, provide both lateral and vertical hydraulic gradient estimates and the implications on contaminant transport. | <ol style="list-style-type: none">1. Lateral and vertical hydraulic conductivity values are assigned for every model element within the numerical modelling domain. In most areas, the vertical hydraulic conductivity is assumed to be 1/10th of the lateral hydraulic conductivity due to variability in the depositional environment (i.e., intermittent periods of quiet water deposits, and higher-energy water deposits) and fracturing (typically bedding plane fractures are more prevalent than vertical joints).2. In the case of the desilicified zone the thermal alteration was conservatively assumed to have resulted in equivalent hydraulic conductivity values in the lateral and vertical directions. This conservative assumption within the desilicified zone is designed to over-predict mass transport potential to surface receptors.3. The gradients applied are considered reasonable and defensible. By calibrating to 3D point observations of groundwater levels, and using surface water levels for hydrogeologic boundary conditions, the model has been inherently calibrated to 3-dimensional hydraulic gradients. Thus, lateral and vertical hydraulic gradients are incorporated within the analysis presented. | No updates to the EIS in response to this IR. |
| IR-91 | NRCan | Fish and fish habitat | Appendix 7-C, section 2.5.2 | <p>Context: The numerical model calibration quality plot (Appendix 7-C, sec. 2.5.2.1, Figure 2-13) contains a small error. The vertical (simulated heads) and horizontal (observed heads) axes do not have the same scales (499 to 521 masl versus 499 to 522 masl). Therefore, the line of ideal fit is offset.</p> <p>Rationale: As a result, NRCan notes that observed heads in the 510-512 masl range are underpredicted by the model. NRCan also notes that the calibration statistics (Appendix 7-C, sec.2.5.2.3) are highly leveraged by two data points from open boreholes south of Kratchkowsky Lake where simulated values are largely controlled by the nearby constant-head boundary in the Lower Sandstone aquifer (520 masl).</p> | The proponent should correct the scales on the axes of Figure 2-13 in Appendix 7-C. The proponent should also comment on the effect on calibration of the clustering of most observation wells in the ore zone. | <p>The scales on Figure 2-13 of Appendix 7 have been corrected and included in Attachment IR-91.</p> <p>From a regional perspective, the available groundwater levels are clustered around the Phoenix deposit. However, Denison advanced monitoring well clusters to support hydrogeologic (and hydrochemical) characterization upgradient, downgradient, and cross-gradient to the deposit. Data from all of these wells were used to calibrate the numerical model. It is acknowledged that the hydrogeologic conditions are extrapolated from the available data; this is consistent with the state of the practice.</p> | The corrected Figure 2-13, which will be included in the final EIS, is appended as Attachment IR-91. |
| IR-92 | CNSC | Geology and groundwater | Appendix 7-C, Section 3.2.1, Mineralogical Composition | <p>Context: Table 3-2 summarizes the clay content of the Athabasca Group sandstones and the Paleoweathered Zone. Although minimum, maximum and median values are provided, the number of samples and variability of the dataset are not. Rationale for incorporating illite into reactive transport modelling and excluding kaolinite/dichlorite is provided in the text.</p> <p>From p. 3.29 in Appendix 7-C: “The illite content was based on the normative clay composition determined from site-specific corehole elemental analysis (median illite by mass is 7.68%; Table 3-2) and using portable infra-red mineral analysis indicating median illite content by mass is 13.1% (data not shown)”</p> <p>From p. 3.30 in Appendix 7-C: “Using the minor amount of illite compared to the more dominant chlorite is conservative in that not all sorptive capacity of the clays is accounted for in the simulated paleoweathered zone”. This conservative assumption appears contrary to assumptions for the desilicified zone (DSZ) and Athabasca Group sandstones “Illite was used to represent the total clay content, which varies from 1.74% to 5.85% by mass in the hydrostratigraphic units within the Athabasca Group sandstones and Desilicified Zone”.</p> <p>Rationale: Information is missing in the EIS regarding the clay composition of hydrostratigraphic units. Results from infrared mineral analysis are not reported.</p> <p>The assumption for the solute transport model is that all clays in the downgradient DSZ are illite. However, clay content in the Read Formation (Lower Sandstone Aquifer) downgradient of the ore zone is low in illite (0.42%) compared to kaolinite (0.52%) and dichlorite (1.18%). A value of 3.9% illite clay by weight is used for the DSZ, but Table 3-2 indicates median content is 2.42% illite. It is not clear why illite was used to represent total clay content for the DSZ, as opposed to the conservative assumptions used for the Paleoweathered Zone, nor has any basis or justification been given.</p> | <ol style="list-style-type: none">1. Please provide in Table 3- the number of samples and variability of the datasets used to estimate the clay content of hydrostratigraphic units for the model. Include results from infrared mineral analysis in the text if the information is used to support assumptions for modelling.2. Please provide further information/discussion within the EIS relating to the assumptions of clay content in hydrostratigraphic units for modelling. Provide further justification and rationale as to why total clay content in the Athabasca Group sandstones and Desilicified Zone is assumed to be illite, and how this assumption is conservative. This discussion could include a comparison of the properties (cation exchange capacity, surface area) of illite vs. kaolinite vs. dichlorite for the anticipated range of subsurface conditions (pH, redox, U concentrations, etc.). | Please see response in Attachment IR-92. | <p>The updated version of Table 3-2 (provided in Attachment IR-92) will be included in the final EIS Appendix 7-C.</p> <p>To reflect the discussion in Attachment IR-92 and updates to Table 3-2 of Appendix 7-C, the following text will be included on page 3.29-3.20 of Appendix 7-C in the final EIS:</p> <p>Conceptually, the paleoweathered zone mineral assemblage was made up of 9% clay by mass, as illite, and 25% quartz. The illite content was based on the normative clay composition determined from site-specific corehole elemental analysis (median illite by mass is 9.20%; Table 3-2). Portable infra-red mineral analysis supported the normative clay content in that chlorite is the dominant clay mineral (69.5% relative abundance) followed by illite (median 13.1% relative abundance). The quartz content was based on a regional study by Macdonald (1980) evaluating the mineralogical composition of the weathered bedrock/saprolite regionally. The mineral composition of the paleoweathered zone was conceptualized in this manner because the data set for the project with respect to clay minerals was for the sorptive properties of illite. Using the relatively smaller illite content of the paleoweathered zone compared to the more dominant chlorite content is conservative in that not all sorptive capacity of the clays is accounted for in the simulated paleoweathered zone.</p> |
| IR-93 | CNSC | Geology and Groundwater | Appendix 7-C, Table 3-10: Properties of | <p>Context: In Appendix 7-C, section 3.5.6.2.2 Ion Exchange and Surface Complexation, the consideration of ion exchange and surface complexation and the corresponding parameters and chemical</p> | Please provide additional evidence to justify the model parameter of site density for goethite, applied to the numerical model. If necessary, the reactive transport | Please see response in Attachment IR-93. | The updates to Table 3-10 of Appendix 7-C are detailed in Attachment IR-93 and will be included in the final EIS. |

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| | | | Adsorbing Mineral Phases | <p>reaction are discussed.</p> <p>Rationale: The site density of sorbent Geothite was reported in Table 3-10 to be 1.6E3 mol/kg. Taking into account the specific surface area of 60 m2/g, this equals to 1600/6E4 mol/m2, or 0.0266 mol/m2, 1.6e4 sites/nm2.</p> <p>This value largely overestimates the site density of goethite, which is reported to be in the range of 2~6 sites/nm2. The reference used in the EIS report indicates the similar range of variation for this specific parameter.</p> <p>There are plenty of similar studies on SCM of iron oxides in literature. It is suggested to consult with more than one single study to enhance the reliability of model parameters.</p> <p>The overestimation of sorption site density will directly result in underestimation of the affected COPCs' concentrations in pore fluid. This will result in underestimation of COPC transport plume in the affected underground space, and potentially the dissolved concentrations in the hydrogeological sink.</p> | modelling should be re-run to update the contents presented in the EIS report. | | |
| IR-94 | CNSC | Geology and Groundwater | Appendix 7-C, Numerical modelling: post-decommissioning evaluation, Section 3.5.5, Subsurface Conditions Incorporated | <p>Context: It is reported in this section the assumed subsurface conditions that were applied in the geochemical site conceptual models. Critical phenomenon of pH tail was mentioned. Inclusion and exclusion of corresponding geochemical reactions were discussed briefly.</p> <p>Rationale: It was reported that the residual reduced minerals of uraninite and pyrite were not included in the modelling of the remediated mining area. The argument was based on consideration of the upstream groundwater, passing through the mined zone, will not be oxidizing and groundwater conditions are expected to be similar to pre-mine conditions. However, this ignores the pH tail effect that releases proton H+ sorbed to solid surface during ISR flooding. By ignoring this process, there is a potential risk of underestimating the source terms for some key COPCs. Exclusion of uraninite and pyrite in remediated mining area modelling is contradictory to pH-tail effect. The justification is not sufficient in the current form.</p> | Please provide additional evidence to justify the approach for excluding uraninite and pyrite from the analysis of remediated mining area. This may require the results from additional modelling. | Please see response in Attachment IR-68, IR-94, IR-97. | No updates to the EIS in response to this IR. |
| IR-95 | CNSC | Geology and Groundwater | Appendix 7-C, Table 3-11 | <p>Context: The Table 3-11 reported the Solid-Phase Concentrations and Partitioning Constants for COPCs. Data were both measured and simulated.</p> <p>Rationale: It is unclear how the partition coefficients of various COPCs upon desilicified and paleoweathered rocks were obtained. It was not reported at what pH were these Kd analyzed. Sorption of chemicals on solid phase is known to be pH dependent. It is unclear whether pH influence was considered in the measurement and analysis of apparent partition coefficients.</p> <p>In addition, uptake of metals on clay is highly nonlinear, and always has a maximum capacity. Even with a very strong affinity towards specific metal ions, the sorption will be saturated at elevated concentrations. Therefore, assuming a linear correlation needs to be cautious of the concentration range of target COPC species, and the applicable sorption capacity of the clay mineral.</p> <p>In the current model, only the linear form of sorption is considered, although with discussion of Kd value selection. Additional rationale is needed to justify if the applied methodology is sufficient for assessment.</p> | Please justify the choice of applying a linear form partition coefficient for the modelling and assessment, and whether it provides a conservative approach to the assessment results. Clarity around the experimental conditions during the measurement of partitioning coefficient of various COPCs on the target rocks may help support this assumption. | Please see response in Attachment IR-95. | The updated version of Table 3-11 (provided in Attachment IR-95) will be included in the final EIS Appendix 7-C. |
| IR-96 | CNSC | Geology and groundwater | Appendix 7-C, Section 4.4.4, Sub-Domain Model Transport Boundary Conditions | <p>Context: From the text, "Transport parameters were specified for diffusion (1x10-9 m2/s), longitudinal dispersivity (10 m along the plume trajectory), and transverse dispersivity (5 m)". The source of this information is not provided in Appendix 7-C. It is unclear if the values used are defaults in the modelling software, from literature, from small-scale laboratory tests, or are site-specific values determined through tracer tests.</p> <p>Rationale: The use of a calibrated flow model does not imply that the solute transport model is calibrated. The transport parameters (such as effective porosity, dispersivity and reactive transport parameters) can only be calibrated by matching simulated and observed spatial and/or temporal distributions of a solute. Sensitivity analysis indicates that decreasing longitudinal and transverse dispersivities by a factor of two resulted in exceedances of groundwater criteria for both selenium (Se) and cobalt (Co). Given the clear influence of these values on contaminant transport, it is important that transfer parameter values are justified in the solute transport model. In addition, the influence of large-scale heterogeneity on dispersion and solute transport predictions should be discussed, to identify any uncertainty in the</p> | <p>1. Please provide the source of the numerical value used for diffusion and longitudinal and transverse dispersivity, and provide justification if default values by the model code were used.</p> <p>2. Please provide a discussion on the influence of large-scale heterogeneity on dispersion and solute transport predictions in the modelling report.</p> <p>See also related: IR-89.</p> | Please see response in Attachment IR-96. | No updates to the EIS in response to this IR. |

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| | | | | <p>model predictions, and provide confidence that the applied model is adequately representing groundwater flow and solute transport.</p> <p>Further guidance on solute transport modelling can be found in BC MOE (2012) [1].</p> <p>Reference: [1] British Columbia Ministry of the Environment (BC MOE). 2012. Guidelines for Groundwater Modelling to Assess Impacts of Proposed Natural Resource Development Activities. Report no. 194001, 385 p.</p> | | | |
| IR-97 | ECCC | Fish and fish habitat | Appendix 7-C, Figures 4-6, 4-7a, 4-7b, 4-8a, 4-8b, 4-9a, 4-9b | <p>Context: Appendix 7, Figures 4-6, 4-7a, 4-7b, 4-8a, 4-8b, 4-9a, 4-9b present contaminant transport simulations of chloride, selenium, cadmium, and uranium. All simulations use initial condition concentrations at t=0 (or end of mining operations. In the 3D FEFLOW contaminant transport model it is not clear why initial condition concentrations were chosen rather than a constant concentration boundary.</p> <p>It is also unclear if mining activities will cause mobilization of the contaminants beyond the end of operations.</p> <p>Rationale: The choice of boundary conditions may impact the predicted transport of contaminants that reach Whitefish Lake through groundwater, which may have impacts to aquatic life.</p> | <p>1. Explain and clarify if mining operations will mobilize contaminants beyond operations?</p> <p>2. Clarify if the source of contamination, (e.g., uranium, selenium) will cease after operations?</p> <p>3. For the 3D model please provide the rationale for using initial concentrations rather than constant concentration boundary conditions for contaminant concentrations.</p> | Please see response in Attachment IR-68, IR-94, IR-97. | No updates to the EIS in response to this IR. |
| IR-98 | CNSC | Change to an environmental component due to hazardous contaminants | Section 8, Aquatic Environment | <p>Context: It states in EIS in Section 8.3.7.1 (p. 8-151) that "Cameco's Key Lake Operation will overlap spatially and temporally with the Project".</p> <p>Rationale: It is not clear whether there is the possibility that planned Denison discharges would eventually flow into and influence a background reference lake used by Key Lake operation.</p> | Please provide supporting information to demonstrate whether discharges from the proposed operation will not eventually flow into a reference lake used by another existing operation. | <p>Denison understands that Alpha Lake and McGowan Lake are used as reference lakes for a Cameco operation within the area of Denison's proposed project. Denison will communicate with Cameco through the Saskatchewan Mining Association to highlight the timing of the start of the Project as it may relate to Cameco's use of regional lakes for reference lake purposes. McGowan Lake will no longer be suitable as a reference lake for Cameco once the Wheeler River Project starts operating, since it will be downstream of treated effluent release. Alpha Lake (LA-9 in Denison's aquatic baseline studies) will likely be outside of any influence from Denison's activities.</p> <p>Please note that Denison has previously been in communication with the Saskatchewan Ministry of Environment, Environmental Protection Branch regarding the baseline study work Denison completed as part of the Environmental Assessment process and the potential changes to McGowan Lake (a Cameco's reference lake) from the proposed Wheeler Project. Reference: Email from Janna Switzer (Denison) to George Bihun (MOE) on May 12, 2020.</p> | No EIS updates are anticipated to address this IR. |
| IR-99 | CNSC | Aquatic environment | Section 8, Water Quality, Table 8.2-13 | <p>Context: Table 8.2-13 shows the maximum concentration of hazardous and radiological COPC's in surface water throughout the local study area. However, the concentration for all constituents is stated as mg/L.</p> <p>Rationale: It is unusual for radiological COPC's to be displayed in mg/L, radiological constituents are typically displayed in Bq/L</p> | Please use Bq/L when displaying concentration of radiological COPC's. If this was a typographical error in the table, please indicate as such and revise the table to indicate values are indeed in Bq/L. Please also review other tables displaying concentrations of radiological constituents to ensure this error is not repeated in other tables. | The values provided in Table 8.2-13 for radiological COPCs are presented as Bq/L and the units provided in the sub-title (mg/L) are not consistent with the data provided. Table 8.2-13 is consistent with the data provided in Appendix 10-A (Environmental Risk Assessment), which specifies the concentrations as having been measured in Bq/L. Subsequent updates of the EIS will correct this inconsistency. Denison will review the final EIS to ensure this error is not repeated in other tables. | Table 8.2-13 will be revised to ensure the units for radiological parameters are expressed in Bq/L. The revised table is provided in Attachment IR-99. |
| IR-100 | HC | Indigenous Peoples' health / Socio-economic conditions | Section 8, (p. 8-195) Section 8.5.3, Table 8.5-2, (p. 8-226) | <p>Mercury is excluded as a COPC in the assessment. Inadequate consideration of mercury and methylmercury in fish and other country foods, and use of incorrect Hg-related health guideline values can underestimate the risks to human health among country food consumers.</p> <p>Context: Section 8 states “Mercury has not been identified as a COPC for the Project as it is currently not present in the receiving environment (i.e., background condition) at detectable concentrations and will not be produced as part of the mine process; therefore, it will not be discharged to the aquatic environment.</p> <p>However, it is understood that potential nutrient enrichment-related effects are possible and can be linked to increases in mercury in the environment” (p. 8-195).</p> <p>Table 8.5-2 shows that there is mercury present in the tissues of Northern Pike and White Sucker sampled in the waterbodies within the local study area and in Russell Lake. These fish are regularly consumed by nearby communities according to the ERFN 2017 dietary survey.</p> <p>In Section 8.5.3, fish tissue concentrations are compared to Health Canada's human health risk- based maximum permissible mercury concentration (0.5 µg/g wet weight), which is applicable to most species of commercially sold fish rather than country foods.</p> <p>Rationale: It is recommended that mercury be listed as a COPC considering it is in fact present in fish tissue under existing conditions, the significant consumption of fish by the local Indigenous communities, and its toxicological significance to human health.</p> <p>Further, the Health Canada provisional tolerable daily intake (pTDI) value of 0.2 µg/kg/bw/day (Health Canada, 2007) is a more</p> | <p>1. Include mercury (including methylmercury) as a COPC in the assessment given the baseline presence of mercury in sampled fish, the potential increase of methylmercury in receiving waters due to nutrient enrichment resulting from the project, the significant fish consumption by the local population and that country foods, particularly fish, are an important source of dietary exposure to mercury.</p> <p>2. Assess health risks from fish consumption by calculating hazard quotients for baseline and predicted methylmercury levels in country foods using Health Canada's pTDI for methylmercury (Health Canada, 2007).</p> <p>3. Clarify whether mercury data represented throughout the EIS represents total mercury, inorganic mercury or methylmercury.</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends including methylmercury in the list of COPCs to be monitored in fish throughout all project phases.</p> <p>See also related Advice to the Proponent: AD-31.</p> | <p>1. The intent is not to include mercury (and methylmercury) as a COPC for the assessment. As indicated in EIS Section 8.4.6.1, Residual Effects Characterization, mercury is not associated with the local geology and is not expected to be released in the effluent at measurable levels and was therefore not identified as a COPC. Denison notes that there is potential for increased methylmercury production in the receiving environment under a certain combination of factors to which the Project may contribute, such as increased nutrient levels in the environment; however, prediction of methylmercury production is not practical. Denison commits to monitoring mercury and methylmercury in the aquatic environment over the life of the Project to determine the potential changes in mercury concentrations in fish tissue over time.</p> <p>2. As the Project advances and operational monitoring is underway, Denison will assess health risks from fish consumption by comparing fish tissue data collected during operation from the monitoring program against Health Canada's mercury guideline of 0.5 ug/g wet weight. This is a human health risk-based maximum permissible concentration.</p> <p>3. Mercury data presented throughout the draft EIS represents total mercury. Denison agrees to included methylmercury as part of the constituents monitored in fish throughout all project phases.</p> | <p>A commitment will be added to Section 8 of the final EIS that as the Project advances, Denison will assess health risks from fish consumption by comparing fish tissue data collected during operation from the monitoring program against Health Canada's mercury guideline of 0.5 ug/g wet weight.</p> <p>It will be clarified in the final EIS that mercury data presented is total mercury.</p> |

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| | | | | <p>appropriate reference level when evaluating consumption of mercury in fish by Indigenous people, as it allows for the consideration of food consumption patterns in the risk assessment that differ from the general population and is protective of the most sensitive sub-group (i.e., developing foetus).</p> <p>It is important to note that methylmercury, rather than inorganic mercury, is generally the predominant mercury species present in fish and is also the most toxicologically significant form. The assumption of 100% of mercury in fish and other country food items being present as methylmercury ensures that the potential health risks are not underestimated. It is unclear, however, if the mercury data presented throughout the EIS represent total mercury, inorganic mercury or methylmercury.</p> | | | |
| IR-101 | ECCC | Fish and fish habitat | Section 8.1.1.3, Section 8.2.1.3 Aquatic Environment | <p>Context: In Section 8.1.1.3 Spatial and Temporal Boundaries the Project Area, Local Study Area (LSA) and Regional Study Area (RSA) are established as they pertain to surface water quantity. The same is done in Section 8.2.1.3 for surface water quality. In Section 8.1.1.3 Figure 8.1-4, the locations of the Project Area, LSA, RSA and surface water features and monitoring stations are provided.</p> <p>However, the locations of wetlands located near the Project area and within the LSA and RSA have not been provided. The location of wetlands within or near the Project footprint, as well as the other wetlands existing within the LSA can be confirmed from Part II_S9 Terrestrial Environment, Section 9.2.3.3 Figure 9.2.-8, including the wetland classifications. There appears to be at least one shallow open water wetland and several bogs located within the Project Area. There is no consideration of wetlands or potential effects to wetland hydrology, surface water or sediment quality throughout the aquatic environment assessments. There is no baseline information regarding wetlands and their status as fish habitat and ecological function, or assessment of potential effects to flow rates, water levels, water quality, sediment quality, or biota.</p> <p>Rationale: There is currently not enough information provided for ECCC to provide advice on the potential risks of the proposed Project to wetland hydrology, surface water and sediment quality within the LSA. This pathway of effects is important to assess in terms of potential effects to wetland habitat availability and quality due to changes in flow rates, water levels, water quality, sediment transport, sediment quality and potential effects to terrestrial and aquatic receptors. It is necessary to evaluate if changes in groundwater and surface water runoff flows and routing will affect water levels and habitat availability within wetlands. Potential effects from COPCs and radionuclides to surface water and sediment, or potential effects to ecological receptors within wetlands have not been evaluated.</p> | <p>1. Provide baseline information regarding wetland characterization within the Project Area and LSA, including: locations, wetland type, size, water surface elevation, depth, water flow pathways, and the presence of wildlife receptors including presence of fish/fish habitat within the Aquatic Environment section of the draft EIS. If this information is available in annexes or baseline studies, summarize it within the main body of the Aquatic Environment section of the draft EIS with references to respective documents for review.</p> <p>2. Provide baseline information on wetland surface water and sediment quality characterization for wetlands within the Project footprint.</p> <p>3. Provide an assessment of potential effects to wetlands within the LSA and potential effects to ecological receptors during all phases of the proposed Project.</p> <p>4. Provide further information on mitigation measures and monitoring that would be applied for the protection of wetlands.</p> | <p>Responses are numbered as listed in the IR. Figures associated with this IR are provided in Attachment IR-101.</p> <p>1) Below indicates the information that is presented in the draft EIS regarding wetland characteristics. This information was housed within the terrestrial environment component and potential impacts to wetlands as a valued component is further assessed under Section 9.2 of the draft EIS, and specifically Section 9.2.6.4. The following list indicates what information was provided in the draft EIS specific to information request #1. As such, repackaging the available information in Section 8 would be redundant and therefore in Denison’s view unnecessary.</p> <p>a) <i>Locations of Wetlands</i> Section 9, Figure 9.2-8 on page 9-83 of the draft EIS presents a map of the RSA and LSA detailing the locations of various wetland features including bogs and fens.</p> <p>b) <i>Wetland Types</i> Section 9, Figure 9.2-8 on page 9-83, and Table 9.2-8 on pages 9-91 to 9-92 of the draft EIS provides the geographical distribution and listing of the following wetland types within the LSA:</p> <ul style="list-style-type: none">i. BS17 – Black spruce treed bogii. BS18 – Labrador tea shrubby bogiii. BS19 – Graminoid bogiv. BS19/24 – Graminoid bog/Graminoid fenv. BS20 – Open bogvi. BS21 – Tamarack treed fenvii. BS23 – Willow shrubby rich fenviii. BS24 – Graminoid fenix. BS25 – Open fenx. BS27 – Sedge rocky shore (shallow open water) <p>c) <i>Wetland Size</i> Section 9, Table 9.2-8 on pages 9-91 to 9-92 of the draft EIS lists the following wetland types and the cumulative area they encompass within the LSA:</p> <ul style="list-style-type: none">i. BS17 – 18.2 haii. BS18 – 23.3 haiii. BS19 – 2.8 haiv. BS19/24 – 0.8 hav. BS20 – 0.6 havi. BS21 – 1.9 havii. BS23 – 0.6 haviii. BS25 – 0.4 haix. BS27 – 4.2 ha <p>d) <i>Wetland Water Surface Elevation</i> Surface elevations for the wetland have been assessed and the information is summarized below and in the Attachment IR-101 Figure 1 Elevations of wetland features in the LSA.</p> <ul style="list-style-type: none">• Wetlands 1.5 km west of the SSA range from 526-524 masl• Waterbodies and their surrounding wetlands directly to the east of the SSA are at an elevation of between 506 and 500 masl• Waterbodies and surrounding wetlands 2 km east of site are approximately between 499 and 497 masl• Wetlands north of the SSA and in the vicinity of the proposed air strip range from 514-508 masl.• Wetlands situated further north of the SSA in the LSA were at an elevation of approximately 526 masl• Southern wetlands that will interact with the proposed hydro corridor extension for the mine have an elevation of 491masl• Most wetland evaluated south of the SSA had elevations ranging from 491-488 masl <p>e) <i>Wetland Depth</i> – information associated with wetland depth for those in the LSA is not available.</p> | No EIS updates are required for this response. |

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| | | | | | | <p>f) <i>Wetland Flow Pathways</i> - Nearly all wetlands are connected or adjacent to rivers and tributaries, and thus flow pathways are discernable in Figure 9.2-8 of the draft EIS.</p> <p>g) <i>Presence of Fish and Fish Habitat</i> For the purposes of this assessment the bogs and fens within the area can be assumed to provide supporting fish habitat to the adjacent lake and river water bodies in the vicinity of the LSA. Section 9.2.6.4.1 of the draft EIS described the estimated change in the aerial extent of wetland due to direct impacts of the Project footprint (see also Figure 9.2-8). The assessment indicated a total loss of 0.5 ha (less than 0.1%) of all wetlands within the Terrestrial RSA.</p> <p>2) As noted in other parts of this IR response, the wetlands within the Project footprint are limited to two areas (i.e., stream crossings along the access road to the airstrip and powerline connection SE of Highway 914 [See Figure 2: Denison Wheeler River Project SSA and Wetland Feature Distribution in Attachment IR-101]) and these wetland areas can be avoided through design and construction mitigations. As such, no direct impact to any wetlands or waterbodies are expected as part of the Wheeler River Project that may impact fish or fish habitat.</p> <p>In regard to baseline information on wetland surface water and sediment quality characterization for wetlands within the Project footprint:</p> <p>a) <i>Surface water quality in wetlands</i> – surface water quality was not specifically sampled in the wetland complexes adjacent to the project footprint during the original baseline assessment. However, surface water quality was sampled and assessed at stream and lake stations situated upstream and downstream of wetland areas. These stations were selected for sampling as they were identified as providing repeatability (i.e., relative water depth) and informative with respect to desired segments of the system. For example, water quality was sampled at SA-4, SA-5, LA-6, SA-6 and LA-5 following the flow path from upstream to downstream, respectively. The water quality at these nodes was inclusive of upstream wetland influences. For further reference to surface water sampling station during baseline, please refer to Figure 8.2-4 of the EIS.</p> <p>b) <i>Sediment quality in wetlands</i> - sediment quality was not specifically sampled in the wetland complexes adjacent to the project footprint during the original baseline assessment. However, sediment quality was sampled and assessed at depositional lake stations situated upstream and downstream of wetland areas. The sediment quality at these nodes would be inclusive of upstream wetland surface water and sediment influences. For further reference to sediment sampling stations during baseline, please refer to Figure 8.2-4 of the EIS.</p> <p>3) For the purposes of this assessment the bogs and fens within the area can be assumed to provide supporting fish habitat to the adjacent lake and river water bodies in the vicinity of the LSA. Section 9.2.6.4.1 of the draft EIS described the estimated change in the aerial extent of wetland due to direct impacts of the Project footprint (see also Figure 9.2-8). The assessment indicated a total loss of 0.5 ha (less than 0.1%) of all wetlands within the Terrestrial RSA</p> <p>However, when further scrutinizing the potential overprinting of wetland features as a result of the Project it is evident that even this loss is avoidable. The interaction of the Project with wetlands is relegated to those areas where stream crossings for access roads and powerline connections are proposed (See Figure 2: Denison Wheeler River Project SSA and Wetland Feature Distribution (Attachment IR-101)).</p> <p>Wetlands associated with stream crossings have been identified to have mitigative designs (clear-span) to ensure no impacts to fish and fish habitat. The hydro-line as shown in Figure 1 will be constructed to avoid direct impacts to fish and fish habitat following best installation practices. As such, no direct impact to any wetlands or waterbodies are expected as part of the Wheeler River Project that may impact fish or fish habitat.</p> <p>As discussed in Section 8.1.6.1 of the EIS, water levels in the ponds and lakes in the vicinity of the of the Project are expected to experience negligible effects, with magnitudes of changes in water levels predicted to be in the sub-centimeter range. As natural fluctuations in lake water levels were approximately 0.4 m from 2011 to 2019, Project-related changes are not expected to be of a magnitude to compromise the Surface Water Quantity VC. It can then be considered a reasonable assumption that any changes to wetland features will have similar sub-centimeter impacts to water levels due to changes in surface flow and/or groundwater and therefore do not pose an indirect effect to water quantity or fish and fish habitat associated with these wetland features.</p> <p>4) As no impact is expected due to overprinting or due to draw down effects by the ISR, additional mitigation measures are not warranted. Updated baseline information on wetland depths and water-levels may be useful in providing a frame of comparative reference to potential changes during the operation, decommissioning and post-decommissioning phases of the project. However, such changes are expected to be less than measurable.</p> | |
| IR-102 | ECCC | Fish and fish habitat | Section 8.1.3.1 Appendix 8-C, including | Context: Only one measured-results dataset for baseline stream flow exists that is relevant to the Project data from the Water Survey of Canada (WSC) station for Wheeler River (06DA005), and the Proponent used constructed records. The Proponent states that data | 1. Provide more information on the extension of Project hydrometric station data using WSC station 06DA005. | Please note: Figures and tables associated with this IR response as noted below are provided in Attachment IR-102. See also response IR-236. | Wording errors in Appendix 8-C, Appendix II, Table 1 will be updated in the final EIS as follows: - SA-2 extension method = Unit Area Runoff with Scaling and Offset |

| Ref. # | Department | Project Effects Link | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Information Requirement (IR) ² | Denison Response | Final EIS Updates |
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| | | | Appendix II, Table 1 (p. 2) | <p>from 06DA005 was used to extend local hydrometric station records and calculate baseline water quantity metrics. However, this was done through a complex combination of daily data correlation or monthly unit area runoff relationship, with or without offset, where some stations were based off constructed records instead of the real long-term dataset at 06DA005 (see Section 8.1.3.1 and Appendix II of Appendix 8-C, Table 1, p.2 (PDF p. 569)). Appendix 8-C references previous reports in its own appendices, but no equations are shown and there is no description of the accuracy of the fit, or explanation for not referring back to the one dataset (WSC station). Subsequent statistics calculated from these constructed records (e.g., 7Q10 needed for SK water licenses) would be affected by this uncertainty.</p> <p>Rationale: Fish habitat can be altered by changes to depositional and erosional patterns in streams. Confidence in the Proponent’s estimate of baseline water quantity, and by extension Project effects to fish habitat, cannot be established without a complete description of the method applied, as well as a discussion of its accuracy.</p> | <p>2. Discuss the accuracy of any correlations/relationships and justify any deviations from simple unit area runoff relationships in the estimation of baseline water quantity values for the Project hydrometric stations. Constructing records from records that are themselves constructed is not recommended.</p> <p>3. If baseline water quantity metrics need to be revised, discuss (if any) resulting changes to the effects assessment.</p> | <p>1. As mentioned by ECCC and discussed in the draft EIS, baseline hydrometric datasets are available for the Project at various nodes throughout the watershed and these datasets are extended to cover a broader period of record to the Wheeler River station (06DA005) operated by Water Survey Canada. Datasets for local stations measured at the Project cover a range from 2010 to 2019, though the date records are not continuous over this period. There is value in the hydrometric data collected at the Project site and these data should inform the long-term estimates of flow at Project nodes. As such, relationships are established to link 06DA005 first to SA-1 via correlation, than SA-1 to the other stations at the Project via correlation, unit area runoff relationships and unit area runoff relationships with scaled and/or offset influences.</p> <p>The use of 06DA005 solely to extend the record at the Project is reasonable given that it is a direct receiver from the Project watersheds and has a watershed area approximately one order of magnitude larger the SA-1 which is the largest watershed monitored at the Project. Further, trends in the datasets for coincident dates are generally similar and correlated are sufficiently in agreement. 06DA005 is not a perfect proxy for long-term record extension; in particular a flow event in October 2016 results in proportionally greater flow rates than were observed at 06DA005. That said, it is the best available station and incorporates locally and regionally measured data which is standard practice.</p> <p>A wording error in Table 1 of Appendix II of Appendix 8-C indicates that for Assessment Nodes SA-2 and SA-3 the extension method is listed as Unit Area Runoff with Offset. Rather, SA-2 should be listed as Unit Area Runoff with Scaling and Offset and SA-3 should be listed as Unit Area Runoff with Scaling. Also, the source station for SA-5 should be noted as SA-6. These corrections will be made in the final EIS.</p> <p>All record extension methods follow the same equation format (presented below) where the variable Q represents discharge. Correlations may have influence over all five variables while Unit Area Runoff methods may only use one or two. The variable A through E are adjusted to define the fit of the extension method. The fit of the extension method is determined as the summation of the differences between the observed and estimated daily average discharge (or instantaneous measured discharge if the station did not have an installed datalogger) for coincident days in the datasets. Variables A through E are adjusted through a solver algorithm such that the summation of the differences is as near to zero as possible.</p> $Q_{Assessment\ Node} = A \cdot [B + C \cdot (Q_{Source\ Station} + D)^E]$ <p>Table 1 in Attachment IR-102 presents the variable used for each assessment node and indicates the source station for the calculation. In Attachment IR-102 following Table 1, figures 1 to 7 are presented for each assessment node show the estimated hydrograph for the station as well as measured discharges and reported hydrographs as daily average discharge. Figures are not presented for nodes LA-1 and LA-5 as there are no measured discharges immediately at the outlet of those lakes.</p> <p>2. Simple unit runoff relationships from larger watersheds are a reasonable approach when no other data are available for use at a Project. In this approach larger watersheds tend to have attenuation which impacts the timing and magnitude of runoff events When local data are available it is a better approach to understand the relationship of local flow rates within the broader context. As an example, at SA-3 if the unit area relationship is used from 06DA005 direct to that watershed it results in a dramatic under prediction; the measured data indicate that that watershed is capable of generating larger flow rates than would be expected simply based on a unit runoff.</p> <p>Regarding the comment on the use of constructing records based on constructed records, the same methodology is incorporated into developing hydrographs at the Project as is used to estimate flows at 06DA005. The long-term extension of the Project data simply relates the datasets in a manner which is acceptable to the Proponent’s technical experts.</p> <p>Using the record extension methodologies presented in Table 1 of Attachment IR1-2, ensures the data provide a better fit ultimately to 06DA005 as understood within the regional context.</p> <p>3. The proponent is of the professional opinion that the baseline water quantity metrics do not need to be revised and the information presented in the draft EIS and supporting documents is suitable for the intended purpose. As noted in the draft EIS, Section 8.1.6.2, “The confidence in the assessment of predicted effects on hydrology is quite high due to available hydrological data for the LSA. Uncertainty is minimal with the assumptions that water withdrawal and discharge scenarios presented herein represent the bounding case and hydrogeological modelling projections are not changed.”</p> | <p>- SA-3 extension method = Unit Area Runoff with Scaling - Source station for SA-5 = SA-6</p> |
| IR-103 | ECCC | Fish and fish habitat | Section 8.1.3.4 Climate Change Influenced Extreme Events | <p>Context: The Proponent notes that Intensity duration frequency (IDF) curves are used to estimate the size of water management structures around a site and that the IDF curves are often specific to climate monitoring stations.</p> <p>The Proponent used the IDF_CC Tool 5.0 developed by the Institute for Catastrophic Loss Reduction (2021) which generates Intensity Duration Frequency (IDF) curves at ungauged locations in order to estimate future IDF curve values under influences of climate change. This tool generates sub-daily values at ungauged locations by interpolation and distance weighing from gauged locations.</p> <p>Rationale: IDF trends exhibit random behavior at some locations and</p> | <p>Provide the gauged stations used to generate the sub daily duration values found in Table 8.1-6: Baseline of Intensity Duration Frequency data.</p> <p>Technical Discussion Required: Yes</p> | <p>ECCC correctly notes that the tool generates sub-daily values at ungauged locations by interpolation and distance weighing from gauged locations. The closest gauged location to the Project is located 35 km_south southwest at the Key Lake Mine (KLM) and the IDF values at KLM for historical and future scenarios (Tables 1 and 2 below) are substantially lower than those predicted for the Project. The IDF-CC Tool estimated 1:100-year, 24-hour return period events of 79.9 and 88.6 mm during the current and predicted future values, respectively. As per Tables 1 and 2 those values are substantially larger, and more conservative than, the coincident values of 56.4 and 62.0 mm for KLM.</p> <p>The predicted values for the Project are likely strongly influenced by Cree Lake (4061861; 85 km west southwest) and Collins Bay SK (4061620; 130 km northeast). The interpolation may also be influenced by Stony Rapids A (4067PR5; 196 km north). The Cree Lake, Collins Bay SK and Stony Rapids A stations are all substantially higher than KLM; however, the</p> | No EIS updates are anticipated to address this IR. |

| Ref. # | Department | Project Effects Link | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Information Requirement (IR) ² | Denison Response | Final EIS Updates | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | correlated behavior at other locations. The choice of gauged locations will infer the statistics for the ungauged locations, including the IDF trends. Without identification of the gauged locations, it is not possible to assess if the modelled data is realistic or not. If the modelled data is not accurate the design of water management structures on the site may not be sufficient resulting in the potential for impacts to the Project from flooding or extreme weather events. | | <p>geography, and likely the climate of KLM, is more similar to those of the Project than from the more distant stations.</p> <p>Despite the potential for the IDF_CC Tool to use weighting factors, the estimates provided by the tool for the purposes of assessing impacts of the project on the surface water hydrology are robust and conservative including in consideration of flooding or extreme weather events.</p> <p><u>IR-103 Table 1: Key Lake (4063753) – Historical IDF</u></p> <table><tr><th>T (years)</th><th>2</th><th>5</th><th>10</th><th>20</th><th>25</th><th>50</th><th>100</th></tr><tr><td>5 min</td><td>5.39</td><td>6.66</td><td>7.11</td><td>7.37</td><td>7.43</td><td>7.56</td><td>7.65</td></tr><tr><td>10 min</td><td>7.46</td><td>10.11</td><td>11.40</td><td>12.39</td><td>12.66</td><td>13.37</td><td>13.94</td></tr><tr><td>15 min</td><td>9.22</td><td>12.44</td><td>13.97</td><td>15.12</td><td>15.42</td><td>16.23</td><td>16.86</td></tr><tr><td>30 min</td><td>11.50</td><td>16.59</td><td>19.20</td><td>21.24</td><td>21.81</td><td>23.36</td><td>24.63</td></tr><tr><td>1 h</td><td>13.72</td><td>18.91</td><td>21.28</td><td>23.00</td><td>23.45</td><td>24.61</td><td>25.49</td></tr><tr><td>2 h</td><td>15.71</td><td>22.25</td><td>26.04</td><td>29.31</td><td>30.29</td><td>33.09</td><td>35.61</td></tr><tr><td>6 h</td><td>21.93</td><td>27.85</td><td>30.92</td><td>33.36</td><td>34.05</td><td>35.92</td><td>37.48</td></tr><tr><td>12 h</td><td>26.57</td><td>33.31</td><td>36.50</td><td>38.87</td><td>39.50</td><td>41.17</td><td>42.46</td></tr><tr><td>24 h</td><td>35.57</td><td>44.63</td><td>48.82</td><td>51.86</td><td>52.67</td><td>54.76</td><td>56.35</td></tr></table> <p><u>IR-103 Table 2: Key Lake (4063753) – 2020 – 2050 Predicted IDF using CMIP6 Raw GCMs and SSP5.85</u></p> <table><tr><th>T (years)</th><th>2</th><th>5</th><th>10</th><th>20</th><th>25</th><th>50</th><th>100</th></tr><tr><td>5 min</td><td>5.80</td><td>7.21</td><td>7.72</td><td>8.03</td><td>8.10</td><td>8.29</td><td>8.41</td></tr><tr><td>10 min</td><td>8.06</td><td>10.96</td><td>12.42</td><td>13.45</td><td>13.78</td><td>14.70</td><td>15.55</td></tr><tr><td>15 min</td><td>9.95</td><td>13.49</td><td>15.21</td><td>16.43</td><td>16.80</td><td>18.04</td><td>18.82</td></tr><tr><td>30 min</td><td>12.47</td><td>17.99</td><td>20.90</td><td>23.10</td><td>23.78</td><td>26.00</td><td>27.69</td></tr><tr><td>1 h</td><td>14.88</td><td>20.51</td><td>23.16</td><td>25.08</td><td>25.68</td><td>27.36</td><td>28.61</td></tr><tr><td>2 h</td><td>16.85</td><td>24.13</td><td>28.27</td><td>31.65</td><td>32.77</td><td>36.06</td><td>39.23</td></tr><tr><td>6 h</td><td>23.50</td><td>30.23</td><td>33.64</td><td>36.05</td><td>36.88</td><td>39.24</td><td>41.27</td></tr><tr><td>12 h</td><td>28.59</td><td>36.18</td><td>39.67</td><td>42.08</td><td>42.85</td><td>44.99</td><td>46.74</td></tr><tr><td>24 h</td><td>38.26</td><td>48.47</td><td>53.03</td><td>56.20</td><td>57.14</td><td>59.86</td><td>62.03</td></tr></table> | T (years) | 2 | 5 | 10 | 20 | 25 | 50 | 100 | 5 min | 5.39 | 6.66 | 7.11 | 7.37 | 7.43 | 7.56 | 7.65 | 10 min | 7.46 | 10.11 | 11.40 | 12.39 | 12.66 | 13.37 | 13.94 | 15 min | 9.22 | 12.44 | 13.97 | 15.12 | 15.42 | 16.23 | 16.86 | 30 min | 11.50 | 16.59 | 19.20 | 21.24 | 21.81 | 23.36 | 24.63 | 1 h | 13.72 | 18.91 | 21.28 | 23.00 | 23.45 | 24.61 | 25.49 | 2 h | 15.71 | 22.25 | 26.04 | 29.31 | 30.29 | 33.09 | 35.61 | 6 h | 21.93 | 27.85 | 30.92 | 33.36 | 34.05 | 35.92 | 37.48 | 12 h | 26.57 | 33.31 | 36.50 | 38.87 | 39.50 | 41.17 | 42.46 | 24 h | 35.57 | 44.63 | 48.82 | 51.86 | 52.67 | 54.76 | 56.35 | T (years) | 2 | 5 | 10 | 20 | 25 | 50 | 100 | 5 min | 5.80 | 7.21 | 7.72 | 8.03 | 8.10 | 8.29 | 8.41 | 10 min | 8.06 | 10.96 | 12.42 | 13.45 | 13.78 | 14.70 | 15.55 | 15 min | 9.95 | 13.49 | 15.21 | 16.43 | 16.80 | 18.04 | 18.82 | 30 min | 12.47 | 17.99 | 20.90 | 23.10 | 23.78 | 26.00 | 27.69 | 1 h | 14.88 | 20.51 | 23.16 | 25.08 | 25.68 | 27.36 | 28.61 | 2 h | 16.85 | 24.13 | 28.27 | 31.65 | 32.77 | 36.06 | 39.23 | 6 h | 23.50 | 30.23 | 33.64 | 36.05 | 36.88 | 39.24 | 41.27 | 12 h | 28.59 | 36.18 | 39.67 | 42.08 | 42.85 | 44.99 | 46.74 | 24 h | 38.26 | 48.47 | 53.03 | 56.20 | 57.14 | 59.86 | 62.03 | |
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| 10 min | 7.46 | 10.11 | 11.40 | 12.39 | 12.66 | 13.37 | 13.94 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 min | 9.22 | 12.44 | 13.97 | 15.12 | 15.42 | 16.23 | 16.86 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 1 h | 13.72 | 18.91 | 21.28 | 23.00 | 23.45 | 24.61 | 25.49 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 h | 15.71 | 22.25 | 26.04 | 29.31 | 30.29 | 33.09 | 35.61 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 h | 21.93 | 27.85 | 30.92 | 33.36 | 34.05 | 35.92 | 37.48 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 h | 26.57 | 33.31 | 36.50 | 38.87 | 39.50 | 41.17 | 42.46 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24 h | 35.57 | 44.63 | 48.82 | 51.86 | 52.67 | 54.76 | 56.35 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| T (years) | 2 | 5 | 10 | 20 | 25 | 50 | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 min | 5.80 | 7.21 | 7.72 | 8.03 | 8.10 | 8.29 | 8.41 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 min | 8.06 | 10.96 | 12.42 | 13.45 | 13.78 | 14.70 | 15.55 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 min | 9.95 | 13.49 | 15.21 | 16.43 | 16.80 | 18.04 | 18.82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30 min | 12.47 | 17.99 | 20.90 | 23.10 | 23.78 | 26.00 | 27.69 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 h | 14.88 | 20.51 | 23.16 | 25.08 | 25.68 | 27.36 | 28.61 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 h | 16.85 | 24.13 | 28.27 | 31.65 | 32.77 | 36.06 | 39.23 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 h | 23.50 | 30.23 | 33.64 | 36.05 | 36.88 | 39.24 | 41.27 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 h | 28.59 | 36.18 | 39.67 | 42.08 | 42.85 | 44.99 | 46.74 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24 h | 38.26 | 48.47 | 53.03 | 56.20 | 57.14 | 59.86 | 62.03 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IR-104 | ECCC | Fish and fish habitat | Section 8.1.3.4.2 Probable Maximum Precipitation (PMP) Events Appendix 8C | <p>Context and Rationale: The Proponent notes: “The probable maximum precipitation (PMP) event is a design standard value for an extreme rainfall event. The PMP event does not have an estimated return period but is instead based on the theoretical maximum amount of water that a storm could produce based on the maximum persisting dew point.”</p> <p>The Proponent provides a PMP value of 489.3 mm, which is based on data and methodologies available in 1999, taken from the Atmospheric Environment Branch Report (1999), Report Number AHSD-R99-01. The Proponent references Appendix 8C for details. Appendix 8C contains no supplementary information other than what is already provided in Section 8.1.3.4.2.</p> <p>The assumptions and methodologies presented in the report are the results of time series analyses available in 1999. As time series evolve so do the derived statistics. In order to assess potential flood risks and impacts to the Project from flooding, data that is current and representative of the changing climate is needed. The Proponent should explain why they’ve used data from 1999 rather than using up to date data, describe what alternative methods for determining PMP they have considered, and describe how they will support their use of 489.3 mm as a PMP, or describe how they will generate a refreshed PMP. The main factor that influences the statistical data output is the length of the time series hence the reason to keep the statistical data. The PMP values can be substantially (>10%) different if two decades of data is used in the statistical analysis.</p> | <p>1. Provide a revised PMP value (using up to date data) or justify the use of a PMP that is based on data and methodologies from 1999 as opposed to a more recent time series analysis.</p> <p>2. Describe the alternative methods for determining PMP values that were considered. Include descriptions of both “statistical” outcomes and “rational” outcomes as applicable.</p> <p>Technical Discussion Required: Yes</p> | <p>Please see response to IR-15, IR-236 and AD-15. Although there are a variety of methods available to derive a PMP, Denison’s selected PMP for engineering design (i.e., 493 mm; see response to IR-15; based on Canadian Climate Program [1994]) is over 5 times higher than observed and predicted 24 hour precipitation events (both 1 in 100 year, 24 hour return precipitation events and 24-hour maximum precipitation events; see response to AD-15), and as such, Denison is confident that the Project water management infrastructure will be appropriately designed. The PMP included in Section 8 of the draft EIS was 489.3 mm from a more recent publication (Atmospheric Environment Branch [1999]). Denison retained the higher of the two PMP values (i.e., 493 mm) for design purposes.</p> <p>The proponent will address the information requirements in reverse order of the way they are presented.</p> <p>2. The World Meteorological Organization (WMO) issued Manual on Estimation of Probable Maximum Precipitation (PMP) in 2009 (WMO-No. 1045), the third edition of this manual. This document presents several methodologies for estimation of PMP and is preceded by the similar second edition 1986 document titled “Manual for Estimation of Probable Maximum Precipitation (WMO No. 332)”. The 1986 document served as part of the foundation for analyses presented by Atmospheric Environment Branch (1999). WMO indicates that the 2009 document “keeps a majority of the content from the second edition” and newly added content since 1986 is for “directly estimating PMP for the requirements of a given project in a design watershed on probable maximum flood (PMF) in China, the United States of America, Australia and India.” As such, the proponent believes the Atmospheric Environment Branch (1999) analysis remains current within the context of the Project.</p> <p>Atmospheric Environmental Branch (1999) builds upon a similar document produced in 1994 (Canadian Climate Program, 1994). The 1994 text discusses methodology and results of analyses for northern Saskatchewan. Though the author is confident in their assessment, the author does indicate that values estimated through northern Saskatchewan may be “spurious” due to the scarcity of climatological data in the region. The use of the term “spurious” seems to be in reference to predicted PMP values which are substantially higher than those where data are available.</p> <p>Additional analyses would be possible for this assessment; however, climatological data remain scarce in northern Saskatchewan. Though there is uncertainty as to the result of</p> | No changes to the EIS are required. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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| | | | | | | <p>reassessment of PMP values in the vicinity of the Project, others have completed their own reassessment of PMP values based on locally monitored data which yielded a much smaller result for the PMP. In that situation the proponent opted to stay with a value of 489.3 mm as estimated by Atmospheric Environment Branch (1999) even though it was substantially larger than their reassessed value (NexGen Energy Ltd., 2022).</p> <p>1. Though it is presumed that methodologies have not changed appreciably to justify a reassessment of the PMP, the data scarcity component would also influence the potential for accurate estimation of the design storm. No new stations have been added in northern Saskatchewan with sufficient data record to improve regional observations which play a role in Hopkinson's analyses.</p> <p>Anecdotaly speaking, the estimates of 489.3 mm across the northern Saskatchewan region are considered very high by other practitioners in the industry. This seems to be supported by additional analyses completed for NexGen Energy Ltd. (2022). The acceptance of 489.3 mm or 493 mm as the PMP for the Project falls in line with magnitudes used by existing operators in the area and is likely a conservative estimate.</p> <p>References:</p> <p>Atmospheric Environment Branch. 1999. Environment Canada Prairie and Northern Region – Point Probable Maximum Precipitation for the Prairie Provinces. Atmospheric Environment Branch, Atmospheric and Hydrologic Sciences Division. Regina, Saskatchewan. Report No. AHSD – R99 – 01.</p> <p>Canadian Climate Program. 1994. Point Probable Maximum Precipitation in Northern Saskatchewan. R.F. Hopkinson. Scientific Services Regina Operations Building, Regina Airport. Regina, Saskatchewan. Report No. CSS – R94 – 01.</p> <p>NexGen Energy Ltd. 2022. Rook I Draft Environmental Impact Statement. June 2022.</p> | |
| IR-105 | Directorate of Fisheries and Oceans (DFO) | Fish and fish habitat | <p>Section 8.1.4.1, Potential interactions between project and valued component/key indicators Surface Water Quantity</p> <p>Section 8.1.4.2.2, Surface Water Taking</p> <p>8.3.4.1, Potential interactions between project and valued component/key indicators</p> | <p>Context: Table 8.1-8 and Table 8.3-6 in the EIS indicates a potential for freeze wall operation to influence groundwater interactions and surface water quantity and as a result, impact fish and fish habitat. Section 8.1.4.2.2 references Section 7 Geology and Groundwater for details on potential impacts. In addition, IR-63 notes the groundwater model does not describe the pathway in which groundwater would pass around the freeze wall during operation and any resulting potential effects on groundwater discharge to Whitefish Lake.</p> <p>Rationale: As per IR-63, the groundwater model analysis is insufficient to make conclusions on the potential effects of the freeze wall on groundwater discharge into Whitefish Lake. DFO requires this information to fully understand if altered groundwater regimes will result in changes to Whitefish Lake water levels and any potential impacts to fish and fish habitat as a result of changing water levels.</p> | <p>1. Provide a more fulsome analysis of the potential impact of freeze wall operations on local and semi-regional groundwater regimes, and subsequently to fish and fish habitat within Whitefish Lake. The analysis should provide a rationale of how the scope of the groundwater model is relevant to and able to detect changes at the scale of fish and fish habitat.</p> <p>2. If impacts to fish and fish habitat in Whitefish Lake are predicted to occur due to changes in the groundwater regime, describe any mitigation measures that could be used to avoid these impacts.</p> <p>3. If impacts are predicted that cannot be avoided, characterize residual effects on fish and fish habitat.</p> | <p>Please refer to the disposition for IR-63 for a fulsome explanation of the minor impact that the freeze wall will have on the area and regional groundwater flows. It was concluded that the freeze-walled area is a relatively small disruption to the regional groundwater flow system.</p> <p>Potential indirect impact to the surface water hydrology at Whitefish Lake as a result of project induced changes to the hydrogeology of the area was considered as part of Section 8.1 and discussed in Appendix 8-C. The project impacts were inclusive of changes in groundwater contributions to LA-5 as listed in Table 4-1 of Appendix 8-C. The analysis included the most up to date information during the preparation of the EIS and which indicated a potential loss in contribution of 4-6 L/s of groundwater reporting to LA-5 through the operation and decommissioning phase. This input is anticipated to return to pre-disturbance conditions for Post-Decommissioning. More recent calculations of the potential loss of groundwater contribution to Whitefish Lake as 9.9 L/s. This change is within the same magnitude of that previously modelled and therefore is not likely to constitute a change in the assessment of significant effects for the aquatic environment.</p> <p>Recent modelling using a loss of 9.9 L/S indicates that the majority of this change is due to dewatering of the ISR area and not due to the freeze wall itself. As indicated in Attachment IR-63, the groundwater flow contours will locally deviate from their original paths due to the installation of the freeze wall and the pumping, yet this will not impact the larger spatial migration of groundwater to the lake. Furthermore, groundwater discharge distribution (i.e., seeps and upwellings) will continue to occur in a similar pattern during pumping as to pre-pumping. This indicates that while the overall groundwater discharge rate is reduced, the areas of primary groundwater discharge will remain unchanged. As such, fish which utilize LA-5 for critical life-history periods (namely Northern Pike) will not be impacted due to changes in groundwater interactions directly, or indirectly due to reductions in surface water levels or flow. As such, additional mitigation measures outside that currently proposed in the draft EIS are not suggested.</p> | Based on the response no revisions to the EIS are needed. |
| IR-106 | CNSC | Change to an environmental component due to hazardous contaminants | Section 8.1.4.2.3, Surface Water Discharge | <p>Context: It is stated in this section under construction that all site contact water will be held in the Clean Waste Rock Pond.</p> <p>Rationale: It is unclear from this section what will happen to the contact water held in the Clean Waste Rock Pond, and whether it will be removed from site or released at a later time. What is the contingency plan if more contact water is produced during construction than the Clean Waste Rock Pond has capacity for.</p> | <p>Please indicate what will happen to the contact water stored in the Clean Waste Rock Pond during construction activities, will it be released after the wastewater treatment plant is installed? Further, please describe the contingency plan if contact water produced exceeds estimates and will exceed the volume of the clean waste rock pond?</p> | <p>During Construction, no effluent is expected to be released to the aquatic environment. Contact water stored in the Clean Waste Rock Pond during Construction will be held onsite until the Industrial Wastewater Treatment Plant (IWWTP) is commissioned. At that time the water from the pond would be conveyed to the IWWTP, treated, and released to Whitefish Lake per permit / license requirements.</p> <p>The sequence for Construction activities will occur in a logical manner based on Project execution plans. For example, construction of the wellfield runoff pond will be prioritized during the early part of Construction and it will able to hold 38,200 m³ of water. This will provide contingency and additional water storage capacity if contact water produced exceeds estimates or the volume available in the Clean Waste Rock Pond.</p> <p>Other secondary contingency measures are also available should the volume of water requiring management exceed site infrastructure storage volume. This could include use a hydrovac for offsite disposal.</p> | No changes to the EIS are required. |
| IR-107 | CNSC ECCC | Aquatic environment | Section 8.2.3.3, Existing Surface Water Quality | <p>Context: Under the methodology and metrics section (8.2.3.1) it is stated baseline water quality was sampled in 2016, 2018, and 2019. Looking at the data in Appendix A of Appendix 8D it seems that some waterbodies have little data available for baseline characterization. For example, Whitefish Lake only has 3 and 5 samples taken between its two sample stations, with sampling frequency seeming intermittent.</p> <p>Rationale: The amount of data available for baseline water quality</p> | <p>Please clarify what data quality objectives were used for the baseline characterization data. Please provide justification whether the number of datapoints collected with inconsistent frequency in baseline surface water characterization is sufficient to meet data quality objectives and to adequately characterize the baseline, and whether Denison is confident that the data collected is enough for a robust water quality baseline characterization.</p> | <p>Surface water quality was sampled through 2016, 2018, and 2019 on a monthly basis which is generally consistent with federal requirements for assessing potential impacts through EA. Hydrological assessment has occurred from 2011 to 2019. Mean Annual Discharge (MAD) (m³/s) as measured at the Water Survey Canada (WSC) Wheeler River Watershed Station (06DA005) during 2016, 2018 and 2019 was 17.07, 17.34 and 19.23, respectively, all of which were slightly above the 43 year (1977 to 2019) average of 16.82. The MAD in 2016 and 2018 can be considered near average, with 2019 being considered an average-high flow year, but well below the maximum observed for the timeseries (27.62 m³/s). Since this period, there</p> | No changes to the EIS are required. |

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| | | | | <p>characterization does not seem sufficient to adequately characterize the baseline and the variation it would experience. An effective baseline characterization is vital to ensure water quality is indeed not being affected by the project. In addition, it is not clear if data quality objectives were applied to determine baseline information was adequate.</p> <p>To meet CEAA 2012 requirements, and CNSC expectations outlined in REGDOC 2.9.1, Environmental Principles Assessments and Protection Measures, the applicant is required to complete a characterization of the baseline environment.</p> <p>As described in REGDOC 2.9.1 Appendix B.2, Characterization of the Baseline Environment for Environmental Assessment Under CEAA 2012, the “baseline information should be sufficient to support the use of an aquatic dispersion model to conduct the site-specific ERA and to support an assessment of the effects of the environment on the facility or activity”</p> <p>In addition, the “applicant or licensee should include an assessment of any limitations or gaps in the quality and extent of baseline data and methods, as well as the method(s) by which they have been addressed.”</p> | <p>Suggestions for mitigation and follow-up measures: CNSC recommends that additional water samples are collected and analyzed at a consistent frequency to ensure a robust baseline</p> | <p>have been no land use changes within the area that would constitute a major change in water quality.</p> <p>Baseline water quality samples were collected during years of average to average-high flows in the Wheeler River system and therefore representative of background conditions for assessment of potential impacts in the EIS. Additional conservatism was included in the impact assessment by using the 95th percentile values for baseline parameter concentrations when modelling potential effluent effects. As such, the surface water quality data collected are suitable for the intended purpose of assessing potential impacts and the additional conservativisms that were included as part of the assessment were precautionary.</p> <p>Given the above, Denison feels strongly that the baseline water quality data collected are suitable for the purposes of the EIS and the application of additional conservativisms in the use of the data provide a conservative (i.e., protective) framework for evaluating potential effects.</p> <p>Denison commits to the collection of additional surface water quality baseline data prior to project development starting to ensure updated baseline information is available for identification of any changes that might influence estimates of Project impacts. These data will be used to support permitting and licensing through updates to the ERA.</p> | |
| IR-108 | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.3.3 Aquatic Environment | <p>Context: Tables 8.2-2 and 8.2-3 provide summaries of the baseline surface water quality in the LSA. No justifications for the selection of water quality guidelines have been provided. COPCs that require calculations based on other parameters such as hardness, pH, or temperature to derive guidelines (i.e., ammonia, cobalt, zinc, etc.) should be indicated within the table, with a note specifying the parameter values used in the calculations, so that thresholds may be confirmed. No baseline data for un-ionized ammonia has been provided, which is a Schedule 4 substance requiring monitoring under the MDMER. For cobalt, manganese, and vanadium, Federal Environmental Quality Guidelines (FEQGs) and/or CCME Canadian Water Quality Guidelines (CWQGs) for the Protection of Aquatic Life have not been included. A guideline of 26 mg/L has been provided for molybdenum as a Saskatchewan Environmental Quality Guidelines (SEQG), however the actual SEQG is 31 mg/L and the CCME CWQG is 0.073 mg/L.</p> <p>Rationale: In order to assess potential changes to surface water quality from Project related activities, ECCC requires that data on all parameters that require MDMER effluent and receiving environment monitoring be provided for assessment, including accurate water quality guidelines where available.</p> | <p>1. Update Tables 8.2-2 and 8.2-3 to include all COPCs that require effluent characterization and receiving environment monitoring under the MDMER.</p> <p>2. Update Tables 8.2-2 and 8.2-3 to include missing or corrected water quality guidance thresholds, and information on values used to derive thresholds for COPCs that are dependent on general parameters.</p> | Please see Attachment IR-108. | Tables 8.2-2 and 8.2-3 will be updated in the final EIS, per Attachment IR-108. |
| IR-109 | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.1.1 Aquatic Environment | <p>Context: In this section it is stated “Treated water from the IWWTP will be pumped to the three Effluent Monitoring and Release Ponds (each 3,300 m³). These ponds will be designed to hold effluent for 72 hours for testing before discharge to the environment” (p. 8-75). It is unclear what procedure will be followed if effluent in monitoring ponds does not meet discharge requirements following testing.</p> <p>Additionally, it is also stated that “Treated water in the Effluent Monitoring and Release Ponds will be monitored prior to release to a surface waterbody or injected into groundwater via deep well injection.” However, the MDMER pursuant to the Fisheries Act requires all mine effluent and seep. from the mine site that contain deleterious substances be discharged through a final discharge point.</p> <p>Rationale: In order to fully understand effluent management, more information is required regarding the procedure for managing effluent in monitoring ponds that does not meet discharge requirements. It is unclear how effluent that does not meet discharge requirements will be managed if it needs re-treatment and re-testing prior to discharge.</p> <p>ECCC reminds the Proponent that Project effluent from all final discharge points must meet federal legislation requirements.</p> | Provide further information regarding management of effluent in monitoring ponds that does not meet the requirements for discharge under the MDMER. | Section 2 Project Description, Section 2.2.3.9 Treated Effluent Monitoring and Release Ponds of the draft EIS outlines Denison's commitment to test effluent prior to discharge to Whitefish Lake, to ensure it meets federal and provincial discharge limits. Any pond not meeting the criteria will be recycled back to the Industrial Wastewater Treatment Plant via the process water pond. | No EIS updates are anticipated to address this IR. |
| IR-110 | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.1.1 Aquatic Environment Appendix 8-E, Section 2.1 | <p>Context: It is stated that the diffuser at the final effluent discharge point will be located in approximately 3m of water. However, in Figure 8.2-5 displaying the location of the proposed diffuser and lake bathymetry, the diffuser location seems to be located in 2-2.5m of water. A similar image in Figure 1 Section 2.0 of Appendix 8-E also indicates that the diffuser seems to be located in 2-2.5m of water. Additionally, while thermal effects are unlikely, this cannot be confirmed until a more detailed diffuser design is provided for review.</p> <p>Rationale: The Proponent should confirm the location and depth of the proposed diffuser in order to confirm that modelling predictions for effluent discharged into the receiving environment are accurate.</p> | <p>Provide confirmation of the diffuser depth and location.</p> <p>ECCC requests the opportunity to review the finalized diffuser design once it is available.</p> | The diffuser will be placed at a depth between 2.5 and 3 m. The mapping provided in the draft EIS and Appendix 8-E is based on coarse bathymetric information, which will be supplemented with more robust bathymetric surveys to support final siting and design associated with permitting and licensing. | No EIS updates are anticipated to address this IR. |

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| IR-111 | CNSC | Fish and fish habitat | Section 8.2.4.2.2, Controlled Discharge | <p>Context: This section of the EIS indicated that the scenario was assessed using a conservative assumption of a continuous freshwater withdrawal rate of 40.5 m3/hr, and a continuous effluent discharge rate of 81.0 m3/hr.</p> <p>Rationale: The withdrawal rate assessed is half of the effluent rate, it is unclear from the text where the other half of the volume of effluent is coming from, if not drawn from the lake.</p> | Please clarify where the other half of the total volume of effluent discharged is from in the water balance between water intake and effluent. | Process water will be drawn from both groundwater and surface water (when required). The 81.0 m³/hr discharge rate conservatively assumes withdrawal from both sources at the maximum proposed rates. Please refer to Section 2.2.3 and specifically Figures 2.2-14, 2.2-15 and 2.2-16 of the draft EIS which depict the water balance for the Project for each of Construction, Operation and Decommissioning phases. | No EIS updates are anticipated to address this IR. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IR-112 | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.2.2, Aquatic Environment Appendix 8-E, Section 1.2.1 Appendix 10-A (ERA), Section 3.1 | <p>Context: This section of the EIS states that, “for the purpose of assessing the scenario of greatest potential effects, the Project was assessed as having a continuous freshwater withdrawal rate of 40.5 m³/hr and a continuous effluent discharge rate of 81.0 m³/hr.” (p. 8-21)</p> <p>However, several sentences later it is stated that, “The approach to assessing Project-related effects on the Surface Water Quality VC was conservative for the following reasons: The assessment was based on a continuous (year-round) discharge rate at an expected average effluent discharge of 0.0101 m3/s (or 36.5 m3/hr) throughout Construction, Operation, and Decommissioning...”</p> <p>This is a continuous theme throughout Section 8, Aquatic Environment, where the discharge rate for the surface water quality assessment changes between 36.5 m3/hr and 81.0 m3/hr. However, in Appendix 10-A (ERA) the 36.5 m3/hr discharge rate is the only value used for the near and far-field modelling.</p> <p>It should be made clear in the main body of the draft EIS that the average effluent discharge rate of 36.5 m3/hr has been used as the input for the near- and far-field modelling for effluent, surface water and sediment quality predictions. The maximum upper bound discharge rate is 81 m3/hr; however, modelling for effluent, surface water and sediment quality was not completed for this discharge rate.</p> <p>Rationale: It remains unclear throughout the draft EIS that all predictions of COPC concentrations in effluent, and receiving environment surface water and sediment are based upon the effluent discharge rate of 36.5 m3/hr, and not the maximum upper bound discharge rate of 81 m3/hr. All conclusions about risk to the environment and aquatic and terrestrial biota must make this clear. If the Proponent wishes to make conclusions based on the maximum upper bound discharge rate of 81 m3/hr, modelling needs to be conducted using this rate of discharge.</p> | <p>1. Confirm that the surface water quantity, quality, and aquatic biota risk assessments and modelling, were conducted using the discharge rate for 36.5 m3/hr within the draft EIS.</p> <p>2. Revise any statements or conclusions in the draft EIS to improve clarity about the usage of the maximum upper bound discharge rate of 81 m3/hr. Remove statements regarding use of the discharge rate of 81 m3/hr during modelling and risk assessments to the receiving environment as needed.</p> | <p>1. Denison confirms that the surface water quantity, quality, and aquatic biota risk assessments presented in the draft EIS and ERA (Appendix 10A) were conducted using the discharge rate for 36.5 m³/hr.</p> <p>2. Denison provides the following summary to clarify effluent discharge rates and identify updates to the final EIS:</p> <ul style="list-style-type: none">Section 8.2.4.2.2 of the EIS will be modified (see details in EIS Updates column).Appendix 8-E used an effluent discharge rate of 36.5 m³/hr, which is correct. No changes required.Appendix 10-A used an effluent discharge rate of 36.5 m³/hr in the modelling and ERA results; however, in Section 6.2 of the ERA in Appendix 10-A, a sensitivity analysis was conducted to assess the effects on surface water and sediment when the effluent discharge rate is increased to the upper bound discharge rate of 81 m³/hr. No changes required. | <p>The sentence in Section 8.2.4.2.2 will be updated in the final EIS as follows:</p> <p>Denison does not intend to include constant freshwater withdrawal or effluent discharge throughout Operation; however, for the purpose of assessing the scenario of greatest potential effects, the Project was assessed as having a continuous freshwater withdrawal rate of 40.5 m³/hr and a continuous effluent discharge rate of 81.0 36.5 m³/hr.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IR-113 | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.2.3 and Section 8.4.7.6, Aquatic Environment | <p>Context: No quantitative assessment of climate change has been conducted. Representative concentration pathways (RPC) projections for climate change have not been integrated with near-and far-field modelling to assess impacts to surface water quality or sediment quality in the future.</p> <p>Rationale: Changes in air and water temperatures, precipitation, snow melt, ice formation, etc., due to climate change can all influence COPC concentrations in surface water and sediment. It is not possible to assess the potential impacts from climate change on predicted surface water and sediment COPC concentrations with the current information.</p> | Provide a quantitative analysis of the potential impacts of predicted COPCs from mine effluent to surface water and sediment quality with climate change scenarios for the Project lifespan incorporated into modelling. Include modelling predictions regarding the influence of changes to air and water temperatures, precipitation, snow melt, ice formation, etc., on COPC concentrations in surface water and sediment. | <p>Section 8.1.3.4 (and Appendix 8-C) provides a quantitative assessment of the potential changes in surface water quantity due to climate change. The 1:100 year, 24-hour return period rainfall events for the baseline and climate change influenced IDF curves are 79.9 mm and 88.6 mm, respectively. The PMP for the Project is estimated to be 493 mm (refer to IR-15 and AD-15) which is well above both 24-hour maximum precipitation and 1:100, 24 hour return precipitation events. The PMP is very conservative (e.g., assumes effectively a full year of precipitation in one event) under both existing and future conditions (climate change). The potential impacts of climate change to precipitation and therefore flows was summarized in Appendix 6-C, Table 10 with the total annual precipitation and the maximum 1-day events being variable over the next four decades (Table 1). Regardless, the climate change scenario indicates a potential increase in event based assimilative capacity in the receiving environment.</p> <p>TABLE 1- Existing and Predicted Precipitation Data for Key Lake (provided in EIS, Appendix 6-C, Table 10)</p> <table><tr><th>Year</th><th colspan="4">Total Annual (mm)</th><th colspan="4">Maximum 1-day (mm)</th></tr><tr><td></td><td>Measure d</td><td>RCP 2.6</td><td>RCP 4.5</td><td>RCP 8.5</td><td>Measure d</td><td>RCP 2.6</td><td>RCP 4.5</td><td>RCP 8.5</td></tr><tr><td>2011-2020</td><td>455</td><td>518</td><td>509</td><td>508</td><td>48</td><td>29</td><td>27</td><td>27</td></tr><tr><td>2030</td><td></td><td>528</td><td>503</td><td>537</td><td></td><td>27</td><td>24</td><td>26</td></tr><tr><td>2040</td><td></td><td>487</td><td>498</td><td>514</td><td></td><td>28</td><td>29</td><td>24</td></tr><tr><td>2050</td><td></td><td>504</td><td>524</td><td>520</td><td></td><td>26</td><td>29</td><td>33</td></tr><tr><td>2060</td><td></td><td>513</td><td>515</td><td>523</td><td></td><td>26</td><td>33</td><td>26</td></tr><tr><td>2070</td><td></td><td>527</td><td>534</td><td>568</td><td></td><td>29</td><td>31</td><td>28</td></tr><tr><td>2080</td><td></td><td>539</td><td>551</td><td>547</td><td></td><td>30</td><td>33</td><td>28</td></tr><tr><td>2090</td><td></td><td>543</td><td>545</td><td>548</td><td></td><td>31</td><td>32</td><td>35</td></tr><tr><td>2100</td><td></td><td>546</td><td>535</td><td>559</td><td></td><td>23</td><td>25</td><td>28</td></tr><tr><td colspan="2">Overall Increase:</td><td>28</td><td>26</td><td>51</td><td></td><td>-6</td><td>-2</td><td>1</td></tr></table> <p>To mitigate the potential for unplanned release of deleterious substances into the surface water environment even during the next 40 years of climate change, the PMP of 493 mm was</p> | Year | Total Annual (mm) | | | | Maximum 1-day (mm) | | | | | Measure d | RCP 2.6 | RCP 4.5 | RCP 8.5 | Measure d | RCP 2.6 | RCP 4.5 | RCP 8.5 | 2011-2020 | 455 | 518 | 509 | 508 | 48 | 29 | 27 | 27 | 2030 | | 528 | 503 | 537 | | 27 | 24 | 26 | 2040 | | 487 | 498 | 514 | | 28 | 29 | 24 | 2050 | | 504 | 524 | 520 | | 26 | 29 | 33 | 2060 | | 513 | 515 | 523 | | 26 | 33 | 26 | 2070 | | 527 | 534 | 568 | | 29 | 31 | 28 | 2080 | | 539 | 551 | 547 | | 30 | 33 | 28 | 2090 | | 543 | 545 | 548 | | 31 | 32 | 35 | 2100 | | 546 | 535 | 559 | | 23 | 25 | 28 | Overall Increase: | | 28 | 26 | 51 | | -6 | -2 | 1 | No EIS updates are anticipated to address this IR. |
| Year | Total Annual (mm) | | | | Maximum 1-day (mm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Measure d | RCP 2.6 | RCP 4.5 | RCP 8.5 | Measure d | RCP 2.6 | RCP 4.5 | RCP 8.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2011-2020 | 455 | 518 | 509 | 508 | 48 | 29 | 27 | 27 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2030 | | 528 | 503 | 537 | | 27 | 24 | 26 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2040 | | 487 | 498 | 514 | | 28 | 29 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2050 | | 504 | 524 | 520 | | 26 | 29 | 33 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2060 | | 513 | 515 | 523 | | 26 | 33 | 26 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2070 | | 527 | 534 | 568 | | 29 | 31 | 28 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2080 | | 539 | 551 | 547 | | 30 | 33 | 28 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2090 | | 543 | 545 | 548 | | 31 | 32 | 35 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2100 | | 546 | 535 | 559 | | 23 | 25 | 28 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Overall Increase: | | 28 | 26 | 51 | | -6 | -2 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Ref. # | Department | Project Effects Link | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Information Requirement (IR) ² | Denison Response | Final EIS Updates |
|--------|------------------|--|---|--|--|--|--|
| | | | | | | used for water management engineering designs. During a PMP, water requiring management will report to the wellfield runoff pond which will be sized to accommodate a PMP event at the site. This pond has been sized to 38,200 m ³ (excluding a freeboard of 1 meter). From the wellfield runoff pond, water will then be sent to the process water pond for treatment if required. In Section 2.8 Project Design Features, Denison notes that “Ponds will be designed to maintain a minimum freeboard of at least 1.0 m to allow for continued functioning during a probable maximum precipitation (PMP) event.” As such, the project has been designed to manage water during PMP and greater, and therefore mitigation of potential impacts to water quality due to climate change has been initially included as part of the EIS. As a result, it is Denison's opinion that a quantitative assessment of potential impacts to surface water quality is not warranted as it is likely to indicate improved results from the conservative assessment of potential water quality changes during operation and decommissioning phases. Continued monitoring of background, effluent and receiver water quality will be undertaken and provide the ability for adaptive management throughout the life of the mine in association with potential climatic changes to the local and regional area. | |
| IR-114 | ECCC CNSC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.2.3 and Section 8.2.4.2.4 | <p>Context: Tables 8.2-9, 8.2-10 and 8.2-13 demonstrate predicted maximum effluent concentrations of COPCs and maximum predicted receiving environment concentrations in the near- and far-field. General parameters such as temperature, pH, conductivity, etc. that would require Project thresholds and monitoring under the MDMER have not been provided in this table. Lead, nickel, TSS and un-ionized ammonia were not provided, despite all being Schedule 4 substances with maximum monthly concentrations under the MDMER. Aluminum, iron, nitrate, thallium, and manganese have not been provided despite being required parameters under Schedule 5 Section 4 of the MDMER for effluent characterization.</p> <p>For zinc, it is unclear how guidelines have been calculated when CCME thresholds can only be derived with hardness values <250 mg/L. Additionally, water quality thresholds appear to have been calculated using estimated effluent concentrations rather than receiving environment baseline concentrations.</p> <p>Mercury has been identified as a COPC of interest to Indigenous groups for the proposed Project. Table 8.2-8 indicates that background concentrations of mercury in LA-5 are low, and predicted effluent concentrations are also low. However, no information has been provided on background methylmercury concentrations or expected atmospheric deposition of mercury from Project related emissions. Predicted effluent concentrations of 3915 mg/L of sulphate are quite high, and sulphate is known to increase mercury methylation rates in aquatic environments.</p> <p>Rationale: A review of all modelling results for all COPCs under the MDMER will assist ECCC in understanding the potential risks to the receiving environment. ECCC recommends the use of the most stringent guidelines for the protection of aquatic biota. All water quality thresholds should be derived from receiving environment parameters to determine any baseline receiving environment and effluent COPC exceedances of water quality thresholds.</p> <p>Increased sulphate availability can lead to increased methylation rates of mercury and methylmercury in sediment and surface water. Methylmercury is a toxin that can bioaccumulate within the food chain and present risks to aquatic biota and wildlife consuming aquatic biota. Potential changes to methylmercury concentrations in water quality, sediment and fish tissues should be assessed due to the proposed sulphate loadings in effluent.</p> <p>Additionally, in accordance with the MDMERs, Denison will be required to demonstrate that their effluent quality meets the limits in the MDMER. Denison is expected to provide the predicted effluent quality for lead, nickel, and un-ionized ammonia to demonstrate compliance with the MDMERs.</p> | <ol style="list-style-type: none">1. Update all tables to include all COPCs with required monitoring under the MDMER including acute and chronic thresholds.2. Ensure all selected water quality thresholds are derived using baseline receiving environment concentrations and use water quality guidelines that are protective of aquatic biota.3. Provide baseline data on the concentrations of methylmercury in surface water, sediment and fish tissues (i.e., large-bodied sports fish and small-bodied forage fish) in the LSA and RSA receiving environment to establish a baseline prior to potential Project impacts.4. Provide an assessment of risk from methylmercury to ecological receptors due to changes in sulphate concentrations in effluent, and potential deposition of mercury from Project related atmospheric emissions in the receiving environment. | See response in Attachment IR-114. | Tables 8.2-9, 8.2-10, and 8.2-13 will be updated in the final EIS. The updated tables are provided in Attachment IR-114. |
| IR-115 | ECCC | Fish and fish habitat | Section 8.2.4.2.3 Aquatic Environment Appendix 10-A (ERA), Section 3.1.1.1 | <p>Context: Table 8.2-8 demonstrates baseline concentrations of COPCs in LA-5 South Whitefish Lake, their respective water quality guidelines from applicable sources, and proposed Project thresholds. General parameters such as temperature, pH, conductivity, etc. that would require Project thresholds and monitoring under the MDMER have not been provided in this table. Lead, nickel, Total Suspended Solids (TSS) and un-ionized ammonia were not provided, despite all being Schedule 4 substances with maximum monthly concentrations under the MDMER. Aluminum, iron, nitrate, thallium, and manganese have not been provided despite being required parameters under Schedule 5 Section 4 of the MDMER for effluent characterization. Water quality thresholds appear to have been calculated using estimated effluent concentrations rather than receiving environment baseline concentrations. The water quality objective selected for molybdenum is the 31 mg/L SEQG rather than the CCME guideline of 0.073 mg/L.</p> <p>Rationale: ECCC recommends the use of guidelines that will ensure the protection of aquatic biota. All water quality thresholds should be</p> | <ol style="list-style-type: none">1. Update Table 8.2-8 to include all COPCs with required monitoring under the MDMER.2. Ensure all selected water quality thresholds are derived using baseline receiving environment concentrations and are at levels protective of aquatic life.3. Provide additional information to justify the use of the selected water quality guideline for molybdenum. | <ol style="list-style-type: none">1. Table 8.2-8 has been updated and provided in Attachment IR-1152. Denison believes that the water quality thresholds used in the assessment (Section 8.2.4.2.3, Aquatic Environment; Appendix 10-A (ERA), Section 3.1.1.1) were appropriate and reflect levels that are protective of aquatic life. The predictive water quality analysis considered the effects of toxicity modifying factors, such as hardness, on water quality. Specifically, the analysis considered induced hardness - that is hardness that is derived from or includes contributions from on site sources and in this case discharge from the IWWTP. It is a reasonable in this case to utilize induced hardness since the water quality assessment directly considers the potential effect of IWWTP discharge on the receiving environment. The hardness added to the receiver from the discharge represents a constant source during periods of discharge. The effluent hardness value used in the analysis was derived from bench scale testing and is considered to be a reasonable estimate of expected hardness in effluent. With that in mind, the predictive water quality analysis reflects the water quality conditions that are anticipated to prevail in the receiver and therefore presents an appropriate platform on which to base the effects assessment. | Table 8.2-8 of the draft EIS will be replaced per the IR response as indicated. |

| Ref. # | Department | Project Effects Link | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Information Requirement (IR) ² | Denison Response | Final EIS Updates |
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| | | | | derived from receiving environment parameters to determine any baseline receiving environment and effluent COPC exceedances of water quality thresholds. | | <p>3. Denison has selected the Saskatchewan specific guideline for molybdenum of 31 mg/L to be the most appropriate for the Project. It was derived from recent data following the CCME (2007) protocol. The molybdenum water quality objective based on the 5th percentile (HC5) of the species sensitivity distribution (SSD) according to the CCME protocol; 18 data points for 12 different species were used, mainly EC10 data (WSA, 2017). The CCME guideline is identified as an interim guideline and was based on multiplying the lowest chronic toxicity value, the 28-d LC50 of 0.73 mg/L for rainbow trout (O. mykiss), by a safety factor of 0.1. This original study by Birge (1978) has not been reproducible, either using the original methods or using standard methods (Davies et al. 2005). No changes to the EIS are proposed in this regard.</p> <p><u>References:</u> Birge, W.J. 1978. Aquatic Toxicology of Trace Elements of Coal and Fly Ash. Special Collections, USDA National Agricultural Library. Accessed February 16, 2023, https://www.nal.usda.gov/exhibits/speccoll/items/show/5224.</p> <p>CCME. 2007. A protocol for the derivation of water quality guidelines for the protection of aquatic life.</p> <p>Davies, T.D., J. Pickard and K.J. Hall. 2005. Acute molybdenum toxicity to rainbow trout and other fish. Journal of Environmental Engineering & Science 4: 481-485.</p> <p>WSA (Saskatchewan Water Security Agency). 2017. Saskatchewan Water Quality Objective for the Protection of Aquatic Life – Molybdenum. Fact Sheet. Report No. WSA 514.</p> | |
| IR-116 | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.2.5, Section 8.4.4.2.5 and Section 8.5.4.2.3 | <p>Context: Tables 8.2-14, 8.4-9 and 8.5-5 demonstrate predicted mass flux (in mg/s) of COPCs in groundwater during the future centuries scenario. The table does not provide any information on actual surface water concentrations of COPCs or accumulation in concentrations over time. It is not possible to determine what the COPC concentrations in surface water and sediment will be during the future centuries scenario with the current information.</p> <p>Additionally, only a subset of parameters have been provided in this table based on parameters that were elevated in effluent after treatment. Groundwater may have a variety of different COPCs with elevated concentrations as it will migrate directly from the ore body area and not receive treatment.</p> <p>Rationale: It is not possible for ECCC to assess the predicted concentrations of COPCs in surface water and sediment, and therefore risk to aquatic biota during the future centuries scenario with the provided information.</p> | <p>1. Provide the predicted water and sediment quality concentrations of COPCs in the receiving environment for the future centuries scenario.</p> <p>2. Include data for a greater suite of COPCs that were assessed as having potential to be at elevated concentrations in groundwater.</p> | See response in Attachment IR-116. | The EIS will be updated with the information provided in Attachment IR-116. Specifically, Table 8.2-14 and Table 8.4.9 of the EIS will be replaced by Table 1 of Attachment IR-116 and Table 8.5.5 will be replaced by Table 2 of Attachment IR-116.. |
| IR-117 | CNSC | Human health with respect to hazardous contaminants | Section 8.2.4, Table 8.2-9 | <p>Context: CNSC staff note that some of the effluent quality predictions in the EIS are quite high for a uranium mine and mill facility compared to the existing facilities.</p> <p>For example, the upper bound effluent quality of molybdenum is 2.5 mg/L. In 2021, the highest monthly mean concentration at the existing uranium mine and mill facilities is 0.213 mg/L.</p> <p>Also, the upper bound effluent quality of copper is 0.022 mg/L. In 2021, the highest monthly mean concentration at the existing uranium mine and mill facilities is 0.002 mg/L.</p> <p>Rationale: Surface water quality models should be based on the anticipated effluent quality. From discussions with Denison, it appears that the effluent quality predictions may change based on the results of more bench scale tests that are still being conducted and continued optimization of the design of the water treatment plant.</p> | <p>Please provide the anticipated effluent quality of the constituents of potential concern during normal operations.</p> <p>Once Denison has refined the effluent quality predictions, Denison is expected to update the inputs into the surface water quality model.</p> | <p>The anticipated effluent quality of constituents of potential concern during normal operations presented in the draft EIS is based primarily on lab tests conducted by Denison with a safety factor of three added. Section 3.1.1.2 of the ERA (Appendix 10-A) states: "The reasonable upper bound treated effluent was derived using a combination of information available from lab tests conducted by Denison as well as derived effluent quality based on not exceeding water and sediment quality guidelines in the middle part of Whitefish Lake. Effluent treatment feed solution was prepared by leaching drill core material from the Phoenix deposit, and further processing that solution through two steps (process precipitate removal and yellowcake precipitation) prior to effluent treatment testing. Effluent treatment tests incorporated three stages: low pH, high pH, and neutralization. A combination of reagents (iron sulphate, barium chloride, lime, and sulphuric acid) was used to facilitate precipitation of constituents. After each stage, solid-liquid separation was conducted by mixing flocculant with solution to settle solids to the bottom of the test vessel. The supernatant liquid was used for the following stage. The solids were washed, filtered, and dried to determine solids mass generation for mass balance purposes. For each stage, the liquids and solids were assayed for various COPCs. The reasonable upper bound effluent was usually an expected effluent quality from Denison multiplied by a safety factor of three." The derived effluent quality based on not exceeding a water and sediment quality guideline was only used for a handful of constituents. The ERA will be revised to remove lead-210 from the list of constituents that used the derived effluent quality, as the concentration was based on Denison lab tests. In addition, Section 3.1.1.2 of Appendix 10-A will be modified to state: "The derived effluent quality was used for a handful of constituents including cadmium, chromium, and selenium".</p> <p>Denison intends to continue to refine effluent quality predictions as part of the BATEA assessment and licensing phase of the Project. The effluent quality predictions provided in the EIS will continue to bound the assessment and provide a conservative representation of risk to human health and the environment. No changes to the EIS are proposed in this regard. See also responses to IR-16 and IR-18.</p> | <p>Revisions to the draft EIS and ERA (Appendix 10-A) will be made per the IR response as indicated below.</p> <p>Section 10.1.4.2.2 of the EIS and Section 3.1.1.2 of the ERA (Appendix 10-A) will be revised to remove lead-210 from the list of constituents that used the derived effluent quality, as the concentration was based on Denison lab results. The text in both sections will read "The derived effluent quality was used for a handful of constituents including cadmium, chromium, and selenium."</p> |
| IR-118 | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.6.1, Section 8.4.6.1 and Section 8.5.6.1, Aquatic Environment | <p>Context: It is unclear if Tables 8.2-16, 8.4-12, 8.5-7 and 8.5-8 take into consideration potential effects from groundwater seepages of COPCs to surface water and sediment quality in the future centuries scenario. No information regarding the future centuries scenario has been provided in the rationale summary for ratings.</p> <p>Rationale: Groundwater seepage of COPCs may have future impacts to surface water quality, sediment quality and aquatic receptors; however, the extent of residual effects is unclear without further information.</p> | Provide further information regarding how groundwater seep. of COPCs may have future impacts to surface water quality, sediment quality, and aquatic receptors, and any residual effects that may persist. | It can be confirmed that Tables 8.2-16, 8.4-12, 8.5-7 and 8.5-8 did take into consideration potential effects from groundwater seepages of COPCs to surface water and sediment quality in the future centuries scenario. Ground water contributions to surface water as a result of excursions or migration from the shallow groundwater aquifer to Whitefish Lake was well documented in Section 7 and Appendix 7-C. For the COPCs identified in the effluent, the predicted mass flux from groundwater into Whitefish Lake Middle starting 200 years after the Project phases, during the future centuries, was input to the IMPACT model to predict the water and sediment concentrations over time at the exposed locations. The COPCs in groundwater will be released to Whitefish Lake Middle at a predicted mass flux as shown in Table 3-4 (Appendix 7-C) The results of the predictive modelling were then used to support | No EIS updates are anticipated to address this IR. |

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| | | | | | | the environmental risk assessment to assess potential impacts and risks to surface water, sediment and aquatic biota. The IMPACT model scenario for the future centuries was undertaken specifically to investigate the potential for groundwater migration to Whitefish Lake in future centuries to impact the aquatic environment of Whitefish Lake. For each medium or receptor (i.e., surface water, sediment or aquatic biota) no risk was identified during the future centuries period (Appendix 10-A). Additional information concerning potential impacts of groundwater interactions with Whitefish Lake are provided in IR-116. | |
| IR-119 | CNSC | Fish and fish habitat | Section 8.3.1.2, Table 8.3-1, Sediment quality | <p>Context: Sediment quality isn't considered a key indicator for fish and fish habitat, but the accumulation of contaminants in sediment porewater without habitat alteration is similar to the key indicator 'change in surface water quality from baseline conditions' that is considered.</p> <p>Rationale: It is not clear whether sediment was just considered for physical disturbance, and why chemical changes are missing from key indicator list for fish and fish habitat.</p> | Please provide the rationale for exclusion of sediment quality from the key indicator list for fish and fish habitat. | <p>Sediment quality was not included as an indicator for the Fish and Fish Habitat VC, rather Sediment Quality and Benthic Invertebrates were elevated to VCs within the EIS (Section 8.4). In the draft EIS Section 8.4.1.1, Sediment Quality VC was identified as having interrelations or linkages to Benthic Invertebrates (VC) as their medium of support to life-cycles as well as the Fish and Fish Health VC. Specifically, the sediment that benthic invertebrates inhabit as the medium responsible for their ability to carry out their life processes. Benthic invertebrates provide an important forage base for fish species. Aquatic sediments and benthic invertebrates (food supply) are inferred as part of the definition of fish habitat under subsection 2(1) of the Fisheries Act, 1985 (Government of Canada 2019).</p> <p>Alterations to Sediment Quality in an aquatic environment can directly affect Fish and Fish Habitat and this was taken into consideration both with respect to physical and chemical changes. Under Section 8.4.1.2 and Table 8.4.1, key indicators and measurable parameters for sediment quality were provided and included:</p> <ul style="list-style-type: none">- Sediment quantity and physical quality (particle size) from baseline conditions- Change in sediment quality (chemical) from baseline concentrations <p>The results of the assessment of potential effects and significance of those effects for sediment quality as a VC are directly translatable to Fish and Fish Habitat as identified in Sections 8.3.1.1 and 8.4.1.1. As such, providing the same assessment within both sections is considered redundant.</p> | No EIS updates are anticipated to address this IR. |
| IR-120 | CNSC | Aquatic species | Section 8.3.3 and 8.5, Aquatic Environment | <p>Context: Although downstream impacts are not predicted by Denison it is important from an ecosystem perspective to establish baseline locations to monitor for potential cumulative effects to the aquatic environment due to the Key Lake and Wheeler River Operations to ensure the aquatic environment is being protected from cumulative impacts.</p> <p>Denison should consider adding a far-field exposure location and collecting baseline aquatic ecosystem baseline data in Russell Lake including:</p> <ul style="list-style-type: none">• Water quality/chemistry• Sediment chemistry/quality• Benthic invertebrate chemistry /community• Large-bodied fish tissue/chemistry <p>Rationale: Russell Lake is identified as part of the RSA for the aquatic environment, but it appears that no detailed aquatic baseline data was completed in far-field location in Russell Lake. In addition, several Indigenous Nations and communities and local resource users have indicated that Russell Lake is an important body of water both culturally for traditional use and was once used as commercial fishery.</p> | <p>If Denison has not collected baseline aquatic studies in the far-field downstream receiving environment of Russell Lake, please provide a rationale for why.</p> <p>If a far-field Russell Lake location was sampled as part of baseline data collection, more information about the process and results with regards to sampling at Russell Lake should be included in the EIS. This information would be valuable to help determine potential cumulative effects downstream in the Russell Lake drainage system (due to the Key Lake Operation) which has been identified as a key concern and area of interest by several Indigenous Nations and communities.</p> | <p>Aquatic baseline surveys were conducted at two stations (LAB-1 and LAB-2) in Russell Lake and were considered 'far-field' stations in relation to the proposed mining plan for the Wheeler River Project. Data collection methods and results are presented in the draft EIS throughout the applicable subsections of Section 8.</p> <ul style="list-style-type: none">• Section 8.2 details the Surface Water Quality methods and results,• Sections 8.3 and 8.5 detail fish habitat, community, and health methods and results; and• Section 8.4 details sediment quality and benthic invertebrate community and chemistry methods and results. <p>A breakdown of where specific processes and results are located for each of these components is presented below:</p> <p><u>Surface Water Quality/Chemistry:</u> Surface Water Quality was sampled in Russell Lake. Methods and metrics are presented in Section 8.2.3.1. Water was sampled in Russell Lake and presented in Table 8.2-2 (Pages 8-60 to 8-62) of Section 8.2.3.3 of the EIS report, and summarized in Table 8.2-4. Surface Water predicted maximum Constituents of Potential Concern for the Russell Lake Inlet (LAB-1) are presented in Table 8.2-13 of Section 8.2.4.2.4. Cumulative effects are also assessed in Section 8.2.7. Detailed baseline summary data is presented in Appendix 8-D of the report in Table 3-3.</p> <p><u>Sediment Quality/Chemistry:</u> Sediment was sampled in Russell Lake, and the sample methodology is presented in Section 8.4.3.1. Sediment grain size results are summarized in Table 8.4-2 in Section 8.4.3.2.1, and full data is presented in Appendix 8-D, Table 3-4. Sediment chemistry was summarized in Table 8.4-3, and full data is in Appendix 8-D, Table 3-5.</p> <p><u>Fish Habitat, Tissue Chemistry, and Community:</u> Russell lake is not clearly indicated in the initial list of sample areas presented in Section 8.3.3 or Section 8.5.3; however, habitat information is presented in the Fish Habitat table (Table 8.3-4) of Section 8.3.3.2, and both Russell Lake sample locations (LAB-1 and LAB-2) and their associated fish community data are presented in the fish community map (Figure 8.3-6). Fish community and information is also presented in Table 8.3-4. Baseline fish community information is presented in Appendix 8-D of the report in Table 3-9. Fish chemistry summary data (Mean, Max, Min) for Northern Pike and White Sucker bone and tissue samples is presented in Table 8.5-2 of Section 8.5.3 of the Draft EIS. Detailed fish tissue data summary is presented in Appendix 8-D of the report in Table 3-10.</p> <p><u>Benthic Invertebrate Chemistry and Community:</u> Benthic invertebrates were sampled in Russell Lake, and the sample methodology is presented in Section 8.4.3.1. Benthic invertebrate endpoints are summarized in Table 8.4-4 of Section 8.4.3.2.4, and benthic invertebrate chemistry is summarized in Table 8.4-5. Detailed baseline benthic invertebrate community and chemistry data is presented in Appendix 8-D of the report in Table 3-8, and community data in Tables 3-7A to 3-7D.</p> <p>Also, refer to Cumulative Effects sections (Section 8.X.7) within each part of the Aquatic Environment assessment in the draft EIS for a discussion of potential cumulative effects in Russell Lake. (i.e., Section 8.2.7 for surface water quality; Section 8.3.7 for fish and fish habitat, 8.4.7 for sediment quality and benthic invertebrates, and 8.5.7 for fish health).</p> | No updates to the draft EIS are needed based on this IR response. |
| IR-121 | CNSC | Fish and fish habitat | Section 8.3.3.1, Methodology and Metrics | <p>Context: In the description of methodology for fish communities and spawning surveys, there's no mention that could be found for an any evaluation of fish condition, other than sexual condition.</p> | Please provide reference to where fish condition is considered or provide a justification for its exclusion. | Field work was conducted by aquatic biologists that are familiar with the identification of fish condition and abnormalities as it pertains to fish sampling protocols and the MDMER EEM guidance and protocols. As such, the lack of record of such gross abnormalities is reflective of fish populations of good condition. Any supplemental baseline surveys or future | No updates to the draft EIS are needed based on this IR response. |

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| | | | | Rationale: Exposure to other pre-existing stressors could result in abnormal conditions or deformation(s) in existing population, but the extent of existing conditions should be evaluated to ascertain whether the rate is increasing as a result of proposed activities once in operation. | | environmental effects monitoring will include documentation of fish condition and abnormalities. | |
| IR-122 | CNSC | Fish and fish habitat | Section 8.3.8, Monitoring and Follow-up | Context: Section 8.3.8 of the EIS states: "Changes in fish communities/populations will be assessed through comparison of Construction, Operation, and Decommissioning results to pre-development." Rationale: Tracking changes in fish communities / populations in reference lakes over time should be conducted, as reference lakes can be used to differentiate natural temporal variation with potential project impacts. | Please include reference lakes, and if it is provided, please reference where in the EIS these are discussed. If there are no reference lakes, these should be included in the monitoring program. | The preparation of a study design under the MDMER EEM program strives to ensure that a single reference area or multiple reference areas are as representative of a control condition as possible. Best practice is to undertake an analysis of candidate reference areas using the existing baseline information and investigate their utility as controls prior to project development. A preliminary EEM study can be completed prior to the commencement of ISR operations that will allow for a Before-After-Control-Impact study design, that will provide the ability to monitor change not only in the exposure areas, but in the reference areas, thereby allowing for a reasonable assessment of potential mine related impacts. | No updates to the draft EIS are needed based on this IR response. |
| IR-123 | ECCC | Change to an environmental component due to radiological contaminants | Section 8.4.3.2.3, Aquatic Environment Appendix 8-D, Table 3-5 | Context: Table 8.4-3 provides a summary of the baseline concentrations of COPCs in sediments in the LSA. Sediment quality thresholds and justification for the selection of those thresholds have not been provided. Table 3-5 in Appendix 8-D does provide benchmarks but the selection of benchmarks is not discussed, and the most stringent guidelines are not used for some COPCs. Additionally, there is no data provided for sediment concentrations of mercury, which is a COPC that requires surface water quality monitoring and effluent characterization under the MDMER. Rationale: Further information should be provided regarding any exceedances of sediment quality thresholds in baseline concentrations of COPCs, which should be recommended for further assessment of risk due to effluent discharges. | 1. Provide sediment quality thresholds and justification for the selection of those thresholds for comparison against measured baseline COPC concentrations in the LSA. 2. Provide data on baseline concentrations of mercury in sediment. 3. Identify any COPCs with baseline concentrations that exceed sediment quality thresholds in the LSA. | 1) Please see Attachment IR-123, Table 1, for a summary of baseline sediment concentrations and their respective screening criteria. As indicated in Appendix 10-A Section 3.1.2.3, “Burnett-Seidel and Liber (2013) was selected as the preferred source for the Project thresholds in the sediment quality assessment, as the reported NE2 and REF values are specifically applicable to Saskatchewan waterbodies.” Burnett-Seidel and Liber (2013) was used even if higher than CCME quality guidelines or Thompson et al (2005). In some instances, the NE2 value was lower than the REF value from Burnett-Seidel and Liber (2013). In those instances, the REF value was still used, as screening values should not be lower than background concentrations. 2) Mercury was not analyzed specific to sediments within the LSA during the initial baseline data collection period. Analysis of mercury at a low-level in sediment was not considered necessary for two reasons: 1. mercury is not associated with the uranium mining and milling process and 2. water quality sampling within the LSA indicated levels of mercury below detection at an acceptable level of detection (i.e., 0.00001 to 0.0000001 mg/L). Denison will collect background information pertaining to sediment total and methyl mercury from LSA lakes and streams prior to site development. 3) Please see Table 1 of Attachment IR-123 for a summary of baseline sediment concentrations and their respective screening criteria. One sample concentration for Cadmium of 0.7 µg/g (LAB-2-3) at Russell Lake exceeded the CCME ISQG of 0.6. Another value of 0.6 µg/g (LAB-2-CORE) at Russell Lake equaled to the CCME ISQG of 0.6. All other samples had cadmium concentrations below any screening criteria. References: Burnett-Seidel, C., Liber, K., 2013. Derivation of no-effect and reference-level sediment quality values for application at Saskatchewan uranium operations. Environ. Monit. Assess. 185, 9481–9494. Thompson, P.A., Kurias, J., Mihok, S., 2005. Derivation and use of sediment quality guidelines for ecological risk assessment of metals and radionuclides released to the environment from uranium mining and milling activities in Canada. Environ. Monit. Assess. 110, 71–85. | No updates to the draft EIS are needed based on this IR response. |
| IR-124 | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.4.4.2.3, Aquatic Environment | Context: Table 8.4-7 provides maximum concentrations of surface water COPCs in sediment. The following COPCs, which are required to evaluate the risk from effluent to sediment quality, were not evaluated: <ol style="list-style-type: none">COPCs that have monitoring requirements in receiving environment surface water and effluent under the MDMER,COPCs that exceed water quality guidelines in effluent, and,COPCs that have baseline concentrations that exceed sediment quality thresholds in the receiving environment. Rationale: Due to the lack of information on COPCs with baseline concentrations that exceed sediment quality guidelines, and COPCs that require monitoring under the MDMER, a determination on risk to sediment quality and aquatic biota cannot be made. | 1. Provide the information on baseline exceedances of COPCs in sediment. 2. Provide an assessment of risk for any COPCs that have baseline exceedances of sediment quality thresholds in the receiving environment. 3. Provide an assessment of risk from any COPCs that require monitoring in the receiving environment and effluent under the MDMER. Please include any COPCs in effluent that will exceed water quality guidelines. | 1) The information on the baseline exceedance of COPCs in sediment are provided as part of Attachment IR-123. The table indicates that only the maximum concentration of cadmium exceeded the CCME ISQG on one occasion when assessing all sediment samples over the course of baseline surveys in the LSA. 2) Only one sample concentration for Cadmium of 0.7 µg/g (LAB-2-3) at Russell Lake exceeded the CCME ISQG of 0.6 within the RSA. Another value of 0.6 µg/g (LAB-2-CORE) at Russell Lake equals to the CCME ISQG of 0.6. All other samples had cadmium concentrations below any screening criteria. Cadmium was included as one of the constituents identified as a COPC under the non-radiological Ecological Risk Assessment (Appendix 10-A). No significant adverse effect on either aquatic or terrestrial populations or communities, as a result of releases from the Project, are predicted during the Project phases or during the future centuries. All estimated total HQs for all COPCs (arsenic, cadmium, chromium, cobalt, copper, molybdenum, selenium, uranium, zinc, chloride, and sulphate) for all ecological receptors are predicted to remain below the HQ benchmark of 1. 3) Denison has provided an analysis of the parameters that are identified under MDMER Schedule 4 and therefore have specified effluent discharge criteria. Schedule 5 parameters will be monitored as per the MDMER once under this regulation (i.e., meeting regulated criteria of discharge to the environment [50 m3/day). Please refer to Table 8.2-13 of attachment IR-114. In these cases, COPCs including Schedule 4 parameters were below screening criteria. | Changes suggested for Table 8.2-13 as consistent with IR-114. |
| IR-125 | CNSC | Fish and fish habitat | Section 8.5, Aquatic Environment and Fish health | Context: Indigenous Knowledge studies and information collected in relation to the Project clearly identified the importance of water quality and fish health to local Indigenous peoples and is discussed throughout the Draft EIS. For example: <ul style="list-style-type: none">“Russell is one lake where I commercially fish. How will this effluent impact the water quality, fish health? Will I be able to sell fish from here? If there is going to water” pollution, I just want to know” (19-LK-ERFNTrip-134.255) ”“How are you going to protect the water quality? We are concerned about mercury in fish, other animals, etc. Is there mercury or arsenic in the uranium solution?” (p. 8-53) | One of the many mitigation measures mentioned throughout the aquatic environment section states: “Denison will work with the associated communities to develop and implement the Project-specific monitoring programs and a framework to share the results for the purpose of assessing the performance of the water management system.” (p.10-32) Has Denison considered the collection of additional baseline fish tissue species that are of importance to Indigenous Nations and communities and local cabin owners from | Fish tissue chemistry (bone and muscle) was collected for Northern Pike and White Sucker and presented in Table 8.5-2 of Section 8.5.3. Tissue was not collected for Walleye or Lake Whitefish, however, the tissue analysis of Northern Pike and White Sucker would be key indicators for the fish community in Russel Lake. Northern Pike is a piscivorous top predator much like Walleye, which would address concerns of bioaccumulation of mercury and other metals of concern. White Sucker is a generalist bottom feeding species that is often used to assess metal concentrations at a lower trophic level of the food chain. This information provides an initial baseline understanding of the tissue metal concentrations for the fish of Russell Lake. The outcomes of the impact assessment demonstrated there will be no expected impact to Russell Lake with respect to water quality, sediment quality or fish and fish habitat. As | No updates to the draft EIS are needed based on this IR response. |

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| | | | | Rationale: Several Indigenous Nations and communities and local resources users have indicated Russell Lake is an important body of water both culturally for traditional use and was used as commercial fishery in the past and from an aquatic ecosystem perspective. | Russell Lake? Assuming the species would be walleye (commercially and recreationally) and lake white whitefish that is traditionally an important species consumed. Please provide more information on the engagement to date on the development of the Surface Water Management Program and Monitoring program that Denison is developing and engagement to date with interested Indigenous Nations and communities in the region on fish and fish health. | discussed in the response to IR-120 and this IR, historic information from Russell Lake is available, but may require supplementation prior to project development to monitor potential changes to the aquatic environment in the lake. Engagement on licensing requirements, such as the development of the environmental monitoring program and the associated surface water quality and monitoring regime will occur in later in 2023 and 2024. As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Metis Local on monitoring regimes, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. Denison expects that important country foods harvested for food and cultural purposes (i.e moose, fish species, etc), surface water quality, and other areas of interest will form part of this monitoring program, including the potential to report on wildlife-vehicle mortality or other such areas of potential concern as they evolve over time. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project. | | | | | | | |
| IR-126 | ECCC | Aquatic species | Section 8.5.3 Appendix 10-A (ERA), Section 5.3.1.1.8 | Context: The Proponent has used the US Environmental Protection Agency (US EPA) guidelines for the assessment of selenium fish tissue concentrations in Section 8.5.3 of the draft EIS and in the Environmental Risk Assessment (ERA) in Appendix 10-A (ERA) of Section 10. Rationale: ECCC’s Federal Environmental Quality Guidelines of 6.7 ug/g dry weight fish whole body tissue for selenium should be used, as it is more protective than the US EPA guidelines. | Update the selenium fish tissue assessment in the draft EIS and the Wheeler River ERA (Appendix 10-A (ERA) in Section 10) as needed using ECCC’s FEQG. | Denison is aware of the ECCC Federal Environmental Quality Guideline for selenium in fish. The ECCC FEQG is for fish tissue egg-ovary and whole-body. Denison selected the US EPA guideline over the ECCC guideline since US EPA provides guidelines for fish tissue muscle as well. The fish assessed in the ERA were large-bodied fish including northern pike and white sucker. A fish tissue muscle TRV is appropriate for assessment of large-bodied fish; therefore, the US EPA selenium fish tissue muscle benchmark was preferred over the whole body value from ECCC. | No updates to the draft EIS are needed based on this IR response. | | | | | | |
| IR-127 | CNSC | Aquatic environment | Appendix 8-E, Section 1.2.1, Hydrological Inputs | Context: Within this section it states that the 7Q10 low flow rate used in the mixing assessment “was provided verbally to Ecometrix by NewFields Canada during a project meeting on 26 April 2022” Rationale: The statement that this value was provided verbally is not an infallible method of communicating data, as the value could have been misheard, misremembered, or recorded improperly. | Please verify that the 7Q10 value used in the assessment is the correct value determined by NewFields. | The value used in the assessment (0.616 m³/s) is the correct value determined by NewFields. The value was calculated by NewFields as the inflow from SA-6 to Whitefish Lake and therefore considered representative of the flow in the northern basin of LA-5. This value will be specifically updated in Appendix 8-C (Table 3-3: 7Q10 Estimated Discharge) and Appendix 8-E (Section 1.2.1 to be changed to reference Appendix 8-C, Table 3-3) for clarity. | Appendix 8-C Table 3-3:7Q10 Estimated Discharge will be updated as shown below. TABLE 3-3: 7Q10 ESTIMATED DISCHARGE <table><tr><th>Assessment Node</th><th>7Q10 Flow Rate (m³/s)</th></tr><tr><td>LA-1</td><td>0.874</td></tr><tr><td>LA-5</td><td>0.616</td></tr></table> <small>Note: m³/s = cubic meters per second</small> | Assessment Node | 7Q10 Flow Rate (m³/s) | LA-1 | 0.874 | LA-5 | 0.616 |
| Assessment Node | 7Q10 Flow Rate (m³/s) | | | | | | | | | | | | |
| LA-1 | 0.874 | | | | | | | | | | | | |
| LA-5 | 0.616 | | | | | | | | | | | | |
| IR-128 | CNSC | Current use of lands and resources for traditional purposes | Section 9 Various pages in section 11.1, Land and Indigenous Resource Use Section 12 Section 14 | Context: The increased road traffic (14-18 trucks per day during construction/operations) may have indirect impact on ungulates, furbearers and wood land caribou presence/absence for traditional and subsistence hunting have been raised to CNSC staff when meeting with Indigenous Nations and communities and are presented in the EIS. Rationale: The increased traffic and therefore dispersal of game (moose, woodland caribou) due to increased traffic has been raised as a concern with respect to increased mortality on wildlife and decreased ability to practice traditional rights. | How have the potential residual impacts with respect to increased traffic and noise (due to current and future operations) been communicated to Indigenous Nations and communities who use the road #914 for cultural and traditional activities (such as moose harvesting, berry picking and small game and birds)? Please provide any additional information on the engagement that has taken place to date with Indigenous Nations and communities with respect to concerns and potential impacts on current use of lands and resources due to increased road traffic, and any mitigation measures proposed by Indigenous Nations and communities to minimize the potential impacts. | The potential residual impacts with respect to increased traffic and noise were communicated to ERFN and KML during engagment and through pre review of the EIS and have documented their regular use of the road. Proposed mitigation measures in relation to vehicle traffic were also communicated. Please see draft EIS, Section 4 record of consultation (ROC) 618, 619 and 620. The findings in relation to the potential for residual impacts as a result of change in traffic will be shared again in future engagement activities, expected in late September and early October 2023. Any additional input will be integrated into the final EIS, as part of the commitment made under IR-28. As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has collaborated with ERFN and KML to develop additional mitigation measures specific to these Communities. These include: 1) Assisting ERFN to provide clear highway identification for the location for the Mawdsley Reserve, where many cultural camp activities occur 2) The same is offered to KML; however, the current km 67 Culture Camp for KML was burned in the May 2023 forest fires, and so this will be executed in the future at such time as KML selects a new location. 3) The commitment by Denison to slow truck traffic down for a minimum of 2.5 km on either side of the culture camp(s) to 40 km/hr, during the months of September and October. 4) To communicate this new slowing protocol to Denison's contractors and other operators in the area, to inspire best practice for other operators in the area. | The EIS will be updated to reflect the additional mitigations to which Denison has committed, per the IR response. Specifically, the following will be added to the text of Section 11.1.5.3 and 12.3.5 within the context of traffic mitigation <u>Traffic</u> <ul style="list-style-type: none">Assist ERFN to provide clear highway identification for the location for the Mawdsley Reserve.If requested, assist KML to provide clear highway identification at the km 67 Culture Camp or other selected location.Require Denison truck traffic to slow to 40km/hr for a minimum of 2.5 km on either side of the culture camp(s), during the months of September and October.Communicate the slowing protocol to Denison's contractors and other operators in the area, to encourage best practice for other operators in the area. | | | | | | |
| IR-129 | CNSC | Current use of lands and resources for traditional purposes | Section 9 Section 10 Section 11, including Section 11.1.4.3.1 (p. 11-46) Section 12 Section 16 | Context: ERFN indicated they are concerned about declining moose populations from an influx of hunters; more people may be accessing the area year after year, and worried populations may be affected by the Project (21-EN-ERFN-473.13). Further, the EIS highlights that: “Vehicle collisions are the most likely source of direct mortality for moose. Effective mitigation measures (e.g., breaks in snowbanks; speed limits; and exclusion fencing around contaminated waste pads and ponds) will be implemented to reduce moose mortality.” (p. 11-46) Rationale: The Technical Guidance for Assessing the Current Use of Lands and Resources for Traditional Purposes under CEAA 2012 notes: “The views of affected Aboriginal groups on mitigation be considered and included in the EIS. This could assist in ensuring that the environmental effects on the current use of land and resources for traditional purposes are at an acceptable level for the community.” Sources for indirect moose mortality (e.g., increased hunter access, changes to health due to sensory disturbances, changes to predator-prey dynamics) may result in mortality outside the Wildlife LSA. The | Please provide additional information on the discussions Denison has had with Indigenous Nations and communities on how to mitigate any residual project impacts on their traditional harvesting activities of large game such as moose. More information is required to determine if Denison has engaged directly with ERFN/KML and other Indigenous Nations who utilize the area to harvest moose to determine current baseline harvest numbers that provide subsistence, continued cultural identity and community well-being, as well as discussions on how the project could potentially impact moose populations and the harvesting of moose for traditional practices. | Potential project related changes to moose are detailed in Section 9 of the EIS, and include potential changes associated with vegetation removal and/or ground disturbance (i.e., loss of habitat), sensory disturbances, and vehicular collisions. Mitigations to minimize these potential effects include minimizing the extent of the Project area and associated disturbances to the extent practicable, standard mitigation measures to minimize air emissions, dust, light and noise, exclusion fencing around waste pads and ponds, and measure to minimize direct mortality through vehicular collisions through driver training and safety practices. Baseline harvest information was shared by the Indigenous Communities of Interest through Indigenous and traditional knowledge studies which were considered by all discipline leads in the assessment process. Information on moose is specifically documented in: <ul style="list-style-type: none">Wheeler River Project - Summary of Traditional Knowledge Study Results (ERFN and SVS 2022b)English River First Nation Country Foods Study Final Report (CanNorth 2017a)Land use and occupancy maps shared with Denison by the Kineepik Metis localKineepik Valued Ecosystem Components – KML Pre-statement for Denison (KML 2022) Although Denison understands these documents are not representative of the complete extent of Indigenous moose harvest, recorded harvests proximal to the Project are document | No updates to the draft EIS are needed based on this IR response. | | | | | | |

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| | | | | <p>residual effect of change in moose mortality is likely to occur. Although mitigation measures are expected to reduce, but not fully eliminate, the residual effect on moose.</p> <p>The potential residual impact on the moose and other large game populations in the broader regional study area may potentially impact Indigenous treaty rights, culture, and community well-being if the harvesting of moose and large game declines due to increased traffic, noise, and vehicle mortality or increased outside hunting pressure.</p> | | <p>in Section 11.1.4.3.1 of the EIS, and further harvest in the local and regional study areas are noted in each. Moose is central to the traditional diets of these communities, and as noted in the English River First Nation Country Foods Study Final Report (CanNorth 2017) were the most commonly consumed species by ERFN citizens. Interest and concerns about the Project’s potential interactions with moose populations are also noted in the engagement record, for example the engagement record notes that, for ERFN, moose is a [hunting and food] mainstay and there is concern for how moose would be impacted.</p> <p>To address potential concerns specific to Project related effects to wildlife species of interest to the Indigenous Communities of Interest, Denison has committed to collaborating with ERFN and KML on a monitoring regime suited to each of their interests and needs. As part of this program, Denison and KML will be sharing information in an agreed-upon fashion, about agreed-upon species of interest. Denison expects that important country foods harvested for food and cultural purposes (i.e., moose, fish species, etc.), surface water quality, and other areas of interest will form part of this monitoring programing, including the potential to report on wildlife-vehicle mortality or other such areas of potential concern as they evolve over time. It is expected that the data collected through such monitoring regimes, as described above, would also be relevant to other Indigenous First Nations who may have interest in the Project.</p> | |
| JSIR-130 | CNSC | Physical stressors (noise and vibration) on wildlife | Section 9, Terrestrial Environment | <p>Context: Sensory disturbances such as noise have been identified as stressors for selected wildlife (Ungulates, Furbearers, and Woodland Caribou), birds and amphibians in the project area. However, there is no consideration of impacts from vibrations on these species. Also, impacts of noise and vibration on reptiles have not been assessed in the project area.</p> <p>Rationale: While noise has been qualitatively assessed for selected wildlife, birds, and amphibians, there is no consideration of project-related vibrations as a sensory disturbance/physical stressor. Sensitive terrestrial species (specifically, herpetofauna, amphibians, invertebrates, and caribou) can be impacted by vibrations emanating from the operation of heavy machinery, blasting activities, and other anthropogenic activities at the project site.</p> <p>Also, impacts of physical stressors (noise and vibration) on reptiles were not assessed. These species should be included in this assessment due to their sensitivity to noise and vibrations.</p> | <p>Please provide a discussion of impacts of physical stressors (specifically vibrations) on wildlife, birds, and amphibians in the project area. Specific mitigation measures and/or monitoring for impacts from project-related vibrations should be considered, as appropriate.</p> <p>Also, include reptiles in the assessment of project-related noise and vibrations as sensory disturbance/physical stressor, or a justification for their exclusion.</p> | <p>Vibration is a sensory disturbance that may affect some species and is inherently accounted for in the effects assessment by way of consideration of the sensory disturbance buffers that are recognized as areas of altered habitat (i.e., zone of influence) that may not be used as a result of the Project.</p> <p>Consideration of Project-related vibrations are considered in the responses to IR-46 within the context of vibrations generated by Low Frequency Noise (LFN). Unlike a conventional mining operation, vibration derived from LFN by the proposed operation is not expected. By extension, vibration related sensory disturbance outside the sensory disturbance buffer for habitat alteration already considered in the assessment would not be expected. Nevertheless, in response to the IR, specific mention of vibration will be added in the EIS where sensory disturbance is defined to provide further context to the assessment.</p> <p>Reptiles were not identified as a VC as part of the initial community consultations when the VCs were selected, and their ranges do not typically extend into northern Saskatchewan, and therefore, were not included in the effects assessment. Also, the potential for occurrence of reptiles within the Project footprint is expected to be low.</p> | <p>In the final EIS, discussion of habitat alteration in Sections 9.3 and 9.4 will be updated to include consideration of vibrations.</p> <p>For example: “Habitat alteration through sensory disturbance effects (such as noise, dust deposition, vibrations, and artificial light) is expected to result in reduced habitat quality and effectiveness near Project components and infrastructure reaching beyond the Project Area into the Wildlife LSA.”</p> |
| IR-131 | CNSC | Migratory birds, Wildlife and Wildlife Habitat | Section 9, Terrestrial Environment | <p>Context and Rationale: As per the requirement outlined in Section 79 of the Species at Risk Act (SARA): <i>The person must identify the adverse effects of the project on the listed wildlife species and its critical habitat and, if the project is carried out, must ensure that measures are taken to avoid or lessen those effects and to monitor them. The measures must be taken in a way that is consistent with any applicable recovery strategy and action plans. This is accomplished by ensuring that the Proponent has identified, avoided, lessened and will monitor effects to species at risk.</i></p> <p>As per the CNSC’s Generic Guidelines for the Preparation of an EIS pursuant to the Canadian Environmental Assessment Act, 2012: <i>“The EIS will then describe mitigation measures that are specific to each environmental effect identified. Measures will be written as specific commitments that clearly describe how the proponent intends to implement them and the environmental outcome the mitigation is designed to address. The EIS will describe mitigation measures in relation to species and/or critical habitat listed under the Species at Risk Act (SARA). These mitigation measures will be consistent with any SARA permit, applicable recovery strategy and/or action plan”.</i></p> <p>The draft EIS neither lists the adverse effects to all listed schedule 1 SARA species, nor outlines the measures that will be taken to avoid or lessen these effects. The Proponent references that additional species-specific mitigations will be detailed in environmental management plans but has not provided those plans for review.</p> | <p>Identify all species at risk listed on Schedule 1 of the Species at Risk Act and their critical habitat that are likely to be affected by the Project and describe how they may be adversely affected by the Project. Describe what measures will be taken to avoid or lessen the effects of each Project activity and stage, and how these effects will be monitored to ensure they are avoided or minimized.</p> | <p>As Key Indicators of Valued Components, the EIS includes terrestrial wildlife and avian species that may occur in the Project study areas and are listed on Schedule 1 of the federal Species at Risk Act. Project effects on these species and their habitats are described and assessed, and mitigation measures are included to avoid or reduce the potential for adverse effects on these species and their habitats. The Project effects and associated mitigation measures described in the draft EIS are broadly applicable to SAR species that occupy the same ecological niches.</p> <p>In response to the IR further information has been developed that is specific to SAR and included as Attachment IR-131. This includes a listing of all SAR species potentially occurring in the Project study areas, with links to applicable and appropriate mitigation measures described in the EIS. It is proposed the content of Attachment IR-131 will be added as a new appendix (Appendix 9-D) to Section 9 of the final EIS. The information provided in the SAR appendix includes a summary of the life history requirements, the expected Project effects, proposed mitigation measures, and anticipated residual effects on these listed species.</p> | <p>A new SAR appendix (new Appendix 9-D) will be added to Section 9 of the final EIS. It has been included here as Attachment IR-131.</p> |
| IR-132 | ECCC | Wildlife and Wildlife habitat | Section 9, Terrestrial Environment | <p>Context and Rationale: ECCC has identified that three species at risk arthropods (yellow banded bumble bee, transverse lady beetle, and nine-spotted lady beetle) have ranges overlapping the Project area and these were not mentioned in the draft EIS.</p> | <p>1. Conduct an effects assessment for arthropod species at risk.</p> <p>2. Explain what mitigation measures will be used to minimize potential effects.</p> | <p>Consideration of the three arthropod species at risk are included in Attachment IR-131.</p> | <p>A new SAR appendix (new Appendix 9-D) will be added to Section 9 of the final EIS. It has been included here as Attachment IR-131.</p> |
| IR-133 | ECCC | | Section 9, Terrestrial Environment | <p>Context and Rationale: There is potential for some species at risk (e.g., myotis species, barn or bank swallows, common nighthawk) to be attracted to and use mine infrastructure (buildings, roads etc.) once constructed for nesting, roosting, or foraging.</p> <p>Details on mitigation measures and adaptive management with respect to attraction to Project components should be identified to assess residual and cumulative impacts to species at risk.</p> | <p>For all Project phases, describe the mitigation measures and adaptive management to prevent and minimize effects on species at risk that may utilize mine infrastructure.</p> | <p>Specific exclusion measures will be added to the mitigation measures in Sections 9.3.5 and 9.4.5 of the EIS. These measures will be designed and appropriately applied to prevent or reduce access to Project infrastructure for roosting, nesting, and foraging, and are expected to address adverse Project-related effects on myotis species, barn and bank swallows, and common nighthawk.</p> <p>If bird nests (or tree cavities) should be encountered, any subsequent activities will be conducted in accordance with the 2022 Migratory Birds Regulations.</p> <p>The results of mitigation measures implemented, and any associated wildlife observations will be considered in an adaptive management process to determine if/when/where additional mitigation measures may be required.</p> | <p>The below exclusion measures will be added to Sections 9.3.5.2.5 and 9.4.5.2.4 in the final EIS:</p> <p>Buildings and other Project infrastructure will be designed and maintained to exclude birds (e.g., barn swallows) and bats as much as possible. This would include installing solid barriers (e.g., corner slope panels, wooden panels) or flexible barriers (e.g., netting, tarps or geotextiles) under roof eaves or other exterior surfaces.</p> |

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| IR-134 | ECCC | Wildlife and Wildlife habitat | Section 9, Terrestrial Environment | <p>Context and Rationale: The draft EIS states in multiple places that vegetation clearing may occur year-round.</p> <p>In order to correspond with the timing of emergence from hibernation, tree clearing should not be conducted during the bat roosting period. If maternity roost trees are removed after pregnant females have established a roost area, there is a higher likelihood of abortion than there would be otherwise.</p> <p>Species-specific mitigations are required to protect bat SAR.</p> | Provide important roosting dates for bat species at risk in the Project area. | <p>Maternity roosts are used by pregnant females in late spring (April/May) either alone or in small groups. Females and their offspring roost in groups in nursery colonies in late summer/early fall prior to hibernation. Denison will adjust the activity timing windows to include the April/May maternity roosting period and the July/August nursery roosting period, to the extent practicable. Pre-construction surveys will identify all sensitive wildlife habitat features, including potential roosting trees (e.g., hollow trees, trees with defects, trees with cavities, and tree stumps). Should potential roosting trees be detected, consultations with the regulators will be initiated, and appropriate mitigation measures will be designed and implemented.</p> <p>This information above is provided in Attachment IR-131. This new SAR appendix (new Appendix 9-D) will be added to Section 9 of the final EIS.</p> | A new SAR appendix (new Appendix 9-D) will be added to Section 9 of the final EIS. It has been included here as Attachment IR-131. |
| IR-135 | ECCC | Migratory birds, Wildlife and Wildlife Habitat | Section 9, Terrestrial Environment | <p>Context and Rationale: The mitigation measures for birds and wildlife presented in the draft EIS are very general. Additional detail is required for a complete assessment of residual and cumulative Project effects to birds and wildlife.</p> <p>The Proponent has committed to providing a number of plans including, a Decommissioning Plan, a Spill Response Plan, a Waste Management Plan, a Surface Water Monitoring Plan, a Remediation and Closure Plan, a Radiation Protection Plan, a Soil and Vegetation Monitoring Plan, a Wildlife Monitoring Plan, and a Woodland Caribou Management Plan. In order to assess potential affects to migratory birds and wildlife from Project related activities, ECCC requires details on species-specific mitigation measures, and monitoring plans.</p> | <p>The following information should be included in the various plans and should be provided for review during the environmental assessment:</p> <ol style="list-style-type: none"> For all Project phases, describe the species-specific mitigation measures and responses to prevent and minimize effects on migratory birds or species at risk (SAR) birds and mammals that may utilize mine infrastructure. Explain how light pollution will be managed and what specific mitigation measures will be used to minimize effects to migratory birds and SAR birds and mammals. Provide details on what methods will be used for erosion control and how they will prevent sediment from entering waters frequented by migratory birds or SAR. Explain what actions will be taken if the erosion control measures are not successful. Provide details on noise and other sensory disturbance monitoring and mitigations if noise levels surpass thresholds. Describe time windows and species- specific mitigations related to maintenance activities such as vegetation management, road or building repair and stream crossing replacements. | <p>As noted in the draft EIS Section 1.7.5, Licensing and Permitting, the Project is proceeding through a sequential EA and licensing process. The IR refers to “plans” and that these plans should be provided in the environmental assessment for review. Commitments to develop such plans, and in some cases conceptual level information regarding a number of the proposed plans has been provided in the draft EIS. Given the sequential process to which Denison has committed to, it is Denison’s opinion that the level of information provided in the draft EIS and its supporting documents (including supplemental information provided in response to the IRs) is appropriate at this stage of the Project. It is planned that further detail will be developed and provided during licensing and permitting and that this information will be available for review at that time. Denison understands that the Project cannot move forward until the appropriate Program / Plan / Procedure documentation is in place and has received approval through the regulatory process. Denison believes that this context (that is, that the detailed “plan” information needed to support licensing and permitting has not be included in the EIS) is valuable in considering this IR, as well as other IRs with a similar theme.</p> <ol style="list-style-type: none"> The mitigation measures referenced to in Part 1 of the IR are considered in the response to IR-133 and the reviewer is referred there for additional information. Specific exclusion measures will be added to Sections 9.3.5 and 9.4.5 to prevent or reduce access to Project infrastructure, as noted in the response to IR-133 (and in the adjacent column). Means to manage light pollution and specific mitigation measures to minimize the potential for adverse effects on migratory birds and SAR birds and mammals will be added to Section 9.4.5.2.5 of the EIS as noted in the adjacent column. Erosion control measures have been identified in Section 8, Aquatic Environment, of the draft EIS. These same proven mitigation measures will be effective at mitigating adverse effects on waters frequented by migratory birds or SAR. For completeness, the erosion control measures from Section 8, Aquatic Environment, of the draft EIS will be added to Sections 9.3.5 and 9.4.5 of the draft EIS, as highlighted in the adjacent column. Proposed mitigation measures related to noise and sensory disturbance outlined in Section 6.2.5 of the draft EIS are considered to be adequate and appropriate to limit/localize potential adverse effects on wildlife and wildlife habitat, and include the following: <ul style="list-style-type: none"> not using the concrete batching plant and crusher during nighttime hours, where possible; locating the concrete batching operation as far away from sensitive wildlife features as possible; directing the generator discharge openings away from sensitive features; making use of available on-site obstructions to control sound exposure at sensitive areas (i.e., locate sources behind buildings); and collecting sound level measurements from the identified sources once they are operating and determining whether the actual effect is lower than that which was modelled. <p>Regarding monitoring, as outlined in Section 6.2.8 of the draft EIS, an EMS will be implemented and include noise monitoring plans to confirm that the Project is compliant with the federal and provincial guidelines. Sound levels will be monitored on a continuous basis using calibrated Class 1 sound level meters and data loggers, calibrated to a National Institute of Standards and Technology traceable standard within one year of its use in the program, and field calibrated using a Class 1 acoustic calibrator. Where possible, the sound level meters will utilize the same monitoring locations as were used in the baseline program to allow direct comparison and may be expanded to include the location of the nearest sensitive receptor where access is granted. Should monitoring show noise levels surpass modelled sound levels, Denison will implement corrective action to identify noise sources and reduce sound levels. Details of noise monitoring and an adaptive management process for the Project will be developed to support Project permitting and licensing.</p> <p>5. Information related to timing windows and species as it concerns Project activities has been provided in response to IR-134. As noted in the response to IR-134, Denison will schedule Project activity timing windows to appropriately consider all Valued Components and SAR requirements/sensitivities. For reference, additional information that will be added to the final EIS is described in the response to IR-134.</p> | <p>EIS updates in response to IR-135, part 1 are outlined in EIS Updates for IR-133.</p> <p>Section 9 of the final EIS will be updated to address the response to IR-135, part 2 as follows:</p> <p>Proposed mitigation measures related to light pollution will be added to Section 9.4.5.2.5. This includes using low lighting and/or task lighting (e.g., downturned shaded fixtures to prevent sky-lighting or bird disorientation), putting building lighting on sensors or timers, and potentially using a higher lumen/watt ratio on all new buildings or building expansions.</p> <p>Section 9 of the final EIS will be updated to address the response to IR-135, part 3 as follows:</p> <p>Erosion control measures that are designed to prevent sediment from entering waters frequented by migratory birds or SAR include (but not limited to) the installation of silt fence, straw wattles, and/or erosion control blankets to prevent erosion and limit sediment transport. Additionally, vegetated barriers will be maintained between Project components and wetland features, as much as practical. Further information on erosion and sediment control measures will be provided in the applicable management plans which will be developed to support Project permitting and licensing. Routine inspections and management would be completed to document the effectiveness of the erosion control measures, and any required /replacement of these structures would be completed as required.</p> <p>Section 9 of the final EIS will be updated to address the response to IR-135, part 4 as follows:</p> <p>Proposed mitigation measures related to noise and sensory disturbance outlined in Section 6.2.5 of the EIS are considered to be adequate and appropriate to limit/localize potential adverse effects on wildlife and wildlife habitat.</p> <p>The proposed monitoring related to noise and sensory disturbance outlines in Section 6.2.8 of the EIS are considered to be adequate and appropriate to monitor changes in sound levels.</p> <p>EIS updates in response to IR-135, part 5 are outlined in EIS Updates for IR-134.</p> |
| IR-136 | CNSC | Soil Salvage Monitoring | Section 9.1.8.2 | <p>Context: The proponent plans to salvage and stockpile soil and organic matter/peat in order to use it in reclamation activities during decommissioning. Periodic monitoring of the stockpiles is proposed to be conducted to verify that soil and organic matter/peat are delineated, stripped, handled, and stockpiled as recommended, and to evaluate the stability of salvaged soil, e.g., in relation to potential erosion and/or degradation. It is unclear whether monitoring includes soil quality in terms of concentrations of COPCs.</p> | Please clarify if COPC concentrations monitoring is planned to be performed for stockpiled soil and organic matter/peat. | Per the Residual Effects Characterization: "Predicted changes in concentrations of COPCs (i.e., soil quality) associated with open-source dust, process-source dust and process emissions are expected to be within acceptable health and safety guidelines; no threshold exceedances are predicted." Monitoring of COPCs in soil stockpiles during the life of the Project is not presently being considered, but the need for such monitoring could be revisited within the context of monitoring of sources that could contribute to COPCs to stockpiled soil and organic matter/peat. For example, if source monitoring data exceed predictions | No updates to the draft EIS are needed based on this IR response. |

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| | | | | <p>Rationale: It is expected that project-related activities (road and airport traffic, drilling) can result in open-source (i.e., fugitive) dust and process-source dust (incl. radionuclides), which can accumulate and result in changes in soil quality of the stockpiled soil and organic matter/peat as described in Sections 9.1.4.2.2 and 9.1.4.2.3).</p> | | <p>presented in the EA that may provide rationale for sampling and analysis of COCPs in stockpiled materials.</p> <p>A soil salvage monitoring program/protocol (or equivalent) is expected to verify soil salvage volumes and reclamation suitability. Denison is proposing to support reclamation trials/research at the Project to inform and refine the revegetation strategy. It is understood that reclamation trials/research will include investigations into soil conditions, preparation techniques and amendment strategies (to the standard of the day). These ancillary investigations may include analysis of COCPs, although this is not expected at this time, but as highlighted above would be considered as may be warranted.</p> | |
| IR-137 | ECCC | Migratory birds, Wildlife and Wildlife Habitat, Vegetation and Wetlands | <p>Section 9.2.1.3, Spatial and Temporal Boundaries for Vegetation and Ecosystems, Listed Plant Species and Wetlands</p> <p>Section 9.3.1.3.1, Spatial Boundaries for Ungulates, Furbearers and Woodland Caribou</p> <p>9.4.1.3.1, Spatial Boundaries for Raptors, Migratory Breeding Birds, and Bird Species at Risk</p> | <p>Context and Rationale: The CNSC’s Generic Guidelines for the Preparation of an EIS Pursuant to the Canadian Environmental Assessment Act, 2012 states that: “The EIS will describe the spatial boundaries, including local and regional study areas, for each VC to be used to assess the potential adverse environmental effects of the Project and provide a rationale for each boundary.</p> <p>Spatial boundaries will be defined taking into account the appropriate scale and spatial extent of potential environmental effects, community knowledge and Indigenous knowledge, current or traditional land and resource use by Indigenous groups, ecological, technical, social and cultural considerations.”</p> <p>The information provided in the EIS does not enable a biologically relevant assessment of the Project’s effects.</p> <p>The Proponent did not provide rationale for the selection of study areas for individual vegetation, wildlife or migratory bird valued components (VC). Different VCs may have different spatial boundaries for the LSA and/or RSA. For wildlife and bird VCs, the LSA is defined as a 1.7-km buffer from the Project area, and the RSA is defined as a 6.6-km buffer around the LSA. There is no information on how the spatial boundaries were derived.</p> <p>Specific to Woodland Caribou, boreal population (hereafter referred to as boreal caribou):</p> <p><u>Project Footprint:</u> In a scientific assessment of critical habitat (Environment Canada, 2011) [1] ECCC demonstrated that the application of a 500-m buffer to mapped anthropogenic features best represents the combined effects of increased predation and avoidance on caribou population trends at the national scale. Adding a 500-m buffer to the Project footprint is required to represent functional habitat loss.</p> <p>The draft EIS does not appear to use a buffer for their Project area. The draft EIS (Section 9.3.1.3.1) states: “Project Area: the area within which the Project and all components/activities are located (i.e., the area of maximum physical disturbance). The Project Area covers 169.6 ha and is not VC-specific, but consistent throughout the EA.” (p. 9-168)</p> <p><u>LSA:</u> The defined LSA for boreal caribou has to consider avoidance of disturbed areas, predator access to undisturbed areas, reduction in connectivity and sensory disturbance. This required information is not detailed in the draft EIS.</p> <p>Adverse effects of Projects including predator and prey access to undisturbed areas, reduction in connectivity, and sensory disturbance to individual boreal caribou can vary and extend several kilometers depending on Project activities and ecological context. At minimum, the LSA should capture the above- mentioned effects. For boreal caribou, the Project footprint should be defined as the immediate area to be cleared, plus a 500-m buffer to represent functional habitat loss. Following this guidance, the LSA should be defined as a buffer of the Project footprint with the 500-m buffer.</p> <p><u>RSA:</u> The Amended Recovery Strategy for Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada states: <i>Mitigation of adverse effects from individual projects/activities will require a coordinated approach and management of cumulative effects within and among ranges. A cumulative effects assessment is essential to position the proposed project/activity in the context of all current and future development activities. The cumulative effects assessment will:</i></p> <ul style="list-style-type: none">• <i>Assess the impact of all disturbances (anthropogenic and natural) at the range-scale;</i>• <i>Monitor habitat conditions, including the amount of current disturbed and undisturbed habitat, and amount of habitat being restored;</i>• <i>Account for planned disturbances; and</i>• <i>Assess the distribution of disturbance in large ranges for risk of range retraction in parts of the range.</i> | <p>Provide a biologically relevant rationale for the delineated study boundaries (LSA and RSA) for all different valued components. Include the following information:</p> <ul style="list-style-type: none">• Descriptions of how the RSA and LSA boundaries were derived for all VCs. <p>Specific to boreal caribou:</p> <p><u>Project Footprint:</u></p> <ul style="list-style-type: none">• Include a 500-m buffer of area of maximum physical disturbance to represent functional habitat loss for boreal caribou <p><u>LSA:</u></p> <ul style="list-style-type: none">• Include a description of how the LSA takes into account boreal caribou avoidance of disturbed areas, predator access to undisturbed areas, reduction in connectivity and sensory disturbance to individuals. <p><u>RSA:</u></p> <ul style="list-style-type: none">• Include a description of how the RSA used in the draft EIS is an accurate representation of the SK1 boreal caribou range; or• Re-do the assessment with the RSA at the scale of the range <p>See also related IRs: IR-154 and IR-156.</p> | <p>The Project Area was delineated to capture all direct, and most indirect, likely adverse effects on caribou; as this is the zone of influence most likely to affect caribou in the vicinity of the Project (i.e., in the vicinity of human activity, equipment use and vehicle use). The Project Area (169.6 ha) is the direct footprint of proposed Project infrastructure (74.8 ha) with a buffer applied, thereby representing the area of maximum physical disturbance. The Project Area is not VC-specific, but consistent throughout the EIS.</p> <p>The Wildlife LSA was designed to capture the majority of the Project effects. The LSA extends beyond Project Area of the site to include a reasonable estimation of where sensory disturbance from Project-related activities would extend and where effects on wildlife including caribou are most likely to occur. That is the primary rationale for selection of the spatial extent of the LSA – Denison believes this is an appropriate spatial scale that applies broadly to the wildlife VCs as a whole given the perceived mechanism of VC-Project interaction.</p> <p>Importantly, as noted in draft EIS Section 9.3.6.4, in the caribou assessment, the Project Area had a 500 m buffer applied to account for indirect effects/habitat alteration; this area is within the wildlife LSA (refer to Figure 9.3-14 for a map showing the spatial areas). The 500 m buffer for habitat alteration for caribou was selected in accordance with ECCC’s (2020) assessment of disturbed areas, which buffered (500 m) anthropogenic disturbances to evaluate woodland caribou habitat. The alteration of available woodland caribou habitat is quantified in this EIS by applying a buffer of 500 m around the Project Area in which Project effects in the form of sensory disturbance are likely to affect available woodland caribou habitat and make it functionally unavailable for use.</p> <p>Boreal caribou occur as one continuous population across the SK1 range, including within the Terrestrial RSA. It was decided to not use the entire SK1 range as an assessment area (e.g., due to the dilution factor) and instead use the Terrestrial RSA to appropriately and adequately assess residual and cumulative effects in proportion to the Project. It was deemed to be not feasible to use a large area like the SK1 range to assess residual Project effects because this would provide inappropriate context or "dilute" the adverse effects of the Project on the caribou that have a home range that overlaps with the RSA.</p> <p>The cumulative effect assessment of the draft EIS compares the Project-specific habitat effects (i.e., the Project Area plus a 500 m buffer to account for sensory disturbance) at the scale of the SK1 range (as the applicable management unit for portion of the woodland caribou population that uses the Terrestrial RSA). The result showed that the Project is expected to add 0.001% of anthropogenic disturbance at the scale of the SK1 Boreal Shield Woodland Caribou Management Unit (Section 9.3.7.3.3 of the EIS).</p> <p>References: Environment and Climate Change Canada (ECCC). 2020. Amended Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada. Species at Risk Act Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. xiii + 143pp.</p> | No updates to the draft EIS are needed based on this IR response. |

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| | | | | <p>The proposed Project’s cumulative effects for boreal caribou are possible at the scale of the SK1 boreal caribou range. The RSA used for boreal caribou for this Project is only 40,173.6 ha, compared to the SK1 range, which is 18,034,870 ha. As such, it is too small to capture cumulative effects to this species and does not follow the Scientific Assessment to Support the Identification of Critical Habitat for Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada (Environment Canada, 2011) or the Amended Recovery Strategy for Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada.</p> <p>Reference: [1] Scientific Assessment to Support the Identification of Critical Habitat for Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada (Environment Canada, 2011).</p> | | | |
| IR-138 | CNSC | COPC in Lichen | Section 9.2.4.2.2 Appendix 10-A (ERA) | <p>Context: A quantitative assessment using modelling dispersion and uptake of COPCs in the environment was completed for the Project as part of the ERA, to support conclusions drawn in the EIS. In Appendix 10-A (ERA), COPCs in plant tissue was estimated for lichen. Table 5-5 of the ERA (p. 5.24) named “Complete Exposure Pathways for All Selected Ecological Receptors to be Assessed using the IMPACT Model” lists the exposure pathway for lichen as direct contact on soil.</p> <p>Rationale: Airborne COPC can deposition on lichen and subsequently enter the food chain; therefore, the “contact with air” pathway should be considered. In fact, lichen species are frequently used to monitor the deposition and accumulation of airborne contaminants (e.g., dust, metals). It is also noted that based on sampling results of the 2017 baseline studies, lichen frequently contain higher concentrations of COPC than blueberry (compare Table 9.2-6 and Table 9.2-7 in the EIS), especially at sampling sites with elevated concentrations (e.g., RSV9 and RSV10).</p> | <p>Please include the exposure pathway of direct deposition (dry and wet) of airborne contaminants on lichen in the quantitative ERA, or justify why this exposure pathway was not considered.</p> <p>See also related: IR-189.</p> | <p>Denison agrees that the air to lichen pathway is the primary exposure route for lichen. The ERA (Appendix 10-A) modelled the deposition of air to lichen as an exposure pathway and considered the uptake from soil to lichen as negligible. This will be clarified in Table 5-5: Complete Exposure Pathways for All Selected Ecological Receptors to be Assessed using the IMPACT Model. In the column "Environmental media" for lichen, "On soil" will be replaced by "air". Additionally, the conceptual site model shown in Figure 5-1 of the ERA will be updated to include a pathway arrow from air to lichen.</p> | <p>Minor change. In Table 5-5 of Appendix 10-A, the column "Environmental media" for lichen, "On soil" will be replaced by "air". Additionally, the conceptual site model shown in Figure 5-1 of the ERA will be updated to include a pathway arrow from air to lichen.</p> |
| IR-139 | ECCC | Change to an environmental component due to hazardous contaminants | Section 9.2.5.2.7, Waste and Hazardous Materials Management | <p>Context: In this section, the Proponent outlines various measures to mitigate air emissions, including implementation of the air quality programs within the Environmental Management System, regular maintenance and inspection of equipment, and elimination of unnecessary idling of equipment. However, the intention to use industry-standard emission control systems has not been substantiated.</p> <p>Rationale: For the protection of air quality, it is important to specify the emission standards that equipment will have (e.g., Tier 3 or Tier 4 engines). Vehicles and equipment with Tier 4 engines have much lower emissions of contaminants than those with Tier 3 engines. If non-Tier 4 engines are used, ECCC recommends that best management practices are followed, including proper maintenance of the engine and anti-idling measures.</p> | <p>Confirm if vehicles and equipment will be equipped with Tier 4 engines where feasible.</p> | <p>Denison confirms that vehicles and equipment will be equipped with Tier 4 engines where feasible.</p> | <p>No updates to the draft EIS are needed based on this IR response.</p> |
| IR-140 | CNSC | Change in the Areal Extent of Wetlands | Section 9.2.6.4 | <p>Context: Predicted residual effects on the areal extent of wetlands include the direct effect of loss of wetlands and several indirect effects of alteration of wetlands. As stated in the EIS, wetlands can exhibit low resilience and high susceptibility to disturbance. At the same time, wetlands tend to support a high species diversity, and are considered to have a moderate to high potential to support listed plant species. Lastly, wetlands are rare on the landscape compared to terrestrial ecosites (see Table 9.2-5).</p> <p>Rationale: Several wetland ecosites (BS19/24, BS25, BS27) occur only in small areas (< 30 ha) in the RSA but are predicted to experience disturbance of 6-64%, most notably the ecosite BS19/24 where 0.8 of 1.2 ha are predicted to be disturbed. It is noted that wetlands are scattered throughout the landscape as shown in Figure 9.2-8. More information is requested regarding the ecological impact of this disturbance.</p> | <p>1. Please provide a discussion on the ecological impact of disturbance to rare wetland ecosites.</p> <p>2. Please provide information on whether adequate other habitat is available for species impacted in these disturbed sites in close proximity, taking into account the home ranges of susceptible species.</p> <p>3. Please provide additional information on whether wetland connectivity is maintained through the landscape within the LSA/RSA.</p> <p>See also related: IR-141.</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends that Denison conduct monitoring of species present in wetlands before and after disturbance, with a focus on listed plant species.</p> | <p>1. As described in footnote 3 of Table 9.2-8 and table 9.2-16 of the draft EIS, the ecosite BS19/24 is not a unique ecosystem and is instead an artifact of mapping uncertainty, as baseline mappers were unable to distinguish between BS19 (graminoid bog) and BS24 (graminoid fen) ecosites within these areas due to a lack of available information (e.g., soil information, vegetation field plots, water quality data). If all BS19, BS24 and BS19/24 were combined into a single combined "graminoid peatland" category, only 2.1% (3.6 ha of 170.7 ha) would be expected to be indirectly disturbed. No direct disturbance on wetland ecosites BS19/24, BS25, or BS27 is anticipated. Indirect disturbance with the potential to adversely affect these ecosites includes the introduction and/or proliferation of invasive plants, edge effects, changes to water quantity and quality, and dust deposition during all Project phases (further described in Section 9.2.4.2.1). Wetland ecosites BS19/24 (graminoid bog/fen) and BS25 (open fen) are peatland ecosystems typically characterized by high water tables (i.e., a very moist or very wet moisture regime), while BS27 (sedge rocky shore) is a sparsely vegetated ecosystem predominated by rocky substrates, typically occurring adjacent to lakes and ponds (McLaughlan et al. 2010). Because these ecosystems rely on high water tables and existing water bodies, alteration of water quantity would be expected to have the highest potential to be the most effective mitigation to sustain these wetland ecosites within the Terrestrial LSA throughout the Project lifespan.</p> <p>2. No listed plant species have historically been observed to be associated with ecosites BS19/24 (graminoid bog/fen), BS25 (open fen), or BS27 (sedge rocky shore). As described in Table 2.4.4 of Appendix 9-B of the EIS, populations of the listed plant Alaskan clubmoss were observed to be associated with open Jack pine stands and transitional areas between upland and wetland/riparian areas. As stated in Section 2.2.2 of Appendix 9-B of the EIS the listed plants angle-leaved sundew and neat spike-rush were not observed in ecosites BS19/24, BS25 or BS27 either (see also the response to IR-175). With regard to wildlife, ecosites BS19/24, BS25, and BS27 are not limiting habitats for ungulates, furbearers, woodland caribou, raptors, or migratory breeding birds (as described in Sections 9.3 and 9.4 of the EIS) in the Terrestrial RSA. In fact, these ecosites were observed to exhibit low species richness and species diversity for breeding and migratory songbirds (Section 9.4.3.2.3). For bird species at risk, ecosites BS19/24 and BS25 are considered to provide suitable habitat for Short-eared Owl, Yellow Rail, and Rusty Blackbird; however, these ecosites are not anticipated to be limiting. Up to 2.9% of available Short-eared Owl habitat and up to 2.4% of Yellow Rail and Rusty</p> | <p>1. Section 9.2.6.4.1 will be updated to include the following: As noted in footnote 3 of Table 9.2-8 and table 9.2-16 of the draft EIS, the ecosite BS19/24 is not considered a unique ecosystem and is instead an artifact of mapping uncertainty, as it was not possible to distinguish between BS19 (graminoid bog) and BS24 (graminoid fen) ecosites within these areas during the wetland mapping process due to a lack of available information (e.g., soil information, vegetation field plots, water quality data). If all BS19, BS24 and BS19/24 were combined into a single combined "graminoid peatland" category, only 2.1% (3.6 ha of 170.7 ha) would be expected to be indirectly disturbed. However, no direct disturbance on wetland ecosites BS19/24, BS25, or BS27 is anticipated. Indirect disturbance associated with the potential to adversely affect these ecosites includes the introduction and/or proliferation of invasive plants, edge effects, changes to water quantity and quality, and dust deposition during all Project phases (as described in Section 9.2.4.2.1). Wetland ecosites BS19/24 (graminoid bog/fen) and BS25 (open fen) are peatland ecosystems typically characterized by high water tables (i.e., a very moist or very wet moisture regime), while BS27 (sedge rocky shore) is a sparsely vegetated ecosystem predominated by rocky substrates, typically occurring adjacent to lakes and ponds (McLaughlan et al. 2010). Because these ecosystems rely on high water tables and existing water bodies, alteration of water quantity would be expected to have the highest potential to</p> |

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| | | | | | | <p>Blackbird habitat within the Terrestrial RSA may be altered or lost as a result of the Project during all Project phases (Section 9.4.6.4.1).</p> <p>3. Surface drainage continuity and hydrologic connectivity is expected to be maintained across the Project Area with the engineering, construction and maintenance of surface water management features (e.g., culverts and ditches) as appropriate and as per Project design specifications along access roads and facility sites. A post-construction monitoring program will be developed to document the performance of surface water management structures adjacent to wetlands to evaluate areas (if any) where additional surface water management is considered to be necessary to maintain natural drainage. The monitoring program is expected to verify the presence and condition of surface water management structures, including any areas of water impoundment (e.g., upgradient of a road), erosion, or dead or dying vegetation. Culverts will be regularly inspected to identify where maintenance, repair, upgrade, and/or replacement is necessary to maintain natural surface drainage and the resultant wetland connectivity. This post-construction surface water management monitoring program is expected to identify issues (if any) in a timely manner and allow the adaptive management process, in consideration of the vegetation monitoring results, as vegetation species composition can be a lagging indicator of hydrologic change.</p> | <p>cause an adverse effect, and thus maintenance of wetland hydrology is expected to be the most effective mitigation to sustain these wetland ecosites within the Terrestrial LSA throughout the Project lifespan.</p> <p>2. No updates to EIS required.</p> <p>3. Section 9.2.5.2.3 will be updated to include the following: Hydrologic connectivity is expected to be maintained across the Project Area with the engineering, construction and maintenance of surface water management features (e.g., culverts and ditches) as appropriate and as per Project design specifications along access roads and facility sites. A post-construction surface monitoring program will be developed to document the performance of surface water management structures adjacent to wetlands to evaluate areas (if any) where additional surface water management is considered to be necessary to maintain natural drainage. The monitoring program is expected to verify the presence and condition of surface water management structures, including any areas of water impoundment (e.g., upgradient of a road), erosion, or dead or dying vegetation. The monitoring program is expected to identify issues (if any) in a timely manner and allow the adaptive management process, in consideration of the vegetation monitoring results, as vegetation species composition can be a lagging indicator of hydrologic change. Culverts will be regularly inspected to identify where maintenance, repair, upgrade, and/or replacement is necessary to maintain natural surface drainage and the resultant wetland connectivity.</p> |
| IR-141 | ECCC | Wetlands | Section 9.2.6.4.1 | <p>Context and Rationale: The Proponent states that: “Direct loss of wetlands has been mitigated by reducing the size of the Project Area to the extent practicable during Project design.</p> <p>However, up to 0.5 ha (less than 0.1%) of all wetlands within the Terrestrial RSA are anticipated to be removed from the Project Area during Construction (Table 9.2-16).”</p> <p>Information is not provided on whether wetlands in the terrestrial RSA are considered ecologically, economically or socially important to the region. Information on the regional importance of the wetlands that will be lost is needed in order to assess effects, including a wetland compensation plan if the wetlands are considered regionally important.</p> | <p>1. Provide information that accounts for whether wetlands are considered ecologically, economically and socially important to the region.</p> <p>2. If the above is affirmative provide a wetland compensation plan to offset the loss. Consistent with the Operational Framework For Use of Conservation Allowance [1] a minimum ratio of 2:1 should be the starting point when determining the amount to be offset.</p> <p>[1] Available at : https://publications.gc.ca/site/eng/9.696852/publication.html</p> <p>See also related: IR-138.</p> | <p>During engagement activities, no specific comments or concerns were raised that would suggest wetlands near the Project are considered to be particularly ecologically, economically, and socially important to the region. Drainage in the Wheeler Upland Landscape Area of the Athabasca Plain Ecoregion is very weakly developed, and with numerous poorly drained wetland areas in lower landscape positions (Acton et al. 1998). This pattern is reflected in the Terrestrial RSA, where wetlands and water bodies are commonly scattered, comprising 16.6% of all mapped ecosystems (Section 9.2.3.3; Figure 9.2-8 of the draft EIS). Wetlands in this region provide ecological, economic, and social functions and values, and Denison has appropriately considered this during Project planning (i.e., avoidance to the extent practical). The Project Area has been reduced to the extent practicable, and the Project footprint has been sited to avoid wetlands to the extent feasible (Figure 9.2-8). Where wetland avoidance was not feasible, mitigation measures have been designed to reduce disturbance and maintain surface water connectivity (Section 9.2.5; see also response to IR-140 and IR-101). A small area of direct wetland disturbance is anticipated (0.5 ha; less than 0.1% of all wetlands within the Terrestrial RSA), predominantly associated with access road development. This area includes 0.4 ha of BS17 (black spruce treed bog), <0.1 ha of BS18 (Labrador tea shrubby bog), and <0.1 ha of BS23 (willow shrubby rich fen). These areas of direct wetland disturbance are small and located adjacent to existing access routes, and mitigation measures to maintain surface water connectivity across access roads will be implemented and monitored (see response to IR-140). The re-establishment of appropriate hydrologic conditions during Decommissioning is expected to lead to the re-establishment of wetland ecosystems within these directly disturbed areas. As such, it is Denison's opinion that a wetland compensation plan is not warranted.</p> | <p>No updates to the draft EIS are needed based on this IR response.</p> |
| IR-142 | ECCC CNSC | Wildlife and Wildlife habitat | Section 9.3.3.2.1 Scientific Literature Review – Wolverine Section 9.3.5 Mitigation Measures Section 9.3.6 Residual Effects Evaluation | <p>Context: The Proponent did not conduct any field work to identify potential wolverine dens in the Project area and therefore did not present any mitigations for the potential impacts to wolverine dens.</p> <p>In Section 9.3.3.2.1, the Proponent states: “Denning females are sensitive to disturbance during denning season in February to April and may abandon their dens and, in some cases, their litter, which may decrease their reproductive success. ”</p> <p>In Section 9.3.6, the Proponent states: “In the Project Area, 145.0 ha or 100% of available wolverine habitat is assumed to be removed and will not be available to wolverine for the duration of the Project (Table 9.3-13). Similarly, 145.0 ha (3.4%) of available wolverine habitat within the Wildlife LSA is anticipated to be removed, all from the Project Area, during site clearing in Construction. In the Terrestrial RSA, up to 0.5% (145.0 ha; from the Project Area) of available wolverine habitat is anticipated to be removed during site clearing in Construction.”</p> <p>The residual effect assessment estimates that 8.2% of available wolverine habitat within the Terrestrial RSA may be altered or lost</p> | <p>1. Please provide additional information on whether the lost and/or altered wolverine habitat overlaps with wolverine home ranges.</p> <p>2. Describe any important wolverine habitat feature (i.e., dens) that may be lost as a result of the Project.</p> <p>3. Assess the need for pre- construction/pre-clearing surveys to identify any wolverine denning sites.</p> <p>4. Please provide additional information on whether the remaining, available, undisturbed wolverine habitat size is suitable to maintain populations.</p> | <p>1. While wolverine were not observed during baseline studies for the Project, it is assumed that the Project (Project Area, LSA) may overlap with wolverine home ranges. As described in the EIS, wolverine occur in low densities across all forest stand and vegetation types but are generally absent from areas of human development and activities.</p> <p>2. No wolverine dens were identified during any of the baseline studies. It is not anticipated that wolverine denning sites will be lost and/or altered because there are no specific landscape features typically used by wolverine as potential denning sites located in the Project footprint. Further, much of the proposed Project footprint will be developed within previously disturbed areas, including roads and cutlines.</p> <p>3. Pre-construction surveys will be completed to identify all sensitive wildlife habitat features, including wolverine denning sites.</p> <p>4. Most of the Project footprint is already disturbed through previous exploration activities. The total expected direct habitat loss of 169.6 ha includes the already disturbed areas. In the Terrestrial RSA, 8.2% of available wolverine habitat may be altered or lost; this includes 0.5% that will be cleared within the Project Area during Construction, and an additional 7.7% that may be altered through indirect effects (sensory disturbance). The magnitude of this effect was characterized as being "moderate" and the residual effect is not expected to result in a</p> | <p>1. No updates to the draft EIS are needed based on this IR response.</p> <p>2. No updates to the draft EIS are needed based on this IR response.</p> <p>3. Section 9.3.5.2.4 Work Timing Windows (third bullet will be updated to include): Pre-construction wildlife clearance surveys will be conducted within the Project Area in accordance with a wildlife monitoring plan and the draft Caribou Mitigation Plan. This would include surveying for important wildlife features that would include wolverine den sites.</p> <p>4. No updates to the draft EIS are needed based on this IR response.</p> |

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| | | | | (Table 9.3-20). Rationale: As Wolverine is a Species at Risk Act Schedule 1 listed species, effects need to be identified, avoided, lessened and monitored. Mitigations, such as setback distances, should be used to protect important habitat features, such as dens. Wolverine occupy large home ranges and, therefore, need vast tracts of undisturbed land to maintain viable populations. The species avoids most human footprint types and linear features. | | change that will alter wolverine habitat integrity to the point where it would not be able to sustain the regional populations of wolverine. This considers that no wolverine were observed during the baseline investigations, the small Project footprint, and the typically large size of a wolverine home range. | |
| IR-143 | ECCC | Wildlife and Wildlife habitat | Section 9.3.3.3, Baseline Studies | Context and Rationale: The baseline caribou data is insufficient to understand potential Project impacts to this species. Presence/absence detection was provided by camera traps, incidental observations, winter track and pellet survey. Additional information and analyses on caribou use of the landscape during all life stages of the Project area is required to assess impacts and to determine significance of impact from the Project to caribou. | Provide details on the baseline caribou data including: <ul style="list-style-type: none">Revision of map 9.3-8 to include all observations, categorized by type, season and year (see also IR-145); andDescription of seasonal use of the LSA, RSA and caribou range.Description of Project areas used by caribou.Description of future studies planned to assess habitat use by caribou. Include specific details on how many additional years of aerial surveys will be completed to assess the caribou baseline conditions. Utilizing additional data noted above and specified in IR-145, explain how caribou use of the area could be affected by the Project throughout all seasons and life stages (e.g., calving, post-calving, rutting, wintering). See also related: IR-152. | The baseline data collection program was not specifically designed to collect seasonal caribou habitat use but to document caribou presence in the Project Area, Wildlife LSA and Terrestrial RSA. Based on this information, the EIS assumed caribou to be present in the study areas throughout all seasons and life stages. It should be noted that discrete calving areas have not been documented for the SK1 range. As described in the EIS, caribou may use open fen and treed bog habitat types for calving during the spring/summer period. Information from IK was included in the EIS, including potential calving areas in the Terrestrial RSA. Additional wildlife camera data have been obtained and analyzed to further describe seasonal use of the Project study areas. Updated Figure 9.3-8 (included in Attachment IR-143) provides the caribou sightings from baseline studies and updated to reflect seasonality of all sightings, where such data are available. There is insufficient information to provide further explanation on how caribou use of the area could be affected by the Project throughout all seasons and life stages (e.g., calving, post-calving, rutting, wintering)); however, the EA appropriately addressed direct and indirect effects on caribou and their habitat. Denison’s intent is to develop the specific details related to environmental monitoring in general, and Caribou specifically, as part of licensing. A conceptual framework for monitoring and follow up was presented for each technical EIS discipline in the respective draft EIS section (see Section 9.3.9 for terrestrial wildlife). Environmental monitoring and follow up will fall within the scope of the Environmental Management System (EMS) for which document preparation is ongoing as indicated will be fulfilled during licensing. As noted elsewhere in the IR responses the EMS hierarchy will follow a three-tiered system comprising Program, Plan and Procedure level documentation, with detail associates with each becoming more granular and prescriptive at each successive tier. At this time no aerial surveys are planned. Denison approached the Province with proposals for aerial surveying for the purpose of the baseline program in 2016/2017 but the Province would not provide Denison with permits for aerial surveys. Based on recent discussion with the Province this position has not changed, nor is it Denison’s understanding that it is likely to. | Applicable sections of Section 9.3.3.3 will be updated in the final EIS to include a description of seasonal use of the RSA. This would include: Wildlife Camera Study Wildlife camera locations were spread across three categories of linear features in mature and regenerating forest types: road (a maintained or seasonally accessible road supporting traffic), trail/rough road (a cleared disturbance over 2 m in width), and hand-cut line (a cleared disturbance under 2 m in width) (Appendix 9-B). Trails/rough roads and roads had the highest frequency of wildlife detection, with woodland caribou being the second most commonly photographed species (after snowshoe hare). Of the 34 caribou observations that were recorded, most were documented in the winter, with one observation from the spring and one in the summer. Seven data points had no date associated with the observations. Of the winter observations that were documented, seven occurrences were located in the northern portion of the RSA and the remainder located in the eastern portion of the RSA (Figure 9.3-8). Figure 9.3-8 included in Attachment IR-143 has been updated to include additional camera data on caribou presence and seasonal use and will replace Figure 9.3-8 in the draft EIS The Conceptual Caribou Mitigation Plan is included with the IR response package (Attachment IR-149). This Plan includes description of ongoing studies to assess linear feature use by caribou and will be included in the final EIS as new Appendix 9-E. |
| IR-144 | ECCC | Wildlife and Wildlife habitat | Section 9.3.3.3, Baseline Studies – map 9.3-8 | Context and Rationale: The mapping of caribou observations during baseline studies provided in Figure 9.3-8, “Caribou Sign Observations in the Wildlife Study Areas,” is insufficient to enable conclusions to be drawn. ECCC is not able to review the spatial aspect of caribou observations without a map of all available observations. Additional information is available, as stated in Section 9.3.3.3.3: <i>“A total of 200 observations were made between 2017 and 2019 and recorded as either caribou sign (i.e., tracks, pellets, and evidence of feeding activity based on ground feeding craters and arboreal feeding evidence) or photographs (collected through the wildlife camera study) to document caribou presence in the LSA and RSA. Most observations occurred in the Terrestrial RSA, with observations concentrated in the north and southeast portions.</i> <i>Three observations occurred in the southeast portion of the Wildlife LSA, and no caribou sign was observed in the Project Area. Figure 9.3-8 provides an overview of some caribou sign observed during the baseline studies.”</i> | Update map 9.3-8 to show all caribou observations during baseline studies, broken down by type of observation (camera, incidental, pellet, track) and season/year when the observation was made. Include additional data from the Province of Saskatchewan (see also IR-145) to help characterize caribou use on a spatial map. | Refer to the Attachment IR-143 for the updated version of Figure 9.3-8. Denison acquired data from the Province of Saskatchewan which has been included in Attachment IR-145. As shown in the figure, the data is not available in a format that can be imported for analysis and incorporated into a spatial map. The data does not specify seasonality of the observations. Regardless, this data relates to the information provided by McLoughlin (2019 and 2021) and confirms caribou have been previously documented within the RSA, particularly in the eastern portion. References: McLoughlin, P. D. 2021. Associate Professor, University of Saskatchewan, Saskatoon, SK. Personal Communication. January 2021. McLoughlin, P. D., C. Superbie, K. Stewart, P. Tomchuk, B. Neufeld, D. Barks, T. Perry, R. Greuel, C. Regan, A. Truchon-Savard, S. Hart, J. Henkelman, and J. F. Johnstone. 2019. Population and habitat ecology of boreal caribou and their predators in the Saskatchewan Boreal Shield. Final Report. Department of Biology, University of Saskatchewan, Saskatoon. 238 pp. | No updates to the draft EIS are needed based on this IR response. |
| IR-145 | ECCC | Wildlife and Wildlife habitat | Section 9.3.3.3, Woodland Caribou | Context and Rationale: The Proponent has not provided sufficient information on how caribou use the landscape, including identification of areas for different life stages of caribou (calving, post-calving, rutting and wintering). The University of Saskatchewan published a report entitled Population and habitat ecology of boreal caribou and their predators in the Saskatchewan Boreal Shield. This report contains information on habitat types that are used during different life stages. Additionally, Appendix H of the Amended Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada 20202 [1] details habitat characteristics required by boreal caribou to carry out life processes necessary for survival and recovery. | 1. Provide, based off existing literature or available data and the Amended Recovery Strategy for Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada: <ul style="list-style-type: none">information on known important habitat features or biophysical attributes in Project areas for different caribou life stages (calving, post-calving, rutting, wintering),a map(s) of the type and spatial extent of important caribou habitat features or biophysical attributes of the study areas as defined in Appendix H of the Recovery Strategy,<ul style="list-style-type: none">mapping should be at the RSA/LSA level as well as larger-scale mapping at the scale of the Project footprint. | Denison considers the EA to be a planning and decision-making tool that assesses the potential effects of the Project in a careful and precautionary manner and integrates results of engagement with Indigenous nations and communities. As such, the EA is a process for identifying the Project’s potential interactions with the biophysical and human environment, predicting potential adverse effects, identifying mitigation measures, and evaluating residual and cumulative effects remaining after mitigation. The EA also outlines the proposed efforts for monitoring and reporting to verify compliance with the terms and conditions of EA approval and to assess the accuracy and effectiveness of predictions and mitigation measures presented in the EA. Denison views the EIS as an important planning tool that will be used to support future activities and represents one stage in the rigorous overall approvals process for a uranium mining facility in Canada. Denison is completing a sequential EA and licensing process for the Project. In the EIS, a framework for the Environmental Management System (EMS) is provided along with a clear commitment for Denison to include Project design and | The map included in Attachment IR-145 along with supporting text will be added to Section 9.3.3.3 of the final EIS. |

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| | | | | <p>The scientific literature review (Section 9.3.3.3.1) on Woodland Caribou states: “While calving areas have not been documented within the SK1 range, it is recognized that caribou may use open fen and treed bog habitat types for calving during the spring/summer period. In Saskatchewan, caribou habitat used during the calving season in the SK2 range demonstrated a strong selection for treed muskegs, but avoidance of jack pine, mixed hardwood stands, and roads (Dyke 2008).”</p> <p>ECCC is not able to verify the Proponent’s effects assessment without sufficient information on important habitat or biophysical attributes for caribou within the study areas.</p> <p>[1] https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/recovery-strategies/woodland-caribou-boreal-2020.html#toc0</p> | <p>2. Assess the potential direct and indirect effects based on additional information on caribou from bullet A above.</p> <p>See also related IRs: IR-143 and IR-152.</p> <p>Suggestions for mitigation and follow-up measures: ECCC recommends that the Proponent contact the Province of Saskatchewan to enquire about obtaining caribou telemetry data in the Project area. The data can be analyzed to determine important habitat features in the Project area.</p> | <p>species-specific mitigation measures into the EMS documents as they are developed / as the Project proceeds through the licensing and permitting phases.</p> <p>The selection of valued components (VC), with key indicators (KI), and associated measurable parameters is an important part of scoping in each biophysical and human environment assessment. Woodland caribou were selected as a VC in the Terrestrial Environment assessment for a variety of reasons including a recognition of caribou as an important cultural and subsistence species, the conservation status of caribou, and that Project activities and infrastructure may affect woodland caribou populations. For the woodland caribou VC, the KI selected was also woodland caribou. The measurable parameters for the caribou VC/KI were: 1. amount of habitat that may be altered or lost relative to its availability in the Terrestrial RSA; and, 2. woodland caribou mortalities directly or indirectly attributable to the Project.</p> <p>The main Project interactions identified in the caribou assessment were: direct habitat loss, sensory disturbance, collisions with Project vehicles and equipment, and harvest and/or predation. Accordingly, the potential effects evaluated for caribou were: 1. amount of habitat that may be altered or lost relative to its availability in the Terrestrial RSA; and, 2. mortalities directly or indirectly attributable to the Project. Denison undertook the evaluation and assessment of potential effects on caribou in a conservative fashion to provide confidence in the assessment conclusions. For instance, where granular data concerning seasonal distribution and specific landscape uses were not available the approach was to assume the caribou at all life stages were present during all seasons. Additionally, the caribou assessment used conservative assumptions to categorize ‘available’ habitat. Denison also committed to important mitigation measures such as pre-clearance surveys, among other things.</p> <p>The EIS has demonstrated that the Project, as proposed and assessed, is predicted to minimize the potential for environmental adverse effects on caribou and their habitat before any Project specific construction occurs. The conclusions of the assessment predicted that the likely residual effects of the Project on caribou were not significant.</p> <p>The EIS uses "available caribou habitat" as a basis to assess the Project effects. Available habitat was determined as the ecosites in which caribou / caribou sign were detected most frequently during the baseline studies, and the EIS used a precautionary approach by assuming caribou use of these areas during all seasons and life stages.</p> <p>Subsequent to filing of the draft EIS and as committed to ECCC during an April 20, 2023 meeting between Denison and ECCC, Figure 9.3-8 has been updated (included in Attachment IR-143) to address seasonal use by caribou within the terrestrial study areas.</p> <p>In May 2023, Denison received caribou data from the Province of Saskatchewan that included both incidental observations and telemetry point data within the terrestrial study areas. These data were provided to Denison as a figure, and this figure has been included herein as Attachment IR-145. The information made available to Denison by the Province was not broken down to reflect the timing (seasonality) of the reported data and therefore does not specifically contribute to the description of seasonal use of the Project study areas by caribou.</p> <p>For reference, and based on the data that have been made available, the conservative assessment approach utilized in the draft EIS of assuming caribou presence in the terrestrial study areas throughout all seasons will not be changed.</p> | |
| IR-146 | ECCC | Wildlife and Wildlife habitat | Section 9.3.3.3.1, Woodland Caribou, Scientific Literature Review - Predation | <p>Context and Rationale: The information on impacts of predation and apparent competition for caribou in relation to the proposed Project are insufficient.</p> <p>In the section on caribou predators (9.3.3.3.1), the Proponent provided details on densities of wolves and their overlap with caribou and speaks of apparent competition. The Proponent did not examine other predators, such as black bear.</p> <p>The analysis on impacts of predation and apparent competition is insufficient since known predators have been omitted without explanation from the assessment of effects. ECCC is not able to verify the Proponent’s effects assessment since important species have not been considered in the assessment.</p> | <p>Provide further information and analyses on all potential predators of caribou, including impacts from apparent competition.</p> | <p>Effects from predation as a factor contributing to indirect mortality are discussed and qualitatively assessed in the EIS. Section 9.3.3.3 describes current knowledge of caribou mortality in or around the Project study areas (i.e., the existing studies describe wolf predation and hunting). It is acknowledged that black bear may also prey on caribou; however, this would be expected to follow the same effect pathways and is included in the qualitative indirect mortality assessment. Effects of apparent competition are included in the EIS and are part of the qualitative indirect mortality assessment.</p> | <p>In the final EIS, 9.3.3.3.1 Scientific Literature Review Denison will replace Predation section with the following:</p> <p>Predation McLoughlin et al. (2019) observed that mortality of adult caribou occurred mostly during the snow-free season; however, mortality could not be confirmed for most of the caribou, with only the fate of 1 of 94 collared caribou confirmed in the four years of the study (which had been harvested by a hunter).</p> <p>Relatively low predator (e.g., wolf and black bear) densities in their study area were documented by McLoughlin et al. (2019), with other prey species, such as moose, also occurred at relatively low densities (i.e., 45.7 moose/1,000 km²). While the effect on adult caribou survival by black bear is anticipated to be marginal compared to that by wolves, they may still be a predator of caribou calves and potentially a limiting factor to recruitment (McLoughlin et al. 2019).</p> <p>McLoughlin et al. 2019 noted that there was spatial separation between caribou and wolves as well as black bear, although this was found to be variable amongst individuals. Caribou did not seem to avoid existing linear features (such as roads, trails, and transmission lines) in the area, while wolves established their territories away from linear features. Unlike caribou, who preferred mature conifer stands, wolves selected</p> |

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| | | | | | | | <p>for wetlands and patches of deciduous-mixed forest, avoiding stands of mature conifers. Black bears also used mixed-wood forests but particularly in the summer and fall they selected for jack pine stands <40 years. (McLoughlin et al. 2019).</p> <p>While predation is believed to be the limiting factor for woodland caribou, Neufeld et al. (2021) suggested that habitat- or disturbance-mediated apparent competition only plays a minor role in the Saskatchewan woodland caribou population. Habitat or disturbance-mediated apparent competition occurs when natural (e.g., forest fires) and anthropogenic (e.g., human development or activities) disturbances increase the abundance of other ungulates, which in turn may increase predator densities, which then increases predation risk to caribou. Neufeld et al. (2021) concluded that Northern Shield and Taiga ecoregions are of low productivity where caribou may compete with only one ungulate species (i.e., moose) and therefore, caribou and wolf dynamics do not follow general habitat- or disturbance-mediated apparent competition models.</p> |
| IR-147 | ECCC | SAR - Boreal Caribou | <p>Section 9.3.4.2.1, Alteration and/or Loss of Habitat</p> <p>In Section 9.3.4.2.1 the Proponent states that: “Following decommissioning and reclamation, wildlife habitat is expected to recover to baseline conditions.”</p> <p>A more thorough explanation regarding post-decommissioning landscape is required to assess Project impacts.</p> | <p>Context and Rationale: The process of in-situ recovery mining will likely create changes to the surface topography and potential ground subsidence as well as changes to groundwater elevations. These changes can affect the plant communities and ecosite types.</p> | <p>1. Provide further rationale and/or analysis regarding the return of wildlife habitat to baseline conditions post-decommissioning. Incorporate other environmental impacts including:</p> <ul style="list-style-type: none">Ground subsidence and impacts on wildlife habitatChanges to aquifers and impacts on wildlife habitat <p>2. Describe reclamation activities/measures, including temporal information that will be implemented to help in the recovery to baseline conditions.</p> | <p>1. The risk of ground subsidence has been assessed as part of the draft EIS (see Appendix K to Appendix 7-C). Subsequent to the filing of the draft EIS, Denison undertook additional modelling with refined, more granular inputs including consideration of subunits within the altered zone (RESPEC 2023). With this more refined analysis, the potential surface subsidence has been reduced from 7.5 cm to 2.4 to 2.8 mm (RESPEC 2023 is included here as Attachment: IR-21). Overall, the analysis shows there is negligible risk of subsidence and the magnitude of subsidence, if it were to occur, is in the range of millimeters at surface. Further, this potential subsidence would be limited to the footprint directly above the deposit.</p> <p>In consideration of the above, with specific reference to the expected level of ground subsidence, no effects on wildlife habitat nor aquifers that support wildlife habitat are expected. Moreover, Denison does not foresee that ground subsidence would be a risk to the success of wildlife habitat restoration / reclamation during Post-Decommissioning, within the context (potential for adverse effects on wildlife habitat and/or changes to aquifers that may adversely affect wildlife habitat) raised by the IR.</p> <p>As outlined in Section 2.3.3 of the draft EIS, as part of the Conceptual Decommissioning Plan (CDP), reclamation activities, including replanting, will take place once the asset removal, decontamination, demolition, and disposal are completed, and the site has been cleared and leveled. Notwithstanding the execution of major decommissioning activities, Denison will look for opportunities to proactively reclaim inactive areas of the Project site as is possible in a timely manner and without delay. Progressive reclamation is considered in more detail below.</p> <p>Future discussions will be held with Indigenous and general public Interested Parties to determine the amount of access to the area they wish to maintain in the future (post-decommissioning). Based on the results of these discussions, roads associated with the Project site that are no longer needed will be graded and scarified to promote natural revegetation. Access roads or trails required for post-closure monitoring or deemed useful by Interested Parties may be left to facilitate continued access. Access to the site may be restricted by gates and/or berms for safety. Laydown areas will be scarified, covered with 0.5 to 1.0 m of stockpiled overburden, and vegetated with native, self-sustaining species. The footprints of other infrastructure, such as the camp, will be scarified and vegetated with native, self-sustaining species as required. The topsoil and brush stockpiled during pre-construction activities will be used during reclamation. Lessons learned from progressive decommissioning and any site-specific reclamation studies will be incorporated into the detailed reclamation design. Additionally, information from other northern Saskatchewan mine sites will be examined to help Denison select the reclamation tools, including revegetation options, that will contribute towards decommissioning success.</p> <p>2. Specific details concerning reclamation activities / measures, including detailed temporal information for restoration will be developed as part of future updates to the decommissioning plan. The CDP included in the draft EIS contains information related to site restoration; see also the Conceptual Caribou Mitigation Plan provided in Attachment IR-149. The CDP contains the appropriate level of detail for this stage of the Project. Briefly, the three main physical decommissioning activities include:</p> <ul style="list-style-type: none">mining area remediation;asset removal; anddecontamination, demolition, and disposal. <p>Physical decommissioning activities are followed by reclamation. The expected duration for decommissioning is 5 years (from year 18 to 23 of the Project).</p> <p>Importantly, during physical decommissioning, the majority of Project components are scheduled to be removed from site which is expected to facilitate reclamation activities. Also, because of the selected mining method, there are no large site aspects, such as waste rock</p> | <p>No updates to the draft EIS are needed based on this IR response.</p> |

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| | | | | | | <p>piles or tailings management facilities, for which large scale and potentially complex reclamation strategies are needed.</p> <p>Denison has committed to progressively reclaim areas no longer necessary to support/facilitate Operations to limit the amount of disturbance at any given time. Reclamation of inactive areas will take place when/as these areas become available. The progress and success of these activities will be assessed annually. Progressive reclamation and ecosystem-based revegetation will be conducted on disturbed areas as soon as safely and logistically practicable with the use of suitable/appropriate native vegetation species and in accordance with the Reclamation and Closure Plan.</p> <p>As described in Section 2.3.3 and outlined above, the details of the decommissioning plan, including site restoration, will evolve and become more specific as the Project advances. The subsequent iteration of the decommissioning plan will be the preliminary decommissioning plan (PDP). The PDP will be submitted to regulators as part of Project licensing and permitting and will provide additional detailed information with respect to site decommissioning, including site restoration. The PDP would reflect input that will be solicited from Indigenous Nations and communities and others prior to its submission. Prior to executing decommissioning activities, Denison shall prepare and submit a detailed decommissioning plan (DDP) to regulators for acceptance, which builds on the PDP. In this case the DDP would reflect input that will be solicited from Indigenous Nations and communities and others prior to its submission and would also be informed by conditions on the ground at the site at that time, operational experience that has been gained and the regulatory landscape at that time. As is highlighted above, the decommissioning plan, including site restoration, will evolve over time and the plan will become more refined as the Project advances.</p> | |
| IR-148 | ECCC | Wildlife and Wildlife habitat | Section 9.3.4.2.1, Alteration and/or Loss of Habitat | <p>Context and Rationale: ECCC analyzes disturbance for caribou at the range level, in this case within the SK1 range. However, the Proponent did not provide an adequate assessment of total disturbance at the range level. The draft EIS (Section 9.3.4.2.1 p. 9-211) reads: “The SK1 Boreal Shield Woodland Caribou Management Unit has relatively low levels of anthropogenic disturbance and was exposed to large fire disturbances in the past 40 years (ECCC 2019). Environment and Climate Change Canada (2019) identified this caribou population as being self-sustaining at a threshold of 40% undisturbed habitat with the total anthropogenic disturbance not exceeding 5% of their habitat. The current anthropogenic disturbance levels (without areas burnt by past forest fires) for the study areas are below this threshold (with the exception of the already disturbed Project Area) and are estimated as: 24.8 ha (14.6%) for the Project Area, 168 ha (3.5%) for the Wildlife LSA, and 599 ha (1.5%) for the Terrestrial RSA.”</p> <p>Analysis of habitat disturbance should be calculated at the range level in order to assess impacts and determine significance.</p> <p>Analysis should be consistent with the methodology described in the document Scientific Assessment to Support the Identification of Critical Habitat for Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada (Environment Canada, 2011) [1].</p> <p>[1]https://publications.gc.ca/site/eng/401605/publication.html, p. 28/41</p> | <p>Provide the following in order to support analysis of habitat disturbance:</p> <ol style="list-style-type: none">1. Calculation of total disturbance including natural and anthropogenic disturbance at the range level.2. Description of effects on existing habitat at the scale of the range (for < 40% undisturbed habitat in the SK1). Include:<ul style="list-style-type: none">• an account (and GIS file if available) of existing habitat affected, using the following formula: (Project footprint + 500m buffer) - overlapping (permanent alteration(s) + 500m buffer)3. A map of the SK1 range showing all disturbed and undisturbed habitat, including predicted disturbance (direct and indirect) resulting from the Project.4. Description of whether the Project is expected to compromise the ability of the range to be restored to the undisturbed habitat threshold, and provide a rationale for the conclusion. <p>See also related: IR-154.</p> | <p>1., 2., and 3.: This calculation (for Project Area + 500 m buffer) is provided for the Project at the SK1 range level in the Cumulative Effects Assessment (see Section 9.3.7.3.3). Project-specific values are provided as they add to the known existing reported anthropogenic disturbance in the SK1 range and the result shows that the Project would be adding 0.001% of anthropogenic disturbance at the scale of the SK1 Boreal Shield Woodland Caribou Management Unit (refer to response to IR-137). Existing anthropogenic disturbance was mapped at the scale of the Terrestrial RSA (i.e., the assessment area - see Figure 9.3-15); the mapping was not extended to the entire SK1 range because: (1) this was not determined to be the assessment area (explained in response to IR-137) and (2) shapefiles are not publicly available for all developments in the SK1 range.</p> <p>4. The Project is not expected to compromise the ability of the range (i.e., SK1 range) to be restored to the undisturbed habitat threshold. This opinion is based on the small amount of disturbance (i.e., 0.001%) of anthropogenic disturbance and Denison’s commitment to progressive reclamation as well as final reclamation as part of the Decommissioning phase. Also considered was the ecology of the boreal forest which is influenced, primarily by forest fires that continue to “reset” the seral stage of forest, typically at a much larger scale than that of the Project Area. The reclamation efforts will be monitored, and deficiencies noted and addressed appropriately in a timely manner, so that lands are returned to comparable land use capability and habitat (i.e., regenerating forest), that existed prior to the Project. The Project is not expected to adversely affect the habitat within the SK1 range to the extent that the range/habitat is unable to support caribou.</p> | No updates to the draft EIS are needed based on this IR response. |
| IR-149 | ECCC CNSC | Wildlife and Wildlife habitat | Section 9.3.5.2, Additional Wildlife- specific Mitigation Measures | <p>Context: The EIS describes that ongoing research is performed to inform the development of a Woodland Caribou Management Plan. This includes studies on the effectiveness of linear disruption features on predator/prey movements, and a field program for long-term reclamation planning. Moreover, it is stated that the Plan will include a detailed assessment of the need for habitat offsets.</p> <p>The draft EIS Section 9.3.5.2 states: “A wildlife monitoring plan and a Woodland Caribou Management Plan will be developed to address wildlife-specific mitigation measures based on proven and accepted mitigation following standard industry guidelines and BMPs. The plans will provide guidance to avoid or minimize potential adverse effects of the Project on wildlife and wildlife habitat, including monitoring and follow-up programs, as appropriate. It will be in place during all phases of the Project and will be subject to ongoing review and revision as required. If monitoring identifies a need for additional or revised mitigation measures, a process of adaptive management (as described in the plan) will be triggered.”</p> <p>Rationale: The draft EIS does not present sufficient species-specific mitigation measures for boreal caribou. ECCC is not able to assess potential residual impacts to caribou without specific mitigations.</p> <p>Since the Woodland Caribou Management Plan is still under development, it is difficult to judge whether the measures will be adequate to mitigate and/or offset potential project effects on Woodland caribou and its critical habitat.</p> | <p>Provide the Woodland Caribou Management Plan, to demonstrate effective mitigation of potential project effects, along with wildlife-specific mitigation measures for review.</p> <p>The Plan should be informed by and consistent with the Boreal Caribou Recovery Strategy and demonstrate that avoidance and minimization measures will be applied to mitigate for predicted Project effects to boreal caribou and its critical habitat prior to considering offsetting measures. That is, the Plan should follow the mitigation hierarchy and information should be provided as outlined below:</p> <ol style="list-style-type: none">1. AVOID: Describe all measures that will be taken to avoid effects to boreal caribou and avoid the destruction or alteration boreal caribou critical habitat.2. MINIMIZE: Describe all measures that will be taken to minimize the effects to boreal caribou and minimize the destruction of boreal caribou critical habitat.3. RESTORE ON-SITE: describe the measures that will be taken to restore disturbed areas of the project, related to construction, operation and maintenance, on boreal caribou critical habitat, remaining after considering the avoidance and minimization measures.4. Characterize the risk of the adverse effects that are likely to result from the project on boreal caribou and its critical habitat after avoidance minimization, and onsite restoration measures have been considered. | <p>Denison considers the EA to be a planning and decision-making tool that assesses the potential effects of the Project in a careful and precautionary manner and integrates results of engagement with Indigenous nations and communities. As such, the EA is a process for identifying the Project’s potential interactions with the biophysical and human environment, predicting potential adverse effects, identifying mitigation measures, and evaluating residual and cumulative effects remaining after mitigation. The EA also outlines the proposed efforts for monitoring and reporting to verify compliance with the terms and conditions of EA approval and to assess the accuracy and effectiveness of predictions and mitigation measures presented in the EA. Denison views the EIS as an important planning tool that will be used to support future activities and represents one stage in the rigorous overall approvals process for a uranium mining facility in Canada. Denison is completing a sequential EA and licensing process for the Project. In the EIS, a framework for the Environmental Management System (EMS) is provided along with a clear commitment for Denison to include Project design and species-specific mitigation measures into the EMS documents as they are developed / as the Project proceeds through the licensing and permitting phases.</p> <p>The selection of valued components (VC), with key indicators (KI), and associated measurable parameters is an important part of scoping in each biophysical and human environment assessment. Woodland caribou were selected as a VC in the Terrestrial Environment assessment for a variety of reasons including a recognition of caribou as an important cultural and subsistence species, the conservation status of caribou, and that Project activities and infrastructure may affect woodland caribou populations. For the woodland caribou VC, the KI selected was also woodland caribou. The measurable parameters for the caribou VC/KI were: 1. amount of habitat that may be altered or lost relative to its availability in the Terrestrial RSA; and, 2. woodland caribou mortalities directly or indirectly attributable to the Project.</p> <p>The main Project interactions identified in the caribou assessment were: direct habitat loss, sensory disturbance, collisions with Project vehicles and equipment, and harvest and/or predation. Accordingly, the potential effects evaluated for caribou were: 1. amount of habitat that may be altered or lost relative to its availability in the Terrestrial RSA; and, 2. mortalities</p> | The Conceptual Caribou Mitigation Plan, provided in Attachment IR-149, will be included in the final EIS as a new appendix (Appendix 9-E) to Section 9. |

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| | | | | | <p>5. OFFSET: Describe the measures that will be implemented outside the Designated Project area to mitigate adverse effects, destruction or alteration of boreal caribou critical habitat by the Designated Project during construction and operation.</p> <p>6. Characterize the risk of the adverse effects that are likely to result from the project on boreal caribou and its critical habitat after avoidance, minimization, onsite restoration, and offset measures have been considered.</p> <p>Describe all relevant uncertainties on the effectiveness of the measures to address adverse effects on boreal caribou and the rationale for the selected measure, in light of the mitigation hierarchy.</p> <p>See also related IRs: IR-149 and IR-157.</p> | <p>directly or indirectly attributable to the Project. Denison undertook the evaluation and assessment of potential effects on caribou in a conservative fashion to provide confidence in the assessment conclusions. For instance, where granular data concerning seasonal distribution and specific landscape uses were not available the approach was to assume the caribou at all life stages were present during all seasons. Additionally, the caribou assessment used conservative assumptions to categorize ‘available’ habitat. Denison also committed to important mitigation measures such as pre-clearance surveys, among other things.</p> <p>The EIS has demonstrated that the Project, as proposed and assessed, is predicted to minimize the potential for environmental adverse effects on caribou and their habitat before any Project specific construction occurs. The conclusions of the assessment predicted that the likely residual effects of the Project on caribou were not significant.</p> <p>Denison met with ECCC representatives on April 20, 2023, and agreed to provide a conceptual caribou mitigation plan as part of the IR response package, and also include the conceptual plan in the final EIS. As such, the Project’s Conceptual Caribou Mitigation Plan is provided as Attachment IR-149 and will be included in the final EIS.</p> <p>The framework for the Conceptual Caribou Mitigation Plan (the Plan) was developed during discussions between Denison and Saskatchewan Ministry of Environment (ENV) in May and June 2023. The Plan is an evergreen document. It will be consistent with the management goals of ENV for the SK-1 caribou conservation unit and will be developed/refined in consultation with local communities including English River First Nation and Kineepik Métis Local in Pinehouse and ENV. Since the boreal caribou range plan for SK-1 is under development, it is understood that this Plan will be updated as more information becomes available. The conceptual nature of the Plan at this time is in part due to the absence of range plan priorities and reflects Denison’s commitment to continue to work with ENV to meet the management objectives and management strategies for the SK1 range. This approach acknowledges that the responsibility for woodland caribou management lies with the Province of Saskatchewan. Broadly, the province is responsible for developing range plans or management plans which build on the federal recovery strategy by setting goals and objectives for maintaining sustainable population levels. The EIS has demonstrated that the Project, as proposed and assessed, is predicted to minimize the potential for environmental adverse effects on caribou and their habitat before any Project specific construction occurs. The conclusions of the assessment predicted that the likely residual effects of the Project on caribou were not significant.</p> | |
| IR-150 | ECCC | Wildlife and Wildlife habitat | Section 9.3.5.2.1, Best Management Practices for working in Boreal Woodland Caribou Range in Saskatchewan | <p>Context and Rationale: In the draft EIS Section 9.3.5.2.1, the Proponent states: “Denison proactively initiated research to provide field-based findings on the effectiveness of linear disruption features on predator/prey movements.”</p> <p>“Results will help the development of proactive and meaningful restoration strategies as an ongoing part of the overall Project (Omnia 2022). Additionally, the 2023 field program will support a program that uses the results from the 2021/2022 Caribou Trail Study in long-term reclamation planning. The program will be led by the University of Saskatchewan and is funded by Denison, an Indigenous-owned environmental company, the Northwest Communities Environmental Services (Métis owned), Mitacs, and the Natural Science and Engineering Research Council of Canada through an alliance grant. The Caribou Trail Study and the reclamation plan will culminate with the development of a Woodland Caribou Management Plan.”</p> <p>ECCC is available to support the Proponent through review of study programs should those programs be made available during the review process.</p> <p>ECCC requests to see the 2021/2022 study to further our review of caribou use in the Project area.</p> | Provide the report for 2021/2022 Caribou Trail study for long-term reclamation planning for ECCC review. | The report titled <i>Pilot Program: Linear Feature Mitigation Interim Report- Status Update and Preliminary Results</i> is included as attachment IR-150. | No EIS updates in response to this IR. |
| IR-151 | ECCC | Wildlife and Wildlife habitat | Section 9.3.6.4 | <p>Context and Rationale: In the analysis of residual and cumulative effects for woodland caribou, information and analyses on impacts to connectivity and movement across the landscape is lacking.</p> | <p>1. Using available reports and data, provide an analysis of impacts to landscape connectivity for woodland caribou at the LSA and Range scales.</p> <p>2. Determine whether the Project is expected to result in a reduction of connectivity within or between the ranges and provide a rationale for the conclusion. Describe how movement corridor(s) may be affected by Project activities and infrastructure.</p> | <p>To appropriately focus the EA, using an accepted/proven methodology, the EIS considers two effects: (1) alteration and/or loss of habitat and (2) change in mortality.</p> <p>Effects on movement corridors were not assessed specifically as this is not an infrastructure project that is expected to affect movement patterns across the landscape (i.e., landscape connectivity is not expected to be affected). This also considers the life stages and biology of woodland caribou, including their movement patterns. A “wildlife corridor” ~6 km south of the Project Area (as depicted in Figure 4. Map B, page 16 of ERFN and SVS 2022) was identified by IK that was appropriately considered in the assessment, as this feature overlaps with the Terrestrial RSA. However, this feature was not expressly discussed in the residual effects assessment because there is no anticipated spatial overlap of those areas with direct or indirect Project effects. Further, the effect of habitat alteration does consider changes in species' habitat use, including movement. This approach was appropriate considering the small Project Footprint, the progressive reclamation, the baseline data, the available Indigenous Knowledge and the biology of caribou (e.g., no large-scale movement patterns) potentially using portions of the Terrestrial RSA.</p> | No updates to the draft EIS are needed based on this IR response. |
| IR-152 | CNSC | Woodland Caribou Residual Effects Evaluation | Section 9.3.6.4, Appendix 9-B | <p>Context: Baseline studies for Woodland caribou include:</p> <ul style="list-style-type: none">Winter Track Count Survey to assess presence, abundance, feeding activity, and ecosite affiliation;Pellet Group/Browse Availability Survey to detect presence and abundance of caribou, and frequency of occurrence and abundance of lichen; | <p>Please provide a summary of available baseline data on habitat use during all seasons and life stages, in particular sensitive stages such as calving, and how habitat use during all seasons and life stages was considered in the residual effect analysis.</p> <p>See also IR-145 and IR-143.</p> | Refer to the responses to IR 143 and IR 145. | No updates to the draft EIS are needed based on this IR response. |

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| | | | | <ul style="list-style-type: none">Covert Camera Survey to determine presence and use of linear features (roads, trails, and hand-cut lines). <p>The Saskatchewan Conservation Strategy for Boreal Woodland caribou [1] states that caribou are very susceptible to predation during the calf-rearing period, and populations are extremely sensitive to even minor changes in mortality rates.</p> <p>Rationale: It is unclear if, or how, any data on seasonal and spatial use of habitat was considered in the residual effect analysis, for example summer/winter home ranges, sensitive life stages including calving (e.g., location of calving sites). It should be noted that the English River First Nation have identified caribou calving areas in the vicinity of the project footprint.</p> <p>Reference: [1] Saskatchewan Ministry of Environment. 2013. Conservation Strategy For Boreal Woodland Caribou (Rangifer tarandus caribou) in Saskatchewan. Saskatchewan Ministry of Environment. Fish and Wildlife Technical Report 2014.</p> | | | |
| IR-153 | CNSC | Woodland Caribou Residual Effects Evaluation | Section 9.3.6.4.1 | <p>Context: According to ECCC (2020), forest fires can directly alter habitat, making it unsuitable for boreal caribou (e.g., through loss of mature conifer stands, loss of lichens and other forage plants, barriers to movement). Boreal caribou generally do not return to burned areas for several decades until the forest is old enough to support lichens and other food sources, although they may make limited use of burned areas to feed on new growth.</p> <p>The residual effects evaluation of alteration and/or habitat loss lists ecosites BS3 and BS7 (regenerating forest types) as available habitat in Table 9.3-22, which represent 43.5% of the Regional Study Area.</p> <p>Rationale: It is unclear whether the ecosites BS3 and BS7 (regenerating forest types) represent suitable habitat for Woodland caribou year-round. More information is required on the habitat quality (e.g., time since last forest fire) and suitability for different life stages of caribou.</p> <p>For conservatism, it is recommended to perform a second residual effect analysis not including regenerating forest ecosites.</p> | <p>1. Please provide further information on the suitability of ecosites BS3 and BS7 for Woodland caribou in different life stages.</p> <p>2. Please provide the results of a residual effect analysis not including ecosites BS3 and BS7 for conservatism.</p> <p>3. If 2 leads to habitat fragmentation, consider connectivity of habitat patches in the residual effect analysis.</p> | <p>1. Caribou were observed within these regenerating ecosites (BS3 and BS7) during baseline studies and therefore, to be inclusive of all life stages, they were included in the "available habitat" for woodland caribou.</p> <p>2. The EIS followed a conservative approach by including these ecosites in the available year-round habitat to appropriately inform the effects assessment. No additional analysis related to connectivity of habitat patches is considered to be warranted for the Project, considering the baseline data, available Indigenous Knowledge and the biology of the caribou potentially using portions of the Terrestrial RSA</p> <p>3. Effect on habitat connectivity and fragmentation were considered in the habitat-based effects assessment within the context of habitat loss/alteration. The effects assessment considered that the project footprint had been previously disturbed/fragmented and connectivity altered. The assessment appropriately considered effects on wildlife habitat at the LSA and RSA levels</p> | No updates to the draft EIS are needed based on this IR response. |
| IR-154 | CNSC | Woodland Caribou Alteration and/or Loss of Habitat | Section 9.3.6.4.1 | <p>Context: Lichen, the primary food source for Woodland caribou (up to 70% of the year-round diet), can be exposed to airborne contaminants and dust deposition at distances of 1–40 km (e.g., increased metal concentrations or dust were detected in lichen at distances of 1–40 km from a mine site [1, 2]).</p> <p>Rationale: Further information is requested on how the potential for contamination of the food source “lichen” is reflected in the applied buffers of direct and indirect disturbance for woodland caribou.</p> <p>References: [1] Watkinson et al. (2021). Effects of dust deposition from diamond mining on subarctic plant communities and barren-ground caribou forage. Journal of Environmental Quality 50(4): 990-1003. doi: 10.1002/jeq2.20251. [2] Chen et al. (2017). Does dust from arctic mines affect caribou forage? Journal of Environmental Protection 8(3): 258-276. doi: 10.4236/jep.2017.83020.</p> | <p>1. Please provide additional justification for how the potential for contamination of the food source “lichen” is reflected in the applied buffers for sensory disturbance.</p> <p>See also related IRs: IR-137, IR-148 and IR-156.</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends the following:</p> <ul style="list-style-type: none">COPC in Lichen monitoring is recommended in transects from the Project site to assess COPC concentrations and confirm whether the chosen buffer is conservative. | <p>Potential effects on caribou as the result of exposure to COPCs, including dietary pathways inclusive of lichen, were assessed as part of the Ecological Risk Assessment (ERA) (see draft EIS, Appendix 10-A). Hazard Quotients (HQs) associated with the exposure pathways analyses were below the benchmark of 1 for all COPCs.</p> <p>The reviewer is referred to Appendix 10-A, as well as the responses to IRs 138 and 189 for additional information.</p> | No updates to the draft EIS are needed based on this IR response. |
| IR-155 | ECCC | Wildlife and Wildlife habitat | Section 9.3.6.4.1, Alteration and/or Loss of Habitat | <p>Context and Rationale: In Section 9.3.6.4.1 of the draft EIS, the Proponent presents figure 9.3-14 and table 9.3-22, which “depicts available woodland caribou habitat in the Project study areas” and provide a summary of available Woodland Caribou Habitat in the Project Area, Wildlife Local Study Area, and the Terrestrial Regional Study Area.</p> <p>The Proponent does not provide a biologically relevant explanation on the ecosites that are considered available woodland caribou habitat.</p> <p>According to the amended recovery strategy for Caribou, all habitat within SK1 range has been designated as critical habitat. To align with best current knowledge and the amended recovery strategy, the map and table should show the biophysical attributes, as outlined in Appendix H of the recovery strategy.</p> | <p>1. Provide a biologically relevant explanation about how available caribou habitat was determined or determine available habitat based on new data from the province of Saskatchewan (See IR-145).</p> <p>2. Consider referencing Appendix H of the Amended Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada 2020 to define important biophysical features.</p> | <p>Available woodland caribou habitat was identified in the draft EIS to comprise the ecosites with observations of caribou and caribou sign during the baseline studies. This was done without seasonal differentiation because it was assumed that caribou may use these ecosites during all seasons and life stages. Section 9.3.6.4.1 of the draft EIS describes these habitat types. A reference to Appendix H of the 2020 Amended Recovery Strategy and important biophysical features will be added to Section 9.3.6.4.1. in the final EIS.</p> <p>Please see the response to IR-145 related to the acquisition of data received from the Province of Saskatchewan.</p> | Per the IR response, Section 9.3.6.4.1 in the final EIS will be updated to add: “To be conservative, the environmental assessment assumed caribou use of all habitat types during all seasons, as appropriate. This is expected to appropriately address all of the biophysical features outlined in Appendix H of the Amended Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada 2020.” |
| IR-156 | ECCC | Wildlife and Wildlife habitat | Section 9.3.6.4.1 Section 9.3.7.3.1 | <p>Context and Rationale: In Section 9.3.6.4.1 of the draft EIS, the Proponent identified that 142 ha of available caribou habitat within the Project footprint will be directly impacted or lost, while an additional 1,165 ha will be indirectly impacted by Project activities such as sensory disturbance. They assessed the residual and cumulative effect of alteration to habitat for woodland caribou as not</p> | <p>Provide a revised assessment of residual and cumulative effects, taking into consideration that the disturbance within the SK1 range is above the disturbance management threshold required for survival and recovery of the species.</p> <p>See also related IRs: IR-137 and IR-154.</p> | <p>The EA appropriately assessed the residual effects and the cumulative effects within the RSA, as per standard, accepted EA methodology.</p> <p>As described in Section 9.3.7.3.3 of the draft EIS, ECCC identified the caribou population in the SK1 range as being self-sustaining at a threshold of 40% undisturbed habitat and recommended that total anthropogenic disturbance in that range should not exceed 5% with</p> | No updates to the draft EIS are needed based on this IR response. |

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| | | | | <p>significant: “The residual effect of alteration and/or loss of available woodland caribou habitat is not expected to result in a change that will alter caribou habitat integrity to the point where it would not be able to sustain the regional woodland caribou population. Therefore, the effect is assessed as not significant.”</p> <p>Section 9.3.7.3.1 of the draft EIS states: “It is not expected that the cumulative effects of alteration and/or loss of habitat will alter the integrity of woodland caribou habitat within the Terrestrial RSA to the point where it is not sustainable or available to contribute to ecological functions. Therefore, the cumulative effects resulting from the Project’s residual effect interacting with residual effects from other projects and activities is predicted to be not significant.”</p> <p>For the residual effect of alteration and/or loss of available caribou habitat (Section 9.3.6.4.1, Table 9.3-24), the proponent assessed the magnitude as low, the geographic extent as local, the duration as long-term, the frequency as frequent, the reversibility as fully reversible, the context as high and the likelihood as likely. The rationale provided by the proponent is insufficient to determine the accuracy of these assessments, given the lack of data and the small size of the assessment area. ECCC does not support the residual effects assessment of low magnitude, given the uncertainties related to seasonal use by caribou in the project area and the current level of disturbance in the SK1 range.</p> <p>For the cumulative effect of alteration and/or loss of available caribou habitat (Section 9.3.7.3.3 , Table 9.3-30), the proponent assessed the magnitude as moderate, the geographic extent as beyond the RSA, the duration as long-term, the frequency as frequent, the reversibility as fully reversible, the context as high, the likelihood as likely, the significance as not significant and the level of confidence as moderate. The rationale provided by the proponent is insufficient to determine the accuracy of these assessments, given the lack to data presented for caribou and the small size of the RSA, compared to the SK1 region. ECCC does not support the conclusion of the cumulative effects assessments or for the level of confidence.</p> <p>The Amended Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada 2020 states that the range is currently at the 60% disturbance management threshold. Therefore, any activity likely to result in the alteration or destruction of critical habitat may impact on the species survival and recovery. In addition, the Proponent’s assessment was based on information that was lacking data on calving, wintering and rutting areas, and connectivity and caribou movements. The absence of considerations of the regional context of disturbance does not provide a conclusion based on best available information.</p> | | <p>55% being attributed to natural disturbance. In 2020, approximately 58% of the SK1 Boreal Shield range were affected by past forest fires and 3% of the range were affected by anthropogenic disturbances (i.e., 61% of the range were disturbed mostly due to fires).</p> <p>As described in the Cumulative Effects Assessment (Section 9.3.7.3.3 of the draft EIS), the Project-related (i.e., anthropogenic) disturbance was predicted to add 0.001% at the scale of the SK1 Boreal Shield Woodland Caribou Management Unit. Refer to the response to IR-137 for a rationale of the assessment area for the effects assessment (i.e., the Terrestrial RSA).</p> <p>Please also refer to IR-149 and the attached Conceptual Caribou Mitigation Plan (the Plan), specifically Section 5.1 of the Plan. A mapping exercise was completed to provide context on the Project-related habitat loss in consideration of the woodland caribou range (SK1) disturbance management threshold (ECCC 2020). Based on the analysis in Section 5.1 of the Plan using ECCC (2020) criteria, should the Project proceed, the disturbance management threshold for SK1 range would remain unchanged.</p> | |
| IR-157 | ECCC | Wildlife and Wildlife habitat | Section 9.3.9 Ungulates, Furbearer and Woodland Caribou Summary | <p>Context and Rationale: The Proponent has committed to developing a Woodland Caribou Management Plan, which will include a “detailed assessment for the need for habitat offsets.” The Woodland Caribou Management Plan will support ECCC’s review of the Proponent’s assessment of residual effects following mitigation and offsetting.</p> <p>This plan should consider ECCC’s Operational Framework for Use of Conservation Allowances (ECCC, 2012). ECCC is available to assist the Proponent in the determination of appropriate offsets that would balance against Project adverse effects after the application of measures to avoid, minimize and restore on-site are adopted.</p> <p>Based on the Amended Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada 2020, anthropogenic impacts to local caribou populations experience a lag effect, which occurs over extended periods. This lag effect needs to be adequately considered when proposing offsets.</p> <p>ECCC is available to assist the Proponent in understanding how critical habitat is described in the Recovery Strategy and the determination of appropriate offsets that would balance against Project effects based on the predicted impacts to caribou habitat.</p> | <p>Provide the Woodland Caribou Management Plan for review. The plan should clearly demonstrate efforts to avoid and minimize any Project effects and restore on-site any disturbed areas prior to the consideration of offsetting. Details on how severity of disturbance and vulnerability of the species were considered should be explained.</p> <p>See also related: IR-149.</p> <p>Suggestions for mitigation and follow-up measures: ECCC notes that the Woodland Caribou Management Plan should clearly explain efforts to address Project effects, including any contribution to cumulative adverse effects, after it has been determined that all options in the previous steps of the mitigation hierarchy (i.e., avoidance, and minimization,) have been fully considered and applied.</p> <p>In the Woodland Caribou Management Plan, provide details on how the factors outlined in the Operational Framework for Use of Conservation Allowances (ECCC, 2012) were considered in determining the offsetting amounts, including the severity of disturbance and vulnerability of the caribou population. Important factors including time lag (the amount of time from restoration work to when the habitat would be considered caribou habitat) would also need to be considered.</p> <p>ECCC typically recommends a minimum offset multiplier of 4:1 (offset outcome: area disturbed). This is a benchmark ratio applied to a project that is in the lower end of the risk spectrum, such as one with a low severity impact adversely affecting a low vulnerability ecological component. In general, the minimum 4:1 multiplier accounts for time-lags to restoration, uncertainty in outcomes, a precautionary</p> | Refer to response to IR-145. | No updates to the draft EIS are needed based on this IR response. |

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| | | | | | approach, and the adverse impact itself in its specific context. Offset multipliers are variable and determined by project-specific circumstances and associated risks and uncertainties. | | |
| IR-158 | ECCC | Migratory birds | Section 9.4.1.2, Key Indicators and Measurable Parameters | <p>Context and Rationale: In Section 9.4.1.2 the Proponent outlined key indicators for “Migratory Breeding Birds” which includes Waterbirds and Waterfowl, Upland Game Birds and Migratory Songbirds. These are broad categories, which do not allow for assessment of the variation in habitat requirements or ecology of individual species or guilds.</p> <p>ECCC advises the Proponent to identify additional focal species that have the ability to represent anticipated impacts to a broader guild of species. Indicator species should be demonstrably sensitive to the potential effect of interest, and suitable for inferring effects on other species.</p> <p>Species may be grouped into guilds for assessment based on similarities in ecology or vulnerability to Project effects (e.g., species at elevated risk of collision with vehicle traffic).</p> | Identify focal species/guilds for each key indicator species within the Migratory Breeding Birds valued components. Provide an updated analysis of Project effects on migratory birds. | <p>The habitat-based assessment presented in the draft EIS appropriately evaluated potential adverse effects on avian species. The VCs and KIs were selected following extensive consultation with Indigenous nations and communities and other Interested Parties; the VCs and KIs appropriately focused the EA.</p> <p>Waterbirds and Waterfowl, Upland Game Birds and Migratory Songbirds were considered as species guilds themselves, and appropriately identified as Key Indicators of the Migratory Breeding Birds Valued Component and were adequately assessed separately (i.e., at the Key Indicator level) for each Project effect and only rolled up to the Valued Component level for the significance determination. This approach was identified as the appropriate assessment method to identify Project effects on migratory breeding birds and to focus the assessment. The potential effects were identified and described for those species (within the Key Indicator group) that are most affected, and was then applied to all Key Indicator species, including those that may be less affected (e.g., risk of vehicle collisions, risk of entrapment) using a conservative, inclusive approach that considered the baseline data and the habitat. Further selection of focal species within each of these species guilds is not anticipated to affect the outcome of the assessment results or the conclusions</p> | No updates to the draft EIS are needed based on this IR response |
| IR-159 | ECCC | Migratory birds | 9.4.3.2.3 Baseline Studies – Migratory Songbirds Appendix 9-B, Section 2.10.2, Results | <p>Context and Rationale: Information presented in the draft EIS is insufficient to accurately predict Project impacts to breeding birds. The Proponent collected a single year of breeding songbird point counts and aerial waterfowl surveys (including avian species at risk). A single year of surveys in which birds may be unusually scarce or abundant could severely compromise interpretation of post-construction monitoring data.</p> <p>Additionally, data presented in the draft EIS is from 2017 and ECCC advises that more recent data is needed for a comprehensive baseline to verify Project impacts.</p> <p>Data from the Saskatchewan Conservation Data Centre (HABISask), the Saskatchewan Breeding Bird Atlas and the Boreal Avian Modelling project contain information on avian densities and avian species at risk that could supplement field data.</p> <p>The national standard for major projects recommends a minimum of two years of field surveys to be provided, so that temporal variability can be considered when comparing post-construction against baseline records and other available data.</p> | Supplement breeding bird point count data and aerial waterfowl data collected during 2017 with additional pre-construction field data or existing post-2017 data/modelling to provide a comprehensive baseline that can be used to verify Project impacts during construction and operational phases. | <p>The baseline data presented in the draft EIS are sufficient for the intended purpose – that is the data are sufficient, in conjunction with regionally available data, to identify potential project effects. The data collected as part of the baseline studies for birds was focused on the habitat types and areas most likely to be disturbed as a result of the Project. Conducting additional baseline surveys for waterfowl, raptors, and breeding birds is not anticipated to result in changes to the assessment outcomes and predictions made as part of the effects assessment, which was habitat-based, for avian species. The assessment methods used a conservative approach with the assumption that following the implementation of site-specific mitigation measures, the proposed Project activities would have a residual effect on these species guilds regardless of species presence on site.</p> <p>As described in the EIS, pre-construction surveys will be conducted prior to the commencement of any vegetation clearing or soil disturbance. Avian species will also be routinely monitored throughout the life of the Project. Results from the surveys and monitoring activities are expected to inform the adaptive management process to update Project design and identify the need for additional mitigation measures, if required. Note: Section 9.4.3.3 of the draft EIS includes all available information from the HABISask database at the time of the assessment. While recent surveys from Environment and Climate Change Canada and the Saskatchewan Breeding Bird Atlas have expanded surveys into the northern boreal forest, these data are not yet publicly available or published to make inferences on population trends for migratory songbirds that could use the available habitat in the Terrestrial RSA.</p> | No updates to the draft EIS are needed based on this IR response |
| IR-160 | ECCC | Migratory birds | Section 9.4.3.2.3 Baseline Studies – Migratory Songbirds | <p>Context and Rationale: ECCC advises that the results of the field studies need to be interpreted/analyzed in the context of the study area. The Proponent presents results on areas with highest richness and diversity but does not make a link to habitat that will be lost or experience indirect effects.</p> <p>Results from baseline studies as well as other supplemental information as per IR-159 should be used in effects assessment.</p> | <p>Provide results interpreted in the context of Project direct and indirect effects. Include discussion on the habitat types that will be lost or indirectly impacted during the Project and the overall impact on the avian community, using results from the analysis of baseline studies and other supplemental data (as per IR-159).</p> <p>Discussion should support the conclusions of the effects assessment.</p> <p>See also related IRs: IR-161 and IR-162.</p> | <p>The methodology for the habitat-based assessment appropriately evaluated potential adverse effects on avian species using the accepted VC and KI approach for focus of the assessment.</p> <p>The EIS provides a discussion and subsequent quantitative assessment of the habitat types lost and/or altered based on the Valued Components and Key Indicator species. Species richness and diversity (as evaluated in the baseline report) were included as part of the selection of "available habitat" (e.g., for migratory songbirds, ecosites with low richness and diversity were excluded; refer to the response to IR-169 for a description of these ecosites). This approach provided an appropriate assessment of the Project effects on available habitat as it relates to the direct and indirect effects on the avian community.</p> | No updates to the draft EIS are needed based on this IR response |
| IR-161 | CNSC | Bird Species at Risk | Section 9.4.3.3 Appendix 10-A (ERA) | <p>Context: For the assessment of effects on Bird Species at Risk (SAR), in the EIS it was decided to use representative species for certain SAR birds:</p> <ul style="list-style-type: none">Olive-sided Flycatcher and Common Nighthawk were selected to represent Barn Swallow.Yellow Rail and Rusty Blackbird were selected as substitutes for Horned Grebe. <p>No further rationale is provided to demonstrate that the identified surrogate species are representative of the Barn Swallow and Horned Grebe in the EIS. For example, do they share a common diet?</p> <p>Moreover, in the residual effects assessment, limited discussion is provided on the conservatism of chosen suitable habitat types for both surrogate and represented species, in the calculation of habitat loss and alteration, as well as change in mortality. For example, how does habitat for Common Nighthawk and Barn Swallow overlap (do they use identical habitat types?) and how does this affect the calculation of habitat loss and alteration used to evaluate the magnitude of residual effect?</p> <p>Finally, in the ERA, Lesser Scaup is the surrogate for Horned Grebe. Yellow Rail is also represented by Lesser Scaup but Rusty Blackbird is represented by Olive-sided Flycatcher.</p> <p>Rationale: It is unclear what criteria were applied to select surrogate species for Barn Swallow and Horned Grebe, and how the chosen</p> | <p>1. Please provide additional information to justify the selection of surrogate species for Barn Swallow and Horned Grebe in the EIS. This should include a description of the similarity of SAR and associated surrogate species and any relevant uncertainties.</p> <p>2. Please provide conservative estimates of habitat loss and alteration for the represented and not directly assessed species (Barn Swallow, Horned Grebe).</p> <p>3. Please provide clarity as to why different surrogate species are used for Horned Grebe between the EIS and ERA.</p> <p>See also related IRs: IR-160 and IR-162.</p> | <p>1.a. The methodology for the habitat-based assessment appropriately evaluated potential adverse effects on avian species using the accepted VC and KI approach for focus of the assessment. As described in the EIS, the Common Nighthawk (similar to the Barn Swallow) is an aerial insectivore that uses a variety of habitats, including anthropogenically disturbed and cleared areas (Section 9.4.3.3.1). As such, effects on these anthropogenically disturbed areas were appropriately assessed in the habitat-based EA methodology. Since Barn Swallows nest almost exclusively on human-made structures, specific Barn Swallow exclusion methods will be added as mitigation measures to the EIS (Section 9.4.5). If Barn Swallow nests should be encountered, any subsequent activities would be conducted in accordance with the 2022 Migratory Birds Regulations.</p> <p>1.b. To focus the effects assessment on key species, it was decided to use the provincially listed Yellow Rail (and Rusty Blackbird) as surrogates for Horned Grebe. Horned Grebe use similar wetland habitat types for nesting, foraging and protective cover as Yellow Rail. As such, potential effects on these habitat types were assessed appropriately.</p> <p>2. The habitat-based approach for the assessment supports the use of surrogates that are known to utilize the same habitat types. Habitat loss and alteration were assessed for the Key Indicator species included in this Valued Component. A conservative approach of identifying available habitat for these species was chosen to include habitat for those species not directly assessed (i.e., Barn Swallow through Common Nighthawk habitat and Horned Grebe through Yellow Rail and Rusty Blackbird habitat).</p> <p>Please refer to the response to IR-131. A new species at risk appendix has been included with the IR response package and will become Appendix 9-D to the final EIS. This new final EIS appendix lists all avian species at risk (under Schedule 1 of the <i>Species at Risk Act</i>), their conservation status in Saskatchewan, and references to species-specific mitigation measures.</p> | <p>The below barn swallow exclusion methods will be added to Section 9.4.5.2.4 in the final EIS:</p> <p>Buildings and other Project infrastructure will be designed and maintained to exclude birds (e.g., barn swallows) and bats as much as possible. This would include installing solid barriers (e.g., corner slope panels, wooden panels) or flexible barriers (e.g., netting, tarps or geotextiles) under roof eaves or other exterior surfaces.</p> |

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| | | | | surrogates relate to Barn Swallow and Horned Grebe in terms of habitat type and range, nesting, and feeding requirements etc. There is also inconsistency with respect to the use of surrogate species for the Horned Grebe between the EIS and ERA supporting document. | | 3. The rationale for the use of the surrogates in the ERA was provided in the draft EIS Appendix 10-A, Section 5.1.1 Receptor Selection. The summary of species at risk and associated surrogates was provided in the draft EIS Appendix 10-A, Table 5-2. In the ERA, Lesser Scaup was selected as the surrogate for other omnivore ducks and gulls (e.g., Bufflehead, Mew Gull, Herring Gull, Bonaparte’s Gull, Horned Grebe, and Yellow Rail). These riparian bird species would all experience exposure to aquatic release through water, food (invertebrates), and sediment. As such, in the ERA, Lesser Scaup is expected appropriately address the assessment and protection of a number of other riparian bird species, including Horned Grebe and Yellow Rail. | |
| IR-162 | ECCC | Migratory birds | Section 9.4.3.3, Bird Species at Risk | Context and Rationale: Not all avian species at risk present in the study area were included as Key Indicators in the avian species at risk (SAR) valued component (VC). Barn swallow and horned grebe were recorded in the study area, but not included as VCs. Additionally, bank swallow may inhabit the Project area. Impacts to Species at Risk Act Schedule 1 listed species need to be identified, avoided, lessened and monitored. In Section 9.4.3.3. the Proponent states: “It is acknowledged that the listed Barn Swallow (<i>Hirundo rustica</i>) and Horned Grebe (<i>Podiceps auratus</i>) could potentially occur in the Terrestrial RSA. Incidental observations occurred during the baseline studies (Appendix 9-B). To focus the effects assessment on a few key species (described in the following) it was decided to use Olive-sided Flycatcher and Common Nighthawk to represent Barn Swallow as well, and to use Yellow Rail and Rusty Blackbird as a substitute for Horned Grebe. Unlike Horned Grebe, Yellow Rail and Rusty Blackbird are also listed provincially.” Barn swallow, bank swallow and horned grebe may have different nesting habitat requirements than the representative species discussed in the draft EIS. An explanation of how differing species are representative of one another is required, or if an explanation cannot be provided, the species should be assessed individually. | 1. Explain how nesting habitat requirements of barn swallow is represented by common nighthawk and olive-sided flycatcher as a VC or assess individually each SAR that overlaps with the Project and is likely to be affected. 2. Explain how nesting habitat requirements of horned grebe are represented by yellow rail and rusty blackbird as a VC, or assess individually each SAR that overlaps with the Project and is likely to be affected. 3. Assess individually each SAR that overlaps with the Project and is likely to be affected. See also related IRs: IR-160 and IR-161. | 1. It is acknowledged that Barn Swallows (unlike Common Nighthawks) nest almost exclusively on human-made structures; therefore, specific Barn Swallow exclusion methods will be added as mitigation measures to the final EIS (Section 9.4.5). If Barn Swallow nests should be encountered, any subsequent activities will be conducted in accordance with the 2022 Migratory Birds Regulations. 2. Horned Grebe nesting requirements will be addressed by implementing appropriate activity-restriction setback distances. While the Saskatchewan Activity Restriction Guidelines for Sensitive Species (SARGSS) do not specify measures for Horned Grebe, the setback distances for Yellow Rail will be followed: the SARGSS specify setback distances between 150 and 350 m around nesting birds for medium and high disturbance categories, respectively, between May 1 and July 15. 3. The environmental assessment approach was chosen to focus the habitat-based effects assessment; mitigation measures will be updated to include species-specific approaches as determined through the adaptive management process. Note that additional text and a new table will be added to a new Species at Risk appendix to Section 9, listing all avian species at risk (under Schedule 1 of the Species at Risk Act), their conservation status in Saskatchewan, and links to species-specific mitigation measures as they relate to the potential adverse effects on wildlife. | 1. The following Barn Swallow exclusion methods will be added to Sections 9.4.5.2.4 in the final EIS: Buildings and other Project infrastructure will be designed and maintained to exclude birds (e.g., barn swallows) and bats as much as possible. This would include installing solid barriers (e.g., corner slope panels, wooden panels) or flexible barriers (e.g., netting, tarps or geotextiles) under roof eaves or other exterior surfaces. 2. The species at risk new EIS appendix (Appendix 9-D; refer to IR-131) includes the following specific mitigation measure for Horned Grebe: Active and/or suspected breeding and roosting locations identified during the pre-clearing wildlife surveys will be protected with a no-disturbance setback buffer consistent with regulatory guidelines (e.g., the 2017 SARGSS [SK MOE 2017]) for other grebe species (as there is currently no activity restriction guidelines for Horned Grebe in Saskatchewan) in accordance with the level of the disturbance and species until the young have successfully fledged, the nest is confirmed as no longer active (e.g., abandoned or depredated), or the nesting window has passed (for suspected nest locations). 3. A new SAR appendix (new Appendix 9-D) will be added to Section 9 of the final EIS. It has been included here as Attachment IR-131. |
| IR-163 | ECCC | Migratory birds | Section 9.4.3.3.3, Baseline Studies – Avian species at risk VCs | Context and Rationale: The baseline studies and data analysis for species at risk (SAR) birds is insufficient to accurately predict Project effects. ECCC recommends the use of predictive modeling in relation to survey data and habitat attributes to produce distribution and density maps. Sites within the study area that support particularly high densities or diversity of an individual species, based on direct observation and, where appropriate, distribution or occupancy models, would greatly improve confidence in Project impact predictions. Additional information on specific habitat use or models of habitat used by SAR would facilitate a more complete analysis of Project effects. | Provide additional information, including mapping/modelling of specific habitat requirements for each avian species at risk or provide a justification of models used in the draft EIS. | Denison is of the professional opinion that the data presented and analysis provided in the draft EIS is sufficient given the local / regional environment and the level of interaction with SAR birds that is expected. The habitat-based EIS approach did not include more detailed mapping/modelling because of the small Project footprint and the location (i.e., bird densities are not expected to be limited by habitat regionally). The habitat-based assessment appropriately evaluated potential adverse effects on avian species. The VCs and KIs were selected following extensive consultation with Indigenous nations and communities and other Interested Parties. The VCs and KIs appropriately focused the EA; no additional modelling or assessment is considered to be required. In addition, further modeling is not expected to affect or change the findings and conclusions of the EIS. Based on the results of the baseline studies, supplemented by available additional data sources (e.g., HABISask), most avian species were conservatively assumed to be present and breeding in the Project study areas. Species-specific mitigation measures have been included and additional measures will be added (e.g., Barn Swallow exclusion measures; refer to IR-131 and IR-163). Pre-clearing surveys, ongoing monitoring during all Project phases, adaptive management (refer to the response to IR-159), and accepted, species-specific mitigation measures have been designed and will be implemented to avoid and minimize the potential for adverse Project effects. In response to a variety of IRs, further information has been developed that is specific to SAR and included as Attachment IR-131. This includes a listing of all SAR species potentially occurring in the Project study areas, with links to applicable and appropriate mitigation measures described in the EIS. It is proposed the content of Attachment IR-131 will be added as a new appendix (Appendix 9-D) to Section 9 of the final EIS. The information provided in the SAR appendix includes a summary of the life history requirements, the expected Project effects, proposed mitigation measures, and anticipated residual effects on these listed species. | No updates to the draft EIS are needed based on this IR response. |
| IR-164 | ECCC | Migratory birds | Section 9.4.4.2.1, Alteration and/or Loss of Habitat – Migratory Breeding Birds | Context and Rationale: The discussion on impacts to migratory songbirds presented by the Proponent is not sufficient to understand the impacts on various guilds of birds (e.g., aerial insectivores, forest birds, wetland birds, habitat specialists). As per IR-158, focal representative species/guilds should be used as key indicators (KI) in the Migratory Breeding Birds Valued Component. A greater level of detail on Project impacts to migratory songbirds with differing habitat requirements is needed for a fulsome assessment of effects. | 1. Provide further discussion on impacts to different focal species/guilds within the Migratory Breeding Birds Valued Component. 2. Provide mapping of important features or habitat types that will be lost due to the Project for different guilds of migratory birds. | 1. Refer to the response to IR-158. 2. Section 9.4.3.2.3 Baseline Studies provides an overview of the avian species identified within the various habitat types that were surveyed. No important wildlife or wildlife habitat features have been identified. The effects assessment included appropriate consideration of habitat loss and/or alteration related to migratory birds (regardless of different guilds). | No updates to the draft EIS are needed based on this IR response. |
| IR-165 | CNSC ECCC | Birds (all species) | Section 9.4.4.2.2 Section 9.4.5.2.4, Avian Deterrence | Context: On p. 9-364 of the EIS, it is stated that exposure to hazardous materials through contact with contaminated waste ponds could affect avian health and contribute to mortality. | Please perform an ecological risk assessment with avian receptors located at the contaminated waste ponds, including: | The response to this IR is provided in Attachment IR-165. | No updates to the draft EIS are needed based on this IR response. |

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| | | | and Prevention of Entrapment Appendix 10-A (ERA) | <p>However, the ERA places the avian receptors only in waterbodies and locations outside of the Project area (see Figure 5-2 in the ERA), i.e., Whitefish Lake, McGowan Lake, the inlet to Russell Lake, and Kratchkowsky Lake.</p> <p>Further, there are insufficient details on the potential effects of the water quality in the water management and treatment facilities on birds, species at risk, and other wildlife, including the risk of bioaccumulation of contaminants. The Proponent should assess potential effects of water quality from these areas using applicable CCME guidelines.</p> <p>Rationale: It is unclear whether the ecological risk assessment based on the chosen exposure locations is protective and conservative for avian species potentially exposed to contaminated waste ponds on the Project site.</p> <p>While mitigation measures such as physical, visual, and/or auditory deterrents are proposed in Section 9.4.5.2.4, the possibility of avian species coming into contact with waste ponds cannot be excluded based on the available information in the EIS. The possibility of birds, species at risk, and other wildlife accessing the water management and treatment facilities for drinking water or other purposes is not discussed in the draft EIS.</p> | <p>1. Describe and analyze the possibility of birds, species at risk and other wildlife using the water or waste management facilities and provide an analysis to determine if there is a risk to wildlife that may access these areas.</p> <p>2. Identify the potential toxicity of water management ponds to aquatic migratory birds and species at risk (SAR).</p> <p>3. Describe what measures will be taken if the waters are found to be toxic to migratory birds and SAR.</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends that Denison ensure adequate mitigation measures are implemented to minimize the potential for avian exposure to pond waters.</p> | | |
| IR-166 | ECCC | Migratory birds | Section 9.4.5.2 Additional Avian Species-specific Mitigation Measures | <p>Context and Rationale: Avian species-specific mitigation measures are not presented in the draft EIS. The Proponent has committed to providing a variety of environmental management plans.</p> <p>Section 9.4.5.2 reads: “Additional mitigation measures specific to the Raptors, Migratory Breeding Birds, and Bird Species at Risk VCs, in accordance with the Migratory Birds Convention Act, and tailored to Project features will be incorporated into various Project management and monitoring plans such as the, erosion and sediment controls, soil and vegetation monitoring, wildlife monitoring, the Decommissioning Plan, air quality monitoring, Spill Response Plan, Radiation Protection Plan, surface water and effluent monitoring, and Waste Management Plan.”</p> <p>Migratory birds, the nests of migratory birds and/or their eggs can be inadvertently harmed or disturbed as a result of many activities, including but not limited to clearing trees and other vegetation, draining or flooding land, or using fishing gear; this is known as incidental take. This inadvertent harming, killing, disturbance or destruction of migratory birds, nests and eggs is prohibited under the MBCA. Incidental take, in addition to harming individual birds, nests or eggs, can have long-term consequences for migratory bird populations in Canada, especially through the cumulative effects of many different incidents. For further details, please refer to the Avoiding Harm to Migratory Birds website at: https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds.html</p> <p>In order to assess the effectiveness of species-specific mitigations and need for additional mitigations ECCC requires details on the species-specific mitigation measures proposed, and the monitoring plans.</p> | <p>Provide details on species-specific mitigations for species at risk (SAR) and other avian species that will include:</p> <ul style="list-style-type: none">• details on what activity restrictions will be implemented for migratory birds and SAR and when they will be applied;• details on mitigations used during regular maintenance activities such as vegetation management (e.g., mowing), access road repair (e.g., aggregate stockpiles), and infrastructure repair;• details on methods used to detect species listed on Schedule 1 of the <i>Migratory Birds Convention Act</i> (e.g., Pileated Woodpecker) and mitigations/setback distances and timing to reduce risk to these species. | <p>In response to a variety of IRs, further information has been developed that is specific to SAR and included as Attachment IR-131. This includes a listing of all wildlife SAR potentially occurring in the Project study areas, with links to applicable and appropriate mitigation measures described in the EIS. It is proposed the content of Attachment IR-131 will be added as a new appendix (Appendix 9-D) to Section 9 of the final EIS. The information provided in the SAR appendix includes a summary of the life history requirements, the expected Project effects, proposed mitigation measures, and anticipated residual effects on these listed species. Species-specific timing windows and setback distances from the SARGGSS were included in the species-specific sections of the draft EIS (see Section 9.4.3 in the draft EIS). Refer to 3.3 Species-Specific Mitigation Measures for Wildlife Species at Risk in Attachment IR-131. This section provides a summary of the species-specific mitigation measures that will be implemented during Project activities. Mitigation measures specific to the Wildlife SAR that were not included or that were revised from what was described in the draft EIS are provided in bold text. These will be added to the final EIS.</p> <p>Denison considers the EA to be a planning and decision-making tool that assesses the potential effects of the Project in a careful and precautionary manner and integrates results of engagement with Indigenous nations and communities. As such, the EA is a process for identifying the Project’s potential interactions with the biophysical and human environment, predicting potential adverse effects, identifying mitigation measures, and evaluating residual and cumulative effects remaining after mitigation. The EA also outlines the proposed efforts for monitoring and reporting to verify compliance with the terms and conditions of EA approval and to assess the accuracy and effectiveness of predictions and mitigation measures presented in the EA. Denison views the EIS as an important planning tool that will be used to support future activities and represents one stage in the rigorous overall approvals process for a uranium mining facility in Canada. Denison is completing a sequential EA and licensing process for the Project. In the EIS, a framework for the Environmental Management System (EMS) is provided along with a clear commitment for Denison to include Project design and species-specific mitigation measures into the EMS documents as they are developed / as the Project proceeds through the licensing and permitting phases.</p> <p>Please also refer to response to IR-133, IR-135, and IR-167.</p> | <p>No updates to the draft EIS are needed based on this IR response.</p> <p>Final EIS updates related to wildlife SAR, including new species-specific mitigation measures, are outlined in response to IR-131 and exclusion methods are provided in response to IR-135.</p> |
| IR-167 | ECCC | Migratory birds | Section 9.4.5.2.1 Work Timing Windows and Habitat Disturbance | <p>Context and Rationale: The Proponent has stated that when it is not practicable to clear outside of the breeding bird window, they will conduct pre-clearing surveys. Section 9.4.5.2.1 states: “Prior to commencing any site clearing (i.e., vegetation clearing and/or soil disturbance) during the nesting season, pre-clearing nest surveys will be conducted at that location within the Project Area.”</p> <p>ECCC does not recommend the use of nest searches or pre-clearing surveys for active bird nests during the breeding season as a mitigation, given the difficulty associated with finding nests reliably and the high likelihood of disturbing nesting birds when searching. Instead, ECCC recommends that clearing and grubbing activities not be conducted during the breeding bird season.</p> <p>The Migratory Birds Regulations 2022 (MBR 2022) brings new scenarios that need to be considered:</p> <ol style="list-style-type: none">1. Most migratory birds:<ul style="list-style-type: none">- Nests are protected only when they are in use or when live eggs or chicks are present.2. Migratory birds listed in MBR 2022 Schedule 1:<ul style="list-style-type: none">- For the 18 species of migratory birds identified on Schedule 1, the MBR 2022 provide year-round nest protection until they can be deemed abandoned.3. Migratory birds listed under SARA:<ul style="list-style-type: none">- For some SARA listed migratory birds, the residence prohibition (s.33) will protect nests that are not active, but | <p>Provide the following information:</p> <ul style="list-style-type: none">• details on how vegetation clearing related to site development will be conducted to minimize risk to migratory birds and species at risk (SAR).• the timing window that will be used for vegetation removal to reduce risk to migratory birds and SAR | <p>Site clearing and other works that involve disturbance of vegetation and/or soil will be completed during least-risk timing windows for migratory birds and SAR (i.e., winter), where practical, to avoid disturbance during sensitive time periods. It is noted that additional information related to timing windows and species as it concerns Project activities has been provided in response to IR-134.</p> <p>Pre-clearing surveys will be conducted and set-back buffers implemented, as needed. The pre-clearance surveys will be completed prior to all clearing events, regardless of the time of year / season when clearing is set to occur. If nests or tree cavities should be encountered during pre-construction surveys or ongoing monitoring activities, any subsequent Project activities will be in accordance with the 2022 Migratory Birds Regulations.</p> | <p>No updates to the draft EIS are needed based on this IR response.</p> |

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| | | | | are re-used in subsequent years, and the critical habitat prohibition (s.58) will protect nests that are part of the critical habitat identification. Those prohibitions apply everywhere in Canada and at all times of the year. In these cases, a SARA permit will be required. | | | |
| IR-168 | ECCC | Migratory birds | Section 9.4.5.2.4, Avian Deterrence and Prevention of Entrapment | <p>Context and Rationale: The Proponent mentions that avian deterrents will be used on power transmission lines, buildings and other Project infrastructure. However, the Proponent does not mention any deterrents that will be used for deterring birds from the water or waste management facilities.</p> <p>Details on deterrents for all Project components should be identified to assess residual and cumulative impacts to migratory birds.</p> | <p>1. Provide information on avian deterrents to be used to prevent birds or other wildlife entering water or waste management ponds.</p> <p>2. Explain how proposed timing of use of deterrents will reduce risk of migratory birds making contact with treatment waters outside of the nesting season (i.e., during migration and stop overuse).</p> <p>3. Explain which deterrents will be used, which deterrents were considered, and what alternative, adaptive measures will be considered if deterrents are unsuccessful for any Project components.</p> | <p>Refer to response to IR-165 for a discussion on the need for additional avian deterrents at water management and treatment facilities.</p> <p>The following is an excerpt from IR-165:</p> <p>Mitigation measures outlined in the draft EIS to minimize the potential for avian exposure to pond water include:</p> <ul style="list-style-type: none">• Employees and contractors will be provided with wildlife education and awareness training, including education about potential avian issues on site and training on the mitigation measures to avoid or minimize potential adverse Project effects on avian species and their habitat.• Employees and contractors will be educated on waste management policies that limit human-avian interactions.• Designated employees will be trained in appropriate avian deterrent techniques to minimize avian interactions with the Project.• Employees and contractors will be requested to report avian observations on site, injured or dead birds (which will be reported to SK MOE). Avian encounters and outcomes will be monitored, and logbooks will be used to record observations. Logbooks and reports will be available to employees.• Physical, visual, and/or auditory deterrents and exclusion measures will be employed around hazardous materials to discourage avian use, as required.• Vegetation management will be incorporated in the vicinity of waste ponds to discourage avian use of potentially affected vegetation. <p>Adaptive management will be a component of the wildlife management plan which will be developed to support licensing. . If birds are observed on site ponds, additional deterrent techniques could be employed. Examples of other deterrent options to dissuade birds from landing on ponds under an adaptive management framework are provided here:</p> <ul style="list-style-type: none">• Visual deterrents: Reflective tape/flagging could be properly and appropriately installed on infrastructure and/or over the ponds. Predator decoys (i.e., plastic hawks, owls) could be strategically installed on visible high points, such as building roofs and fence posts. Brightly coloured flags flown from posts and/or inflatable tube dancers could be installed along the perimeter of the ponds and/or on the facilities, as appropriate. Inflatable tube dancers are similar to scarecrows, but determined to be more effective (Lukas et al. 2020) likely resulting from the constant motion caused by the wind. A combination of the above visual deterrents would be expected to provide the best results.• Auditory deterrents: Ultrasonic deterrent systems create a “net” that has been shown to repel birds from an area (Ezeonu et al. 2012). Propane cannons are another effective method shown to deter birds. The use of propane cannons has been more widely studied and are recommended over ultrasonic deterrent systems. Propane cannons have been shown to be more effective when paired with a radar-activated on-demand system that fires cannons when birds are entering the area (Ronconi and Cassady St. Clair, 2006), as birds can habituate to a timely, consistent firing/noise event. <p>References: Exeonu, SO, Amaefule, DO, Okonkwo, GN. 2012. Construction and Testing of Ultrasonic Bird Repeller. Journal of Natural Sciences Research 2(9): 8-17.</p> <p>Lukas, S, Clark, L, Davis, A, Sanchez, D, Brewer, L. 2020. Nonlethal Bird Deterrent Strategies: Methods for reducing fruit crop losses in Oregon. Oregon State University Extension Service.</p> <p>Ronconi, RA, St. Clair, CC. 2006. Efficacy of a radar-activated on-demand system for deterring waterfowl from oil sands tailings ponds. Journal of Applied Ecology 43: 111-119</p> | No updates to the draft EIS are needed based on this IR response. |
| IR-169 | ECCC | Migratory birds | Section 9.4.6.3, Residual Effects Evaluation for Migratory Birds, Table 9.4-15 and Map 9.4-11 | <p>Context and Rationale: The analysis of available habitat types for migratory songbirds appears incorrect.</p> <p>In their interpreted ecosite mapping, the Proponent identified 25 different ecosite types. In their table 9.4-15 and map 9.4-11, the Proponent only lists 8 ecosite types that are available migratory songbird habitat. Section 9.4.6 Residual Effects Evaluation for Migratory Songbirds reads: “Considering the baseline data (Appendix 9-B), migratory songbird habitat is described in the following text without species-specific differentiation and referred to as available habitat for migratory songbirds. Based on the baseline study results, 66.8%, 52.2%, and 50.7% of the Project Area, Wildlife LSA, and Terrestrial RSA, respectively, are assumed to provide available habitat for migratory songbirds (Table 9.4-15).”</p> <p>All Project areas, except some anthropogenic features and open water, would be considered available habitat for migratory songbirds. Although some ecosite types may have lower density and diversity, it is expected that all ecosites provide migratory songbird habitat.</p> | <p>1. Explain how information in Table 9.4-15 and map 9.4-11 were derived.</p> <p>2. Explain why other habitat types were not considered as available habitat for migratory songbirds.</p> | <p>1. As per accepted methodology, to appropriately focus the habitat-based effects assessment, as per accepted EA methodology, the most frequently used habitat types (i.e., the ecosites experiencing the highest species richness, highest mean number of breeding songbird pairs, and highest species diversity) within the Project study areas were included as "available habitat" as shown in draft EIS Table 9.4-15 Summary of Available Habitat for Migratory Songbirds in the Project Study Areas and Figure 9.4-11 Available Habitat for Migratory Songbirds.</p> <p>For all three indicators (i.e., highest species richness, highest mean number of breeding songbird pairs, and highest species diversity), the three ecosites with the lowest representation were BS25 (open fen), BS19 (graminoid bog), and BS24 (graminoid fen). These three ecosites were excluded from the description of available habitat for migratory songbirds, as their use/suitability is expected to be low.</p> <p>Denison is confident that this approach is appropriate. Additionally, inclusion of these “low quality” habitat types would not be expected to alter the analysis of the residual effect nor the conclusions of the EA (i.e., the residual effect of habitat loss on Migratory Birds was predicted to be not significant).</p> | No updates to the draft EIS are needed based on this IR response |

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| | | | | | | 2. Although the habitat types excluded from the assessment are “available” to migratory birds, their low “suitability” to the KI species selected to focus the EA, resulted in these habitat types not included in the assessment. In Denison’s opinion, including these low suitability habitat types to the analysis would provide no additional value to the EA process, and would not alter the findings of the analysis nor the conclusions contained in the draft EIA (i.e., the residual effect of habitat loss on Migratory Birds was predicted to be not significant). | |
| IR-170 | ECCC | Migratory birds | Section 9.4.6.4, Residual Effects Evaluation for Bird SAR, Table 9.4-19 | <p>Context and Rationale: The table and map presented by the Proponent do not appear representative of all available habitat for common nighthawk (CONI). Although CONI do preferentially use open areas such as gravel (often an anthropogenic disturbance) and regenerating forest, as identified in the draft EIS, they also use rock outcrops that can be within forested areas. As this area lies within the pre- Cambrian shield, there are likely rock outcrops that are also available habitat.</p> <p>As aerial insectivores, CONI select nesting areas in close proximity to wetlands or lakes where there is abundant forage.</p> <p>Habitat requirements and preferences for all species at risk is required for developing effective mitigations and adaptive management.</p> | <p>1. Provide an updated table and map that considers all available habitat for common nighthawk.</p> <p>2. Additionally, as part of environmental management plans the Proponent should include species-specific mitigations that are biologically relevant to all the species at risk for all Project phases and components.</p> | <p>1. The methodology for the habitat-based assessment appropriately evaluated potential adverse effects on avian species. The VCs and KIs were selected following extensive consultation with Indigenous nations and communities and other Interested Parties; the VCs and KIs appropriately focused the EA; no updated table or map is considered to be required. In addition, further mapping is not expected to affect or change the findings and conclusions of the draft EIS.</p> <p>2. Common Nighthawk were observed in the Project study areas during the baseline studies and are considered to be present and breeding. Rocky outcrops were not reported during the baseline studies (see Section 9.2.3). Pre-clearing surveys will be conducted, set-back buffers implemented, and pre-clearing survey and monitoring results will be used for adaptive management purposes (see also response to IR-159). Species-specific mitigation appropriate for Common Nighthawk is largely related to loss and/or alteration of habitat (including both direct and indirect effects).</p> | No updates to the draft EIS are needed based on this IR response. |
| IR-171 | ECCC | Migratory birds | Section 9.4.6.4, Residual Effects Evaluation | <p>Context and Rationale: Section 9.4.6.4 Residual Effects Evaluation for Bird SAR – Common Nighthawk reads: “Progressive reclamation is anticipated to begin during Construction. However, a conservative approach is used, with Common Nighthawk (CONI) habitat in the Project Area considered to be unavailable for the duration of the Project, only becoming available as habitat following Post-Decommissioning (i.e., during the regeneration of vegetation following Decommissioning).”</p> <p>CONI may nest on the roadsides of access roads within the Project area. As such, the Project area should still be considered available habitat for the duration of the Project and appropriate mitigations and adaptive management should be discussed for this species.</p> | Develop mitigation plans appropriate for avoiding collisions of common nighthawks with vehicles, when and where nighthawks are observed foraging near or roosting on gravel roads. Demonstrate how the planned mitigation activities will result in reduced residual effects from this pathway. | <p>Project design measures and species-specific mitigation measures outlined in draft EIS are expected to be appropriate to avoid or limit the risk of Project effects on Common Nighthawks. The cited text in the IR context and rationale from Section 9.4.6.4 refers to the anticipated duration of the Project effect.</p> <p>As described in the EIS, a Road and Traffic Management Plan will be implemented and mitigation measures (also described in Section 9.4.5.2.6) will include reduction of traffic volume, implementation of speed limits, installing visible signage at locations with potential for wildlife crossings (including avian species), communication (and reporting) of wildlife collisions, and maintenance of ditches and culverts. This mitigation is expected to reduce/limit potential for interactions between the Project activities and Common Nighthawk and their habitat, thereby limiting the risk of a potential adverse effect.</p> | No updates to the draft EIS are needed based on this IR response. |
| IR-172 | CNSC | Birds (all species) | Section 9.4.6.4.2 | <p>Context: Populations of listed species may be less resilient to changes in mortality.</p> <p>CSA N288.6:22 Clause 7.2.4.3 states that effects on a few individuals of endangered, threatened, or vulnerable species would not be acceptable.</p> <p>The residual effects assessment for “Change in Mortality” for bird species at risk states that Project mitigation measures identified in Section 9.4.5 are expected to limit interactions between bird species at risk and potential sources of direct and indirect mortality. However, the mitigation measures are not discussed with respect to their effectiveness to limit interactions, specifically for bird species at risk.</p> <p>Rationale: It is unclear if the proposed mitigation measures are effective in preventing mortality in bird species at risk for which even only a few deaths could negatively impact the population.</p> | Please provide a discussion on mitigation measures with respect to their effectiveness in minimizing mortality for bird species at risk, for which effects on a few individuals would not be acceptable. | Mitigation measures provided in the EIS were selected in consideration of their proven effectiveness and applicability to the Project, including the habitat types and species that could be adversely affected. A component of the effectiveness of the proposed mitigation is appropriately addressed in the discussion on “Confidence” for each of the residual effect assessment in the EIS. The new Species at Risk appendix that will be added to the final EIS (see IR-131) includes discussions of the effectiveness of mitigation measures that Denison is proposing to implement to avoid or reduce mortality of Bird Species at Risk. | The new Species at Risk appendix that will be Appendix 9-D to Section 9 of the final EIS has been included in this IR response package (Attachment IR-131). This new EIS appendix includes the species-specific, proven, mitigation measures and their effectiveness, that Denison is proposing to implement during the Project to mitigate adverse effects on bird species at risk. |
| IR-173 | ECCC | Migratory birds | Section 9.4.8 Monitoring and Follow-up | <p>Context and Rationale: Monitoring and follow up programs are part of adaptive management and implementation of additional mitigations.</p> <p>In Section 9.4.8 the Proponent states: “Considering the Project planning, baseline survey results, and proposed mitigation measures, no follow-up programs are considered to be warranted at this time.”</p> <p>Project impacts related to mortality of birds, such as collisions with the transmission line, mortality along roads and use of waste and water management facilities should be monitored during all phases of the Project and adaptively managed.</p> | <p>Provide details on the follow-up program to monitor impacts to avian mortality. The follow-up plan should include:</p> <ul style="list-style-type: none"> Monitoring of avian use of waste and water facilities Monitoring of mortality along access roads Monitoring of mortality related to transmission lines Monitoring of effectiveness of avian deterrents. | <p>As described in the draft EIS, a wildlife monitoring plan will be developed to support permitting and licensing and implemented as the Project proceeds. The wildlife monitoring plan will provide details on the monitoring and follow-up programs outlined in Section 9.4.8 of the EIS. In Section 9.4.8 of the draft EIS, Denison has outlined the following as part of monitoring programs:</p> <p>“Avian movements across the Project study areas may bring species or individuals into contact with Project components (e.g., buildings, power transmission lines, waste ponds and waste pads) and activities (i.e., vehicle and aircraft traffic), which can result in mortalities and changes to habitat use. Project design and mitigation measures (Section 9.4.5) have been identified that are expected to minimize the likelihood of adverse Project effects. However, changes in avian habitat and habitat use over the life of the Project require an adaptive management process to update Project design and additional mitigation measures, if required. The potential for these changes will require appropriate monitoring for changes in avian mortality or encounters to determine, in a timely manner, whether changes are warranted through the adaptive management process.”</p> <p>Specifically, as it concerns monitoring avian mortality the following is noted and will serve as the basis of the framework for this component of the wildlife monitoring plan. The objective of this component of the plan would be to (1) document and mitigate potential effects of Project activities on avian mortality; and, (2) reduce interactions between wildlife (in this case birds) and people. Avian mortalities observed by Denison staff would be reported immediately to the Environment Department, and an inspection by Environment staff will be made to determine the probable cause of death. Obvious injuries, the position of the animal, and anything considered unusual would be photographed and recorded. Further information such as time, date, location, estimated time of death, and any sightings of other wildlife in the area would also be recorded. A procedure would be developed for carcass removal to prevent attraction of carnivores and other scavengers to the Project site. Wildlife mortality monitoring would be undertaken as required, continuously throughout the life of the Project. All mortalities would require follow-up to determine if anything can be done to prevent</p> | Section 9.4.8 of the final EIS will be updated to note that Denison is committed to monitoring avian mortality related to avian use of waste and water facilities, as well as mortality events associated with interactions with access roads (particularly related to large-bodied carcasses) and transmission lines as documented in the IR response. It will be further noted that such mortalities will be documented and reported to the Saskatchewan Ministry of Environment on a basis as determined in consultation between the Ministry and Denison. |

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| | | | | | | <p>similar mortalities from occurring in the future. Data related to avian mortalities would be compiled to identify trends over time and to determine the cause of mortalities and identify any further mitigation would be appropriate.</p> <p>Further, it is noted that avian mortality related to avian use of waste and water facilities, as well as mortality events associated with interactions with access roads (particularly related to large-bodied carcasses) and transmission lines will be documented and reported to the Saskatchewan Ministry of Environment on a basis as determined in consultation between the Ministry and Denison. Further, Denison has committed to collaborating with English River First Nation and Kineepik Metis Local on developing scope of monitoring regimes, which could include monitoring programs and the reporting on wildlife-vehicle mortality.</p> <p>Additionally, as noted in draft EIS Section 1.7.5, Licensing and Permitting, the Project is proceeding through sequential EA and licensing process. Commitments to develop such plans, and in some cases conceptual level information regarding a number of the proposed plans has been provided in the draft EIS. Given the sequential process to which Denison has committed it is believed that the level of information provided in the draft EIS and its supporting documents (including supplemental information provided in response the IRs) is appropriate at this stage of the Project. It is planned that further detail will be developed during licensing and permitting and that this information will be available for review at that time. Denison understands that the Project cannot move forward until the appropriate Program / Plan / Procedure documentation is in place and has received approval through the regulatory process. Denison believes this context (that is, that the detailed “plan” information needed to support licensing and permitting has not be included in the EIS) is valuable in considering this IR, as well as other IRs with a similar theme.</p> | |
| IR-174 | ECCC | SAR - Bats | Appendix 9-B, Denison Mines Corporation Wheeler River Project, Terrestrial Environment, Wildlife and Vegetation Baseline Inventory, Section 2.1.4 Acoustic Bat Surveys | <p>Context and Rationale: The Proponent conducted acoustic surveys for bats and confirmed presence of two Species at Risk Act (SARA) schedule 1 listed bat species in the Project area, little brown myotis (<i>Myotis lucifugus</i>) and northern myotis (<i>Myotis septentrionalis</i>). However, the Proponent did not do an effects assessment of either of these bat species.</p> <p>Although bats are present in the study area, no work was done to identify hibernaculum or maternal roosting sites. All species at risk that are expected to be present in the Project area should be assessed and species-specific mitigations detailed.</p> | <ol style="list-style-type: none">1. Conduct an effects assessment for little brown myotis and northern myotis, including the likelihood that tree clearing during the bat roosting period, is likely to ‘kill’, ‘harm’, or ‘harass’ Little Brown Myotis and Northern Myotis and its ability to carry out its life processes.2. Describe and map locations of suitable myotis hibernacula and/or maternal roost habitat within the Local Study Area and Regional Study Area and explain how these habitats may be affected by Project activities.3. Describe what mitigation measures will be taken to avoid the breeding period for bats.4. Describe any pre-construction/pre- clearing surveys will be conducted to identify any hibernaculum and maternal roosting sites. Describe how monitoring will support adaptive management. | <p>As Key Indicators of Valued Components, the EIS includes terrestrial wildlife and avian species that may occur in the Project study areas and are listed on Schedule 1 of the federal Species at Risk Act. Project effects on these species and their habitats are described and assessed, and mitigation measures are included to avoid or reduce the potential for adverse effects on these species and their habitats. The Project effects and associated mitigation measures described in the draft EIS are broadly applicable to SAR species that occupy the same ecological niches.</p> <p>In response to a variety of IRs, including this IR, further information has been developed that is specific to SAR and included as Attachment IR-131. This includes a listing of all SAR species potentially occurring in the Project study areas, with links to applicable and appropriate mitigation measures described in the EIS. It is proposed the content of Attachment IR-131 will be added as a new appendix (Appendix 9-D) to Section 9 of the final EIS. The information provided in the SAR appendix includes a summary of the life history requirements, the expected Project effects, proposed mitigation measures, and anticipated residual effects on these listed species. This new EIS appendix provides information on little brown myotis and northern myotis. We note Denison’s commitment to pre-construction surveys to identify potential for maternity and nursery roosting habitat. Refer to response to IR-134 for the timing of clearing activities outside of roosting periods. Results from pre-construction surveys and continuous monitoring (described in Section 9.3.8) will be used in the adaptive management process to update Project design and additional mitigation measures, if required.</p> | No updates to the draft EIS are needed based on this IR response. |
| IR-175 | CNSC | Provincially Listed Species | Appendix 9-B; section 2.2.2 | <p>Context: Vegetation and wildlife habitat characterization field surveys were completed in 2017, based on which ecosite factsheets were prepared. The factsheets list observations of two provincially listed plant species with a rank of S3 (vulnerable/rare to uncommon; Table 2.4-2) according to the Saskatchewan Conservation Data Centre, which are not discussed in the main EIS document:</p> <ul style="list-style-type: none">• Angle-leaved sundew (<i>Drosera anglica</i>) observed in ecosites BS19, BS20, BS22, BS25• Neat Spike-rush (<i>Eleocharis nitida</i>) observed in ecosite BS25 <p>Table 9.2-12 in section 9.2.6.2.1 of the EIS indicates that there may be indirect disturbance to some of these ecosites (BS19, BS20, BS25). In section 9.2.6.3.1 it is discussed that listed plant species are not likely to return once lost from a specific location.</p> <p>Rationale: Given that not all areas in the revised Project footprint were surveyed for listed plant species in baseline studies, there is uncertainty as to whether any species were missed, in particular those that have been observed in ecosites present in the LSA/RSA (e.g., <i>Drosera anglica</i> and <i>Eleocharis nitida</i>, see also Appendix 2 Table of Appendix 9-B). It should also be noted that rare plant surveys were completed in summer 2017 only (section 2.4.2 of Appendix 9-B), which may underestimate annual rare species that may be dormant in the seed bank in some years due to specific seed emergence requirements.</p> <p>It is acknowledged that the proponent committed to pre-construction listed plant surveys targeted on ecosites encountered in the Project Area but not previously surveyed, as well as ecosites within the Project Area with high potential to support listed plants.</p> <p>More information is requested on the potential indirect effects on rare plant species as well as the planned pre-construction surveys.</p> | <ol style="list-style-type: none">1. Please provide a discussion on the potential risks from indirect effects on ecosites with observed rare plant species2. Please provide additional information on the ecosites included in the planned pre-construction listed plant surveys <p>Suggestions for mitigation and follow-up measures: CNSC recommends focusing monitoring on ecosites that have known observations of listed plant species outside of the Project Area (e.g., BS19, BS20, BS22, BS25).</p> | <p>1) As described in Sections 9.2.4.2.1 and 9.2.6.3.1 of the EIS, listed plants may be affected indirectly by the introduction and/or proliferation of invasive plants, dust deposition, edge effects, and changes to water quantity and quality. Mitigation measures planned to address these potential effects are described in Section 9.2.5, and include developing the Project footprint within previously disturbed areas to the extent practical (reducing edge effects); reducing dust deposition on vegetation by directing processing plant exhaust through a scrubber prior to release, appropriate stack height design for optimal dispersion, controlling property access, providing a wash bay, undertaking road watering and traffic controls, and monitoring dust during Construction and Operation; maintaining surface water flow (see response to IR-140); and undertaking invasive plant management. The specific risks of residual indirect effects on a given listed plant population are dependent on a suite of site-specific factors, including (but not limited to) the life requisites of the listed plant species, the species’ resilience to disturbance, the size of the population, and the location of the population in relation to Project activities. As described in Section 9.2.8.1, pre-construction listed plant surveys will be undertaken within the Project Area within ecosites that were not encountered during the 2017 surveys, as well as within selected areas of the Project Area with the potential to support listed plants (e.g., transitional habitats favoured by Alaskan clubmoss). Surveys will be undertaken to verify EA predictions and identify mitigation measures to protect Listed Plant Species, as appropriate. Should Listed Plant Species be identified within the Project Area, site- and species-specific mitigation measures will be developed by a qualified vegetation ecologist to avoid and/or minimize potential Project effects.</p> <p>2) Ecosites planned to be included during pre-construction listed plant surveys include all ecosites with the potential to support listed plants that may be directly or indirectly affected by the Project (i.e., ecosites located within the Terrestrial LSA). This includes ecosites where Alaskan clubmoss were historically observed (BS3/BS7, BS4, BS23); ecosites within the Project Area that were not previously surveyed (BS7, BS9, BS23, Waterbody); and ecosystems known to support angle-leaved sundew and neat spike-rush populations (BS19, BS20, BS25). It is noted that ecosite BS22 has not been mapped within the Terrestrial LSA and is not expected to experience direct or indirect Project effects; as such, it is not planned to be included within pre-construction listed plant surveys.</p> | No updates to the draft EIS are needed based on this IR response. |

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| IR-176 | CNSC | Human Health with respect to radiation exposure | Section 10.1.4.2.1 Section 10.1.6.1.4 Appendix 10-A (ERA) | <p>Context: In section 10.1.4.2.1, the proponent provides an evaluation of air quality constituents of potential concern to human health. It states: “A screening value for radon gas of 200 becquerels per cubic metre (Bq/m3) was available from Health Canada, which applies to total radon including background sources (Health Canada 2009). The radon concentrations which were predicted are incremental concentrations (i.e., above background) and were therefore compared to the applicable incremental screening value of 60 Bq/m3 for indoor air established by the Canadian Nuclear Safety Commission (CNSC) (Health Canada 2010a; Radiation Protection Regulations. SOR/2000-203).”</p> <p>The 60 Bq/m3 radon concentration value also appears in section 7.1.2 of Appendix 10-A (ERA).</p> <p>Further in section 10.1.6.1.4, it is stated: “Radon dose was calculated separately from the dose due to other radionuclides; however, the predicted radon concentration was compared against the CNSC incremental concentration limit of 60 Bq/m3.”</p> <p>The Radiation Protection Regulations do not stipulate a limit for radon above background for sites licensed by the CNSC. The effective dose limits for Nuclear Energy Workers (NEWs) and persons that are not NEWs are listed in section 13 of these regulations, and in subsection 1(3) of these regulations for the general public.</p> <p>The annual effective dose from all sources associated with the licensed activities and within the scope of the Nuclear Safety Control Act and Regulations must be compared to the applicable effective dose limit. For members of the public this limit is 1 mSv per calendar year.</p> <p>In Section 4.2.5.3 of Appendix 10-A (ERA), there appears to be no reference mentioned for the radon equilibrium factors. These factors are a significant input into the dose calculations for radon.</p> <p>Rationale: The reason for the requested change is to ensure consistency with the Radiation Protection Regulations.</p> | <p>The EIS and appendices should be aligned with the Radiation Protection Regulations by:</p> <ol style="list-style-type: none">1. Removing the reference to a 60 Bq/m3 limit.2. Reporting the assessment results as the total dose, from all radionuclides combined including radon progeny, and by comparing this annual effective dose to the effective dose limit. <p>Provide a summary of the conservative assumptions that have been included in the dose calculations.</p> <p>Provide a reference that shows how the radon equilibrium factors were determined.</p> | <p>1. While 60 Bq/m³ (incremental) has been used in CNSC Oversight reports for uranium mines and mills, and referenced by Health Canada, it seems to be no longer used based on the updated Radiation Protection Regulations. Denison will remove any reference to 60 Bq/m³ from the EIS and Appendix 10-A.</p> <p>2. The predicted radon concentrations will be compared to 200 Bq/m³ (total) and total effective dose including radon and U-238 decay chain radionuclides will be compared to the 1 mSv/a dose limit. The total dose to the camp worker from radon (1.3E-01 mSv/a) and U-238 decay chain radionuclides (2E-02 mSv/a) is predicted to be 1.5E-01 mSv/a which is below the dose limit for a non-NEW of 1 mSv/a. This will be included in Section 4.4.1.3 of the ERA.</p> <p><u>Conservative Assumptions:</u></p> <ul style="list-style-type: none">- For calculation of radon dose it was conservatively assumed that the camp worker spends 100% of their time indoors when on site (section 4.2.5.3 of ERA).- Receptors are exposed to the maximum exposure concentrations at their location for each model scenario and Project phase (section 4.2.6 of ERA).- For radionuclides in the U-238 decay chain (other than radon), the camp worker is also exposed through ingestion (water and food) pathways resulting in a conservative dose when also factoring in the dose from radon indoors. <p>The radon equilibrium factors were calculated as described in section 2.4.3 of the IMPACT Model Report, which is Appendix A of the ERA (Appendix 10-A). The equilibrium factors calculated are shown in Table 4-11 of Appendix 10-A.</p> | Per the IR response any reference to 60 Bq/m ³ from the EIS and Appendix 10-A and Section 4.1.1.3 will be revised as indicated. |
| IR-177 | HC | Change to an environmental component due to radiological contaminants | Section 10.1.4.2.1 (p. 10-22) Appendix 10-A (ERA): Appendix B Table B.9, Ref. 19-2638 Section 6, Table 6.1-1 (p. 6-7) | <p>Context: Section 10.1.4.2.1 states that, “Screening values for radionuclide concentrations in ambient air were not available. All relevant radionuclides were assessed in the HHRA in terms of their contribution to the total radiological dose to human and ecological receptors” (p. 10-22).</p> <p>Section 10 Appendix 10-A (ERA) states that, “No formal screening was conducted for radionuclides. However, since radiation dose to human receptors is of public and regulatory interest, the radionuclides in the uranium-238 decay series are carried forward as COPCs for further assessment” (Appendix 10-A (ERA): Appendix B Ref. 19-2638).</p> <p>Table 6.1-1 lists radionuclides as a key indicator for air quality, but only uranium and radon are considered in Section 6, and Section 10 Table B.9 does not include doses from uranium progeny in air.</p> <p>Rationale: Health Canada recommends using screening values that are available for radionuclides if they are appropriate for the dose and if the screening values have listed assumptions (such as particulate size and worker exposure time that can be adapted to in Denison’s models). Two examples are ICRP 96, which CNSC uses in their regulatory reports to derive reference air quality values for Pb-210, Ra-226, and Th-230 (CNSC: Regulatory Oversight Report for Uranium Mines and Mills in Canada 2019); and Health Canada’s Guidelines for Management of NORM (Health Canada: Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials, 2011).</p> | <ol style="list-style-type: none">1. Assess predicted radionuclides in Section 10 Appendix 10-A (ERA) using appropriate available screening values. Alternatively, provide a justification for why a screening wasn’t conducted for radionuclides despite the availability of screening values (e.g., ICRP 96 and NORM Guidelines, 2011).2. Clarify if uranium progenies in air are considered in the atmospheric transport and air quality modelling and are simply not reported, or if they are not included in the models because no screening criteria are available. | <p>1. The methodology used in the ERA was to carry all radionuclides in the U-238 decay chain forward for quantitative dose calculations. As such, a formal screening was not conducted. No radionuclides were removed from the process, but rather all were considered constituents of potential concern (COPCs). Clause 7.2.5.4.3 of CSA N288.6-22 states “Certain COPCs may be carried forward into the EcoRA for reasons of public perception, even if screening benchmarks are not exceeded. For example, the most important radionuclides may be carried forward to demonstrate acceptable risk based on expressed public concern rather than exceedance of screening criteria.”</p> <p>2. Section 3.2 of Appendix 10-A (ERA) states that based on the ISR process the main source is yellowcake (uranium oxide) and not uranium ore. As such, at the point of release, the uranium mass is almost entirely uranium-238, and on an activity basis the uranium-238 and uranium-234 are equal. Ingrowth of progenies including Th-230, Ra-226 and Pb-210 were not considered in air since compared to the life of the Project ingrowth in air would be minimal. This was confirmed using the WISE Uranium Calculator (https://www.wise-uranium.org/rccu.html). Ingrowth of other radionuclides including Th-230 and Ra-226 is included in the air deposition to soil model. Ingrowth of Pb-210 and Po-210 in soil was considered negligible. The human dose results include the soil internal and external exposure pathways and are provided in the ERA results (see Appendix B, Table B.9).</p> | No updates to the draft EIS are needed based on this IR response. |
| IR-178 | HC | Change to an environmental component due to hazardous contaminants | Section 10.1.4.2.1 (p. 10-22) Section 6.1.4.2, Potential Project Related Effects (p. 6-31) | <p>The Baseline + Project scenario was not provided for radon levels.</p> <p>Context: Section 6.1.4.2 states that the predicted levels for radon were not added to the respective baseline air quality levels (p. 6-31), and further explains that “In all modelled phases of the Project, annual average radon concentrations at receptors beyond the Property Boundary are expected to be indiscernible from background levels.”</p> <p>In Section 10.1.6.1.4, a different approach to evaluating predicted radon levels is mentioned: “the predicted radon concentration was compared against the CNSC incremental concentration limit of 60 BQ/m3“(p. 10-44).</p> <p>Rationale: Without a rationale as to why baseline levels of radon were not included in the assessment, HC cannot fully evaluate the appropriateness of the air quality assessment. While Health Canada is of the opinion that using background radon levels as a screening value</p> | <ol style="list-style-type: none">1. Provide further information on whether and how baseline radon concentrations in air were determined.2. Include baseline radon concentrations in the predicted total concentrations when comparing to existing guidelines; alternatively, provide a rationale for why baseline concentrations of radon were not included.3. Discuss the potential health implications of the project-only increment-over-baseline radon levels | <p>1: The baseline range of <7.4-25 Bq/m³ referenced in the air quality assessment is discussed in Section 6.1.1.2.3 of the draft EIS and comes from the CNSC document “The Regulatory Oversight Report for Uranium Mines and Mills in Canada” (2018). Measured baseline values presented and discussed in Section 6.1.3.2.3 of the EIS also fall within this range.</p> <p>2. The rationale for not adding baseline to modelled incremental radon concentrations in the air quality assessment is presented in Section 6.1.1.2.3. This approach was discussed and confirmed with the CNSC during a technical meeting on Sep. 17, 2021.</p> <p>3. As discussed in the response to IR 176, the total incremental dose to the camp worker from radon and U-238 decay chain radionuclides is below the dose limit for a non-NEW of 1 mSv/a.</p> | No updates to the draft EIS are needed based on this IR response |

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| | | | | is appropriate in this case from a health perspective, different approaches to screening predicted radon levels in different sections appear to be used (i.e., background radon levels vs. CNSC incremental concentration). | | | |
| IR-179 | CNSC | Groundwater quality decommissioning objectives. | Section 10.1.4.2.2, Release of Treated Effluent to Whitefish Lake During Decommissioning | <p>Context: It is stated that “This process would continue until the recovered water meets acceptable groundwater quality decommissioning objectives”.</p> <p>Rationale: The information provided does not include groundwater quality decommissioning objectives nor a reference to these objectives.</p> | Please provide groundwater quality decommissioning objectives or a reference to the information. | <p>The “groundwater quality decommissioning objectives” referred to in Section 10.1.4.2.2 of the draft EIS are the mining area decommissioning objectives provided in Table 2.3.3 of Section 2.3.3.1.1 in the draft EIS. The mining area decommissioning objectives have been developed through groundwater modelling work and are achievable based on metallurgical testing. Groundwater modelling and metallurgical testing are described in Section 7.6.2.1 of the EIS and in Appendix 7C of the EIS.</p> <p>For clarity, Section 10.1.4.2.2 will be modified in the final EIS to state: “This process would continue until the recovered water is demonstrated to be stabilized (maintained) at acceptable mining area decommissioning objectives (Section 2.3.3.1.1, Table 2.3-3).”</p> | Section 10.1.4.2.2 in the final EIS will be modified as follows: This process would continue until the recovered water is demonstrated to be stabilized (maintained) at meets acceptable groundwater quality mining area decommissioning objectives (Section 2.3.3.1.1, Table 2.3-3). |
| IR-180 | CNSC | Human health with respect to hazardous contaminants | Section 10.1.6.1.1, Human Receptors Selection and Characterization | <p>Context: Within the Human Health assessment, offsite receptors during the operation period are only considered downstream of Whitefish Lake. The only identified concern was for Se to the Fisher/Trapper located at Russel Lake. This section cites Indigenous Knowledge as informing the receptor selection and location.</p> <p>Rationale: While the assessment is fairly conservative in the assumptions made on intake and receptor habits, it stands to reason that if the trapper receptor was located closer to the operation, such as at McGowan or Whitefish Lakes, this exceedance of Se could be more pronounced.</p> <p>In terms of maintaining a conservative assessment, if the most vulnerable receptor can be shown to be protected at the point of highest expected COPC concentration, it can be concluded that this receptor would be protected further away from the project. Considering this, why was the hunter/trapper receptor not also assessed at Whitefish or McGowan Lake? Was Indigenous Knowledge specific in mentioning Whitefish or McGowan Lakes were not used for the activities carried out by identified receptors?</p> | <p>Please provide justification for excluding a receptor from occupancy at lakes closer to the project during operation (McGowan, Whitefish). Alternatively, conduct a risk assessment to a receptor at these lakes during operation to determine if there is a predicted risk that may require monitoring or mitigation.</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends the following:</p> <ul style="list-style-type: none">Assessment of a receptor located closer to the point of effluent release may need to be considered to ensure there are negligible risksIf Se is expected to exceed hazard quotients further upstream, selenium removal technology may be required as part of the effluent treatment process as a mitigation measure. Other COPC’s exceeding an HQ of 1 may also be identified under this process that could require specific monitoring or mitigation measures. | <p>The traditional land use activities closest to the Project site are reported to occur in the Russell Lake area. However, a potential recreational lease has been identified in the McGowan Lake area. As such, a human receptor (Recreational Fisher/Hunter) was assessed at McGowan Lake in Appendix 10-A (ERA). The Fisher/Trapper was included at Russell Lake based on engagement with a local fisher/trapper (Bobby John), who had a cabin at Russell Lake. Overall, based on Indigenous and Local Knowledge, use of the area near Whitefish Lake for fishing, hunting, gathering is limited. As such the closest human receptor assessed during the Project phases was at McGowan Lake.</p> <p>No unacceptable risk was identified for the human receptor (Recreational Fisher/Hunter) at McGowan Lake due to releases from the Project. The ingestion rates for the receptor at McGowan Lake are more reflective of the average country foods diet and consumptions rates expected for human receptors in the area (based on the ERFN country foods study) than the diet of the Fisher/Trapper which would represent a higher consumption of traditional foods. As indicated in Section 4.4.1.1 of the ERA, the annual fish consumption based on engagement with a local fisher/trapper from ERFN was assumed to be 183 kg/yr (approximately 1 to 2 servings per day), which is conservative compared to an annual fish consumption of 27 kg/yr (2 servings per week) from the ERFN’s Country Food Study (CanNorth, 2017) and 88 kg/yr (approximately 1 serving per day) for the high consumer for the Boreal Shield in the First Nations Food, Nutrition and Environment Study for Saskatchewan (Chan et al., 2018).</p> <p><u>References:</u> CanNorth, 2017. English River First Nation Country Foods Study – Final Report (No. Project No. 2147). Canada North Environmental Services.</p> <p>Chan, L., Receveur, O., Sadik, T., Schwartz, H., Ing, A., Fediuk, K., Tikhonov, C., 2018. First Nations Food, Nutrition and Environment Study (FNFNES): Results from Saskatchewan (2015). University of Ottawa, Ottawa.</p> | No updates to the draft EIS are needed based on this IR response |
| IR-181 | CNSC | Human Health with respect to radiation exposure | Section 10.1.6.1.4 | <p>Context: In section 10.1.6.1.4, it is stated: “The maximum incremental radon concentration at the camp worker site during Operation was predicted to be 12.4 Bq/m3, which is below the CNSC limit of 60 Bq/m3 for incremental radon.”</p> <p>As per IR-176, there is no such CNSC limit for incremental radon.</p> <p>The camp worker would be considered a person who is not a nuclear energy worker (NEW) and subject to the dose limits of section 13 and 14 of the Radiation Protection Regulations, not the dose limit for the general public as per subsection 1(3) of the Radiation Protection Regulations. The CNSC has regulatory requirements for the ascertainment and recording of doses of radiation as per section 5 of the Radiation Protection Regulations. Every licensee must ascertain and record the magnitude of exposure to radon progeny, the effective dose and equivalent dose received by and committed to a person who performs duties in connection with any activity that is authorized by the Nuclear Safety and Control Act or is present at a place where that activity is carried on.</p> <p>The camp worker performs duties in connection with the licensed activity and is present at the location where the activity is carried out. Hence, they are not considered to be a member of the general public (who has no connection with the activity)</p> <p>Further, the proponent indicates that the maximum incremental radon dose to the camp worker was estimated to be 0.13 mSv/year during Operation. The assessment assumes that the camp worker spends 100% of the time indoors. Table 10.1-11 shows the maximum total incremental dose for the camp worker to be 0.02 mSv/year. This appears to be a discrepancy.</p> <p>Table 5.2 in Appendix 10-C provides internal annual dose from radon inhalation. The radon doses to some NEW workers (9.44E-02 mSv/a Driller 1 and 1.03E-01 mSv/a Wellfield Operator 1, 2) here appear less than the radon dose (0.13 mSv/year from section 10.1.6.1.4) to the camp worker, who is a non-nuclear energy worker.</p> <p>Rationale: The reason for the requested change is to ensure</p> | <p>The EIS and appendices should be aligned with the Radiation Protection Regulations by:</p> <ol style="list-style-type: none">Removing the reference to a 60 Bq/m3 limit for incremental radon.Revising all references to the ‘public dose limit’ applied to camp workers (non-NEWs) to align with section 13 and 14 of the Radiation Protection Regulations. <p>The proponent should explain why the radon dose for the camp worker appears as 0.13 mSv/year in one instance and 0.02 mSv/year in another.</p> <p>The proponent is also asked to provide the rationale as to why a non-NEW has a higher radon dose than a NEW.</p> | <p>1. The reference level of 60 Bq/m³ for incremental radon will be removed from the EIS and Appendix 10-A (ERA). The health impact will instead be interpreted based on dose. The incremental radon dose to the camp worker is 0.13 mSv/year during Operations, which is below the dose limit for a non-NEW of 1 mSv/year. The ERA text will be updated.</p> <p>2. The ERA text and Section 10 of the EIS will remove the term "public dose limit" for the camp worker and use the term dose limit for a non-NEW. Note that the same dose limit of 1 mSv/year is applied. Section 10.1.6.1.4 will be modified to state: "Incremental radiation doses due to radionuclides in the uranium-238 decay series were compared to the regulatory public dose limit and dose limit for a non-NEW of 1 mSv/yr as described in the Radiation Protection Regulations under the <i>Nuclear Safety and Control Act</i>."</p> <p>The radon dose to the camp worker is predicted to be 0.13 mSv/year during operations and 0.02 mSv/year during Construction. See Table 4-12: Predicted Radon Dose to Camp Worker during all Project Phases in Appendix 10-A (ERA). No changes to the appendix are required.</p> <p>The radon dose to a NEW is presented in Appendix 10-C (Worker Dose Assessment). The radon dose to a NEW is higher in most instances than to a non-NEW at the camp. As indicated in Section 5.2 of Appendix 10-C, the dose from radon to NEWs in the ISR plant area is predicted to range from 0.53 to 2.27 mSv/year. Radon dose to NEWs from the core shack is expected to be 2.3 mSv/year. Radon dose to the Driller 1 and Wellfield Operator 1, 2 is based on exposure to radon outdoors where exposure is much lower than exposure to radon indoors for the camp worker.</p> | Per the IR response any reference to 60 Bq/m³ from the EIS and Appendix 10-A and the ERA text and Section 10 of the EIS will remove the term "public dose limit" for the camp worker and use the term dose limit for a non-NEW. |

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| | | | | consistency with the Radiation Protection Regulations and the environmental impact statement. | | | |
| IR-182 | HC | Change to an environmental component due to radiological contaminants | Section 10.1.6.1.4, (p. 10-44) | <p>Context: Section 10.1.6.1.4 states, "The limit is incremental and is exclusive of natural background, such as natural levels of radon and medical exposures. A dose constraint of 0.3mSv/yr was established for the public from all radionuclides and all pathways for the Project, as recommended by Health Canada (2010a). The dose constraint represents a dose lower than the public dose limit that ensures the combined dose from multiple sources does not result in exceedance of the public dose limit. Radon dose was calculated separately from the dose due to other radionuclides; however, the predicted radon concentration was compared against the CNSC incremental concentration limit of 60 BQ/m³" (p. 10-44).</p> <p>Rationale: Calculating radon separately from all radionuclides may underestimate the health risks by not considering combined doses from multiple sources when comparing to the public dose limit constraint of 0.3 mSv/yr recommended by Health Canada (2010a).</p> | 1. Provide clarification on how combined doses from all sources would be accounted for in respecting the public dose limit of 0.3 mSV/yr if radon concentrations are being calculated separately. | <p>Health Canada guidance recommends reporting the dose from radon separately. See HC PQRA(rad) document in Section 5.8 Total Dose "In general, it is appropriate to compare the combined dose from external and internal radiation to a dose limit or a reference dose and to compare radon to its own criterion."</p> <p>The existing tables will be kept the same for total dose without radon and a new table for the total dose with radon will be added in Appendix 10-A (ERA) for the camp worker only which includes one column for radon dose and one column for other U-238 decay chain radionuclides. Note that total dose for the camp worker with radon included would be 0.15 mSv/year which is lower than the defined dose constraint of 0.3 mSv/yr. Additionally, the following text will be added to Section 4.4.1.4 of Appendix 10-A and Section 10.1.6.1.4 of the EIS, "The total incremental dose to the camp worker from all radionuclides in the U-238 decay chain including radon would be 0.15 mSv/year, which is below the dose limit for a non-NEW of 1 mSv/yr".</p> | Per the IR response a new table for the total dose with radon will be added in Appendix 10-A (ERA) for the camp worker only which includes one column for radon dose and one column for other U-238 decay chain radionuclides. Section 4.4.1.4 of Appendix 10-A and Section 10.1.6.1.4 of the EIS will be updated to include the following statement, "The total incremental dose to the camp worker from all radionuclides in the U-238 decay chain including radon would be 0.15 mSv/year, which is below the dose limit for a non-NEW of 1 mSv/yr". |
| IR-183 | CNSC | Human Health with respect to radiation exposure | Section 10.2 Appendix 10-C | <p>Context: Exposure scenarios for workers have been identified and high-level summaries of the assumptions and resultant dose estimates have been provided. However, the detailed dose calculations have not been provided.</p> <p>Rationale: The method used to estimate effective, equivalent and committed dose is required to be verified. Sample dose calculations should be included, to confirm use of acceptable input data, for at least the most dose significant scenarios.</p> | Provide the dose calculations for deriving the dose estimates for workers in all exposure scenarios, for at least the most dose significant scenarios. | Example dose calculations are provided in Appendix A of the Worker Dose Assessment, which is Appendix 10-C of the draft EIS. As noted in responses to IRs 185, 186, and 187, some revisions to Appendix A are detailed in Attachment IR-183 to 187. | Changes to Appendix 10-C of the EIS, including example calculations in Appendix A of Appendix 10-C, are as described in response to IRs 185, 186 and 187 (see Attachment IR-183 to 187). |
| IR-184 | CNSC | Human Health with respect to radiation exposure | Section 10.2 Appendix 10-C, 2.0 | <p>Context: It is stated in Appendix 10-C, section 2.0 that: "In addition, the CNSC has proposed a 100 mSv 5-year equivalent dose to lens of eye, in accordance with recent recommendations of the International Commission for Radiological Protection (ICRP, 2012a). This implies an average annual equivalent dose to lens of 20 mSv/a and will be considered as an applicable dose limit for workers."</p> <p>As per section 14 of the Radiation Protection Regulations, the equivalent dose limit for the lens of an eye for nuclear energy workers (NEWs), effective January 1, 2021, is 50 mSv in a one-year dosimetry period.</p> <p>Rationale: The reason of the requested change is to ensure consistency with the Radiation Protection Regulations.</p> | The EIS and Appendix 10-C should be aligned with the Radiation Protection Regulations regarding the equivalent dose limit for the lens of an eye for NEWs. | The text cited by the reviewer from Section 2.0 of Appendix 10-C about a proposed additional limit for 5-year equivalent dose to lens of eye will be deleted to be consistent with the Regulation. See Attachment IR-183 to 187. | Per the IR response, in Section 2.0, p.2-1, of Appendix 10-C of the final EIS the following text will be deleted: In addition, the CNSC has proposed a 100 mSv 5-year equivalent dose to lens of eye, in accordance with recent recommendations of the International Commission for Radiological Protection (ICRP, 2012a). This implies an average annual equivalent dose to lens of 20 mSv/a and will be considered as an applicable dose limit for workers. |
| IR-185 | CNSC | Human Health with respect to radiation exposure | Section 10.2.3.2 Appendix 10-C Table 3.10-3.12 | <p>Context: The Geometries for External Exposure Scenarios Modelled in MicroShield for Sources in various locations were provided in tables 3.10-3.12 in appendix 10-C. The doses from those scenarios were omitted.</p> <p>Rationale: The method used to estimate effective, equivalent, and committed dose is required to be verified. Sample dose calculations should be included, to confirm use of acceptable input data.</p> | The proponent is asked to provide all the necessary information and assumptions required to perform the MicroShield calculations independently and to list the resulting calculated values from the listed scenarios. | The source radiochemistries, geometries, and distance/time assumptions that are inputs to the external dose calculation are provided in the Worker Dose Assessment, which is Appendix 10-C of the draft EIS. The calculation of external dose is detailed in Appendix A (Table A.3) of the Worker Dose Assessment. This calculation uses dose rates at distance as output from MicroShield. As we have noticed several typos in Table A.3 and have changed inputs for drying and packaging in response to IR-186, a revised table is provided here (see Table A.3 in Attachment IR-183 to 187) that will replace Table A.3 in Appendix A of Appendix 10-C. | Per the IR response, revised Table A.3 from the memo will replace Table A.3 in Appendix A of final EIS Appendix 10-C. Tables 5.3 and 5.4 of Appendix 10-C will be revised in the final EIS to show the same small changes in external dose (see Attachment IR-183 to 187). |
| IR-186 | CNSC | Human Health with respect to radiation exposure | Section 10.2.3.2.4 Section 10.2.3.2.6 Section 10.2.4 Appendix 10-C, Section 3.2 | <p>Context: In sections 10.2.3.2.4 and 10.2.3.2.6, as well as section 3.2 of Appendix 10-C, the proponent has stated that workers in the drying and packaging areas of the processing plant will be required to wear powered air purifying respirators (PAPR) to reduce/eliminate inhalation exposure.</p> <p>Further in section 10.2.4, which elaborates mitigation measures, it is stated: "For the drying and packaging/loading areas of the ISR plant, use of PAPR has been assumed. It will be needed in these areas, and it has been planned in these areas to substantially reduce doses from inhalation of uranium dust. Dust levels in these areas will be monitored and kept ALARA."</p> <p>The use of respirators appears to be in contradiction of the requirements of section 13 of the Uranium Mines and Mills Regulations, which states: <i>No licensee shall rely on the use of a respirator to comply with the Radiation Protection Regulations unless the use of the respirator (a) is for a temporary or unforeseen situation; and (b) is permitted by the code of practice referred to in the licence.</i></p> <p>The proponent is also reminded that respirators should not be the first choice for dose reduction in workplaces. They should only be used when the hierarchy of control (elimination, substitution, engineering, or administrative controls) is not possible.</p> <p>Rationale: At this stage of the project, the proponent is expected to identify design improvements to these areas of the ISR plant/processing plant following the hierarchy of control for the</p> | <p>Provide the rationale for mandating the use of respirators by workers in the drying and packaging areas of the processing plant.</p> <p>Include the demonstration of the application of the hierarchy of control for radiological protection within the design of these areas of the processing plant.</p> <p>Justify that this approach complies with section 13 of the Uranium Mines and Mills Regulations.</p> | <p>A very conservative dust level in drying and packaging areas had been used (representing equipment sources of dust to the exhaust system). While the dust hazard cannot be eliminated or substituted, engineering controls will minimize the pathway. As a primary engineering control, the equipment and exhaust will be in a negative pressure enclosure. Under normal operation, workers will not be inside the enclosure. To support a more realistic exposure assessment for drying and packaging, a conservative design estimate for potential dust levels in the main room has been obtained. It is anticipated that workers in these areas will not require PAPR under normal circumstances. As an administrative control, dust levels in the room will be monitored, and individual worker exposures will be monitored and managed. PAPR will be available if needed as a control of last resort. The approach will respect the hierarchy of control and will comply with Section 13 of the Uranium Mines and Mills Regulations. A new worker exposure assessment has been completed for the drying and packaging areas, using the design estimate for dust levels in the main room, a revised time spent in the area, and no routine use of PAPR (see revised Tables A.1 and A.3 in Attachment IR-183 to 187).</p> | Revised Table A.1 provided in Attachment IR-183 to 187 will replace Table A.1 in Appendix A of final EIS Appendix 10-C. Tables 5.1 and 5.4 of EIS Appendix 10-C will be revised to show the same changes in inhalation dose. Tables 5.3 and 5.4 of Appendix 10-C will be revised in the final EIS to show the changes in external dose related to the revised time allocation. References to reliance on PAPR as an exposure control will be removed from text throughout the EIS. |

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| | | | | radiological protection of workers, as per regulatory requirements and as described in REGDOC-2.7.1, <i>Radiation Protection</i> . | | | |
| IR-187 | CNSC | Human Health with respect to radiation exposure | Section 10.2.3.2.4 Section 10.2.3.2.6 Appendix 10-C, Section 3.3, 6.0 | <p>Context: The exposure scenarios and assumptions for the workers in the drying area and the packaging/loading area of the processing plant include the wearing of PAPRs, which is assumed to provide a 1000-fold reduction in dust exposure.</p> <p>Further to reference IR-186, the use of a respirator as well as in worker dose predictions for the project, appears to contravene section 13 of the Uranium Mines and Mills Regulations, and does not follow the hierarchy of controls for radiological protection of workers as described in REGDOC-2.7.1, <i>Radiation Protection</i>.</p> <p>Rationale: At this stage of the project, the proponent is expected to identify design improvements to these areas of the ISR plant/processing plant following the hierarchy of control for the radiological protection of workers, as per regulatory requirements and as described in REGDOC-2.7.1, <i>Radiation Protection</i>.</p> | <p>Modify the exposure scenarios and assumptions (i.e., remove the use of a respirator) for the workers in the drying area and the packaging/loading area of the processing facility.</p> <p>Assess the resultant exposures against CNSC regulatory dose limits and the ALARA principle.</p> <p>Identify mitigation measures as per the hierarchy of control for radiological protection.</p> | As described in response to IR-186, a new worker exposure assessment has been completed for drying and packaging areas, using the design estimate for dust levels in the main room, a revised time spent in the area, and no routine use of PAPR (see revised Tables A.1 and A.3 provided in Attachment IR-183 to 187). The in-design engineering controls will include negative pressure enclosure of source equipment and exhaust, as well as ventilation controls in the main rooms (drying and packaging areas). Administrative controls will include area and individual monitoring and time-exposure management. It is shown that CNSC regulatory dose limits can be met without PAPR. This will be confirmed by air and dose monitoring during the commissioning phase as the control system is optimized. PAPR will be available as needed for non-routine situations, such as any necessary work within the enclosures. | Per the IR response Revised Table A.1 provided in Attachment IR-183 to 187 will replace Table A.1 in Appendix A of final EIS Appendix 10-C. Tables 5.1 and 5.4 of Appendix 10-C will be revised in the final EIS to show the same changes in inhalation dose. Tables 5.3 and 5.4 of Appendix 10-C will be revised in the final EIS to show the changes in external dose related to the revised time allocation. References to routine use of PAPR as an exposure control will be removed from text throughout the EIS. Mitigation measures will be described as per the hierarchy of controls. |
| IR-188 | CNSC | Human Health with respect to radiation exposure | Section 10.2.4 | <p>Context: The following is stated in section 10.2.4: “Dust inhalation is also a potentially substantial component of worker dose at the core shack. At this location, PAPR will not be required; however, N95 masks will be used, and dust levels will be monitored here...It may be possible to increase air exchange in the core shack, above the planned six exchanges per hour, should this be necessary. This would also reduce radon exposure in the core shack.”</p> <p>If it is possible to increase air exchanges in the core shack, it is not clear why this was not assessed and incorporated in the design of the core shack.</p> <p>Rationale: It appears that a control measure (e.g., air exchange protocols in the core shack) to reduce the exposure to workers has been identified. However, it is not certain if it has been formally documented to ensure that it is incorporated in the engineered design of the core shack.</p> | Provide details on how the control measures to reduce the exposure to both workers through the air exchange protocols in the core shack have been formally documented to ensure that it is incorporated in the engineered design of the core shack. | Denison is completing feasibility designs for the Project in 2023. Detailed design to support Project licensing and permitting will begin later in the year. The engineering design of the core shack including control measures to reduce core shack worker exposure will be included in the detailed design and the core shack HVAC design criteria will be provided to the CNSC during Project licensing. The design mitigation measures in the EIS (Appendix 10-C) include: - Ventilation (assumed as 6 room changes per hour) - Monitoring of dust and radon, and worker doses (assumed 3 cores in shack, calculated radon level as 1.18E+3 Bq/m ³ , and assumed dust level as 0.0675 mg/m ³) - Managing worker exposure time and dose (time assumed as 120 d/a, 11 h/d) Although use of N95 masks was mentioned, masks were not factored into the exposure estimation. As described in Section 10.2.4 Mitigation Measures, worker health is managed under the Radiation Protection Program (RPP), which is a worker health and safety plan specifically for radiation exposures. The RPP designates the roles and responsibilities of Denison and contractors, specifies the radiation dose limits, action levels and administrative levels, describes procedures to monitor and manage worker exposures (dust and radon monitoring, personal dose monitoring), and describes the processes for training and record-keeping. The successful implementation of the RPP, in conjunction with in-design measures described for the various project activities, is key to maintaining acceptably low doses of radiation exposure to workers during all phases of the Project. | No updates to the draft EIS are needed based on this IR response. |
| IR-189 | CNSC | Woodland Caribou Ecological Model | Appendix 10-A (ERA) | <p>Context: In the ERA (p. C.12, section 2.3.6 Woodland Caribou) it is stated: “For the ecological model a diet comprised of 50% browse, 20% lichen and 30% macrophytes is assumed for the woodland caribou.”</p> <p>In the EIS, section 9.3.3.3.1, it is stated: “Research has shown that up to 70% of the year-round diet of caribou may consist of ground and arboreal lichens.”</p> <p>Rationale: It is unclear whether the assumptions in the ecological model in the ERA regarding Woodland caribou diet are conservative, given only 20% lichen intake in the model. Lichen is known to accumulate COPC such as metals and dust from the atmosphere.</p> | <p>Please provide additional evidence to support that those Woodland Caribou who may have higher consumption rates of lichen as part of their diet, will remain protected. This can be provided through including a second model that assumes 70% lichen in the diet.</p> <p>See also related: IR-138.</p> | A second woodland caribou with a diet of 70% lichen, 20% browse, and 10% macrophytes was modelled for comparison to the existing woodland caribou with a diet comprised of 50% browse, 20% lichen and 30% macrophytes. Compared with the woodland caribou with the lower lichen diet (50% browse, 20% lichen and 30% macrophytes), the predicted total radiological dose for the woodland caribou with the higher (70%) lichen diet increased 65% to 0.0118 mGy/d, which is below the 2.4 mGy/d radiation dose benchmark for terrestrial biota. The predicted maximum hazard quotient (HQ) for the woodland caribou with higher (70%) lichen diet would generally increase by 5 to 81% with the exception of copper and molybdenum where the HQ decrease due to the copper and molybdenum concentration in lichen being lower than in browse. However, all HQs for both the woodland caribou with the lower and higher lichen diet are below the benchmark of 1 for all COPCs. | No updates to the draft EIS are needed based on this IR response |
| IR-190 | HC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Table 3-8 (p. 3.31) and Table 3-9 (p. 3.36) Appendix 6, Table 5 (p. 16) | <p>NO2 criteria is not being consistently compared.</p> <p>Context: Provincial and federal air quality criteria/screening values for NO2 have been used inconsistently.</p> <p>Table 3-9 in Appendix 10-A (ERA) uses the 2015 Saskatchewan Ambient Air Quality Standards (SAAQS) value of 300 µg/m3 to compare the maximum concentrations of NO2 at receptor locations for the 1-hour average period, while Table 5 of Appendix 6 uses the 2025 Canadian Ambient Air Quality Standards (CAAQS) of 79µg/m3 for the same average period time.</p> <p>Rationale: By utilizing the SAAQS screening value for NO2, the maximum concentrations at receptor locations exceed the 1-hour threshold solely during the decommissioning stage (Table 3-9). However, if the 2025 CAAQS are applied, the screening values would be exceeded at receptor locations for all project phases. It is best practice to use the more protective air quality standards to evaluate potential human health risks associated with project activities.</p> | <p>1. Compare the predicted maximum concentrations to the most protective applicable air quality standards available. Alternatively, provide a rationale as to why the SAAQS for NO2 were used rather than the more protective 2025 CAAQS to determine potential exceedances and screen for the need for additional mitigation measures.</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends use of the standards from the 2025 CAAQS for NO2 in future mitigation and follow-up plans.</p> | The CAAQCs are applicable to measured ambient air concentrations over a three-year period and are not applicable to modelled results from a single facility. In technical meetings between Denison and ENV, the province agreed to the approach of utilizing 1-year of site-specific meteorological data. Use of the CAAQCs would require a three-year site specific data set. Denison agrees to using the 2025 CAAQCs for NO2 in future mitigation and follow-up plans. | No updates to the draft EIS are needed based on this IR response |
| IR-191 | HC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Table 3-9 (p. 3.36) and Table 3-10 (p. 3.46) | <p>Non-threshold substances are not included in screening and monitoring plans.</p> <p>Context: Fine particulate matter (PM2.5) is not being considered further in secondary air quality screening for short and long-term exposure at human and ecological receptors because it is not predicted to exceed the screening values of the Ontario Ambient Air</p> | <p>1. Include PM2.5 and PM10 in the secondary air quality screening for short and long- term exposure at human receptors.</p> <p>2. Include PM10 and PM2.5 in the air quality monitoring plan as they are non- threshold substances.</p> | 1. PM2.5 and PM10 baseline (background) concentrations were compared to the Project AQ Criteria in Appendix 6-A, Table 5: Model Predicted COPC Concentrations for the Construction Scenario. PM2.5 and PM10 background concentrations were found to be below the Project AQ Criteria. Appendix 10-A will be updated to note that baseline concentrations were compared to the Project AQ Criteria and to reference Appendix 6-A, Table 5. As noted by the reviewer, PM2.5 was not included for the secondary air quality screening because the predicted maximum concentrations (which includes background air concentrations) did not | Per the IR response, Section 3.2 in Appendix 10-A will be updated to note that baseline concentrations were compared to the Project AQ Criteria and to reference Appendix 6-A, Table 5. The commitment to include PM10 and PM2.5 to the air quality monitoring plan during |

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| | | | Section 6.1.8 (p. 6-44) | <p>Quality Criteria (OAAQC) or the Canadian Ambient Air Quality Standards (CAAQS) for both annual and 24-hour average periods (Tables 3-9 and 3-10). Furthermore, it is not compared against the baseline for analysis.</p> <p>Table 3-9 indicates that coarse PM (PM10) is predicted to exceed the 24-hour CAAQS during all phases of the project. However, Appendix 10-A p. 3.46 states that, “There were no exceedances of PM2.5 which is generally considered to be a more reliable indicator of potential health effects. However, health effects would be infrequent and reversible, subsiding after exposure; therefore, PM10 was not considered for further quantitative assessment in the ERA.”</p> <p>PM10 and PM2.5 were not included in the air quality monitoring plan (Section 6.1.8).</p> <p>Rationale: Particulate matter and NO2 are considered non- threshold pollutants, meaning that health effects can occur at any level of exposure, The CAAQS for PM2.5 PM.10, and NO2 recognize that there is no population health threshold for human health effects; therefore, any increase in exposure will result in an incremental population risk (Environment Canada and Health Canada, 2012; CCME, 2000). The CAAQS values should not be construed as limits to which polluting up to is allowed. In addition, based on the principles of keeping clean areas clean and continuous improvement, proposed mitigation measures should not be confined to meeting the standards but should also be targeted towards reducing population exposure to CACs associated with the proposed project.</p> <p>Furthermore, although health risks associated with PM2.5 are higher than those associated with PM10, both fractions are considered non-threshold pollutants and identified by IARC (2013) as causes of cancer.</p> <p>Reference: [1] International Agency for Research on Cancer (IARC). 2013. IARC monographs on the evaluation of carcinogenic risks to humans. Volume 109. Outdoor air pollution. Lyon: International Agency for Research on Cancer.</p> | <p>3. Provide a discussion of the significance of predicted exceedances of health- based standards.</p> <p>4. Identify additional mitigation measures to reduce concentrations of non- threshold air contaminants associated with the project.</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends use of the 2025 CAAQS Management Levels to develop mitigation measures that reduce project contributions of non-threshold pollutants (e.g., PM2.5, NO2).</p> | <p>exceed the Project AQ Criteria. This is considered an appropriate approach as PM2.5 is not exceeding an acceptable risk level for PM 2.5. In the case of PM10, this constituent was included in the secondary air quality screening as it exceeded its Project AQ Criteria.</p> <p>2. Denison agrees to include PM10 and PM2.5 as part of the air quality monitoring plan during construction and determine based on adaptive management if monitoring during future phases is required.</p> <p>3. PM10 and PM2.5 are associated with adverse human health effects because these particulate sizes can be inhaled and entrained within the respiratory system (WHO, 2006). Although there are a broad number of health effects associated with the inhalation of PM10 and PM2.5, the effects target primarily the respiratory and cardiovascular systems. Epidemiological studies indicate that the adverse effects of PM are evident for both short-term and long-term exposures of PM, with the risk for adverse health effects increasing with increased exposure duration (WHO, 2006). As such, the exceedances of PM10 health-based standards, as noted in Appendix 10-A, Section 3.2.1.3.2.2, is the potential for unacceptable adverse effects associated with respiratory symptoms such as coughing or difficulty breathing, or asthma symptoms and chronic bronchitis, with effects being reversible and subsiding after exposure.</p> <p>4. The results of the air quality assessment and ERA do not warrant additional mitigation measures for air quality. However, Denison agrees to using the 2025 CAAQCs in future mitigation and follow-up plans.</p> <p>References: World Health Organization (WHO). 2006. WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide Global update 2005, Summary of risk assessment.</p> | construction will be added to Section 6.1.8 and Section 16 in the EIS. |
| IR-192 | CNSC | Human Health with respect to radiation exposure | Appendix 10-A (ERA), Section 3.1.1.2, including Tables 3-1 and 3-2 | <p>Context: Section 3.1.1.2 in Appendix 10-A (ERA) provides the method of how select constituents including cadmium, chromium, selenium and lead-210 were determined. This section does not mention how the other constituents as listed in Tables 3-1 and 3-2 are determined.</p> <p>The values for Th-230 and U-238 in Table 3-1 are unexpected. Typically, these values should be at equilibrium.</p> <p>Rationale: The technical basis for the selection of constituents of concern is required as part of the environmental and human health risk assessments.</p> | <p>1. Provide the methodology of how all listed constituents are determined.</p> <p>2. Provide the rationale as to why Th-230 and U-238 are not in equilibrium.</p> | <p>1. In the first paragraph of Section 3.1.1.2 of the ERA (Appendix 10-A), the text explains that for most constituents the effluent values were based on the results from lab tests conducted by Denison, with a safety factor of three included. Cadmium, chromium, and selenium were singled out because the effluent quality for those constituents were determined based on the back-calculated concentration from a water quality guideline. As stated in the response to IR-117, the ERA will be revised to remove lead-210 from the list of constituents that used the derived effluent quality, as the concentration was based on Denison lab tests. Section 3.1.1.2 of Appendix 10-A will be modified to state: "The derived effluent quality was used for a handful of constituents including cadmium, chromium, and selenium".</p> <p>2. The effluent quality for Th-230 and U-238 were based on lab results from Denison with a safety factor of 3. U-238 and Th-230 are not expected to be in secular equilibrium in the effluent as they have come out of a chemical process in which uranium and thorium partition differently. The effluent quality will continue to be refined through the licensing process based on continued testing conducted by Denison. No changes to the EIS.</p> | Per the IR response, a minor edit, same as response to IR-117. Section 3.1.1.2 of Appendix 10-A will be modified to state: "The derived effluent quality was used for a handful of constituents including cadmium, chromium, and selenium". |
| IR-193 | ECCC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Section 3.1.1.2 Section 8.2.4.2.3 | <p>Context: Appendix 10-A (ERA) Table 3-1 ‘Screening of Effluent Quality against Surface Water Quality Guidelines for the Wheeler River ERA’ does not include acute water quality thresholds for all COPCs compared against predicted effluent quality. For example, it is stated that the final effluent quality discharge target for uranium is 0.057 mg/L. However, the CCME water short term (acute) water quality guidelines for the protection of aquatic life is 0.033 mg/L. The proposed effluent discharge target for uranium exceeds the acute water quality guidelines, indicating effluent may pose the risk of being acutely lethal to aquatic biota at end-of-pipe.</p> <p>All water quality thresholds should be derived from receiving environment parameters, and there are discrepancies between the values used in Appendix 10-A (ERA) Table 3-1 and the values presented in Tables 8.2-8 and 8.2-10 in Section 8.2.4.2.3 of the draft EIS. No selected screening value for TSS has been calculated from baseline conditions. Un-ionized ammonia, which is a regulated Schedule 4 substance under the MDMER, has not been included.</p> <p>Rationale: A review of all modelling results for all COPCs under the MDMER will assist ECCC in understanding the potential risks to the receiving environment.</p> | <p>1. Provide acute and chronic water quality thresholds for all required COPCs with monitoring required under the MDMER.</p> <p>2. Ensure all water quality thresholds are derived from receiving environment baseline parameters and that these thresholds are consistently applied throughout the draft EIS.</p> | <p>1. The application of acute water quality thresholds will be added to Section 8.2.4.2.3 and will be used to refine the effluent quality during the licensing phase (see the response to IR 114 for the updated mixing zone model results). The effluent presented in Table 8.2-9 is based on maximum effluent concentrations; however, Denison is committed to ensuring all effluent released will be below MDMER limits as well as short-term CCME guidelines for protection of aquatic life.</p> <p>2. Water quality thresholds have been applied appropriately in the draft EIS and fit for purpose. Water quality thresholds in Section 3.1.1.2 of the ERA (Appendix 10-A) were based on site-specific hardness of 5.26 mg/L (95th percentile of LA-5 and LA-6). This was to provide a conservative screening for COPCs to be carried forward for further quantitative assessment in the ERA. Water quality thresholds in Section 8.2.4.2.3 are based on Project induced hardness which is assumed to be 250 mg/L. This results in known discrepancies for some water quality parameters that are hardness induced such as cadmium, copper, zinc, and sulphate.</p> | Per the response the application of acute water quality thresholds will be added to Section 8.2.4.2.3 and where applicable are presented in Attachment: IR-114. |
| IR-194 | ECCC | Aquatic species | Appendix 10-A (ERA), Section 3.1.1.2 and Section 3.1.2.3 | <p>Context: In the ERA, COPCs should be selected for further assessment based upon the following factors:</p> <ol style="list-style-type: none">COPC concentrations in effluent that exceed selected water quality guidelines for the protection of aquatic biota, and | <p>1. As noted in IR-114, provide the information on predicted effluent quality for COPCs with required monitoring under the MDMER.</p> <p>2. Provide the information on predicted maximum receiving</p> | <p>1. See response to IR-114. No revisions to Appendix 10-A, ERA are needed based on the response.</p> <p>2. See response to IR-114 for the predicted maximum receiving environment surface water concentrations for constituents regulated under Schedule 4 of MDMER. As indicated in Section 3.1.1 of the ERA in Appendix 10-A a long list of constituents was initially identified for</p> | No EIS updates are anticipated to address this IR. |

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| | | | | <p>2. Baseline COPC concentrations in the LSA that exceed selected surface water and sediment quality guidelines for the protection of aquatic biota.</p> <p>However, only COPCs that had concentrations in effluent that exceeded guidelines were assessed further. Baseline concentrations of COPCs in sediment were not considered. In addition to this, not all COPCs that require monitoring under the MDMER had predicted effluent concentrations. From Section 8.2.3.3 Table 8.2-2 of the Aquatic Environment Report, it appears Aluminum in McGowan Lake and Whitefish Lake South and North, and pH in Whitefish Lake North exceed water quality guidelines. Predicted effluent concentrations or near-field surface water concentrations for Aluminum and pH are not provided.</p> <p>Rationale: It is not possible to determine if there is risk from effluent to the receiving environment and aquatic receptors based on the current information provided.</p> | <p>environment surface water concentrations for COPCs with required monitoring under the MDMER in IR-114.</p> <p>3. Update the ERA to assess the risk of any additional MDMER COPC concentrations in effluent that exceed water quality guidelines.</p> <p>4. Update the ERA to assess the risk of COPCs that had elevated baseline water and sediment quality concentrations in the receiving environment.</p> | <p>consideration in the ERA based on they are known to be present in treated effluent, have existing water quality guidelines or were identified in MDMER (with the exception of cyanide). The focus of the MDMER constituents were those regulated under Schedule 4. Denison will monitor for all MDMER constituents with required monitoring in the environment. This will be included as part of Denison's Effluent and Emissions Plan to support licensing.</p> <p>3. As indicated in Section 3.1.1.1 of the ERA in Appendix 10-A the long list of constituents was reduced further based on potential for exceedance of a water quality guideline (for both protection of human health and aquatic life). Any MDMER constituent that was identified as exceeding a water quality guideline was considered a COPC and assessed further in the ERA (see Table 3-1 in the ERA). For example, effluent quality for arsenic, copper, and zinc which are all Schedule 4 constituent were identified as COPCs in the ERA based on exceeding a water quality guideline.</p> <p>4. The ERA followed the guidance in CSA N288.6-22 which does not require COPCs with elevated baseline concentrations to be considered COPCs for further quantitative assessment in the ERA. Clause 6.2.5.9 indicates that constituents with naturally elevated concentrations should be excluded from further consideration as a COPC. As indicated in Section 8.2.3.3 of the EIS constituents in baseline water quality that exceeded water quality guidelines included aluminum, and occasional exceedances for cadmium, iron, and lead. All of these constituents were considered in the ERA screening; however, were not identified for further assessment (other than cadmium) since based on a conservative screening of effluent quality water quality guidelines would not be exceeded. Section 8.4.3.2.3 of the EIS did not identify any constituents where baseline sediment quality exceeded sediment quality guidelines. Section 3.1.2.3 of the ERA in Appendix 10-A provides the predicted maximum sediment quality in Whitefish Lake for a list of constituents. These concentrations included background concentrations and are screened against sediment quality guidelines. The only constituents that exceed sediment quality guidelines are molybdenum and selenium; however, other COPCs are assessed further in the ERA (see Table 3-14 in the ERA in Appendix 10-A) even though sediment quality guidelines are not anticipated to be exceeded.</p> | |
| IR-195 | ECCC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Section 3.1.2.1 | <p>Context: Figure 3-2 depicts modelled concentrations of COPCs in the receiving environment surface water during all Project phases. Effluent discharge rates during Operations and Decommissioning are not anticipated to differ significantly. However, COPC concentrations seem to decrease rapidly after the end of the operations period despite effluent releases continuing into the decommissioning phase.</p> <p>Rationale: There has been no information provided on predicted changes in effluent COPC concentrations and discharge rates during the decommissioning phase. It remains unclear how COPC concentrations would decrease so quickly following the end of operations.</p> | <p>1. Provide further information on modelled maximum COPC concentrations for each individual Project phase with estimated timing for peak concentrations to appear in the receiving environment.</p> <p>2. Provide further information on predicted effluent quality during the Project decommissioning phase.</p> <p>3. Update ERA figures and conclusions as needed.</p> | <p>1. Per the draft EIS effluent is conservatively assumed to be discharged to the Whitefish Lake Middle during the operations (15 years) and decommissioning (5 years) phases at the same constant discharge rate of 36.5 m³/hr (10.1 L/s) with the same stable effluent quality as shown in Table 3-2. Therefore, the modelled maximum COPC concentrations in water are the same for operations and decommissioning phases (which is considered conservative), the same peak concentrations appear annually due to the variation of the monthly local inflow. Since COPCs are accumulated in sediment, the modelled maximum COPC concentrations in sediment appear at the end of each individual Project phase, which are year 20 for the operations and year 25 for the decommissioning in Figure 3-3.</p> <p>2. The predicted effluent quality during the Project decommissioning phase is expected to be the same as those during the operations. Effluent was set to be released during operations but not during the decommissioning phase in the current model.</p> <p>3. The model has been updated to include effluent discharge during the decommissioning phase, and the ERA figures and result tables will be updated in the next submission accordingly. See attachment IR-195 for the updated Table 3-3 and Figure 3-2.</p> | Per the IR response, edits will be made to Table 3-3 and Figure 3-2 in Appendix 10-A. These edits are provided in Attachment IR-195. |
| IR-196 | ECCC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Section 3.1.2.3 | <p>Context: Table 3-6 provides predicted maximum sediment concentrations of COPCs compared to sediment quality guidelines. Several selected sediment screening values are not the most stringent sediment quality guidelines, with no justification provided. Additionally, copper and lead appear to be missing guidelines that are available from the Burnett-Seidel and Liber (2013) study.</p> <p>Rationale: The most stringent guidelines should be used for the sediment quality risk assessment in the ERA. Use of the most stringent guidelines will allow the most protective assessment to analyze risks to the receiving environment, aquatic and terrestrial biota.</p> | <p>1. Provide further information and justification for the selection of less stringent thresholds.</p> <p>2. Update the ERA as needed.</p> | <p>1. As indicated in Appendix 10-A Section 3.1.2.3, “Burnett-Seidel and Liber (2013) was selected as the preferred source for the selection of the Project thresholds in the sediment quality assessment, as the reported NE2 and REF values are specifically applicable to Saskatchewan waterbodies.” Burnett-Seidel and Liber (2013) was used even if higher than CCME quality guidelines or Thompson et al (2005). In some instances, the NE2 value was lower than the REF value from Burnett-Seidel and Liber (2013). In those instances, the REF value was still used, as screening values should not be lower than background concentrations.</p> <p>2. The guidelines for copper, lead, and vanadium from Burnett-Seidel and Liber (2013) were inadvertently excluded from Table 3-6 in Appendix 10-A which results in changes to selected screening values for copper (9.1 mg/kg dw), lead (16.3 mg/kg dw), and vanadium (35.1 mg/kg dw). The predicted sediment quality for copper, lead, and vanadium are still below the sediment quality guidelines; therefore, no changes to the table are needed other than changes to the sediment quality guidelines identified above. The updated Table 3-6 is provided in Attachment IR-196 – red text indicates a change from the existing table in the draft EIS, Appendix 10-A.</p> <p><u>References:</u></p> <p>Burnett-Seidel, C., Liber, K., 2013. Derivation of no-effect and reference-level sediment quality values for application at Saskatchewan uranium operations. Environ. Monit. Assess. 185, 9481–9494.</p> <p>Thompson, P.A., Kurias, J., Mihok, S., 2005. Derivation and use of sediment quality guidelines for ecological risk assessment of metals and radionuclides released to the environment from uranium mining and milling activities in Canada. Environ. Monit. Assess. 110, 71–85.</p> | Per the IR response edits to Appendix 10-A, Table 3-6, as shown in Attachment IR-196, will be made in the final EIS. |
| IR-197 | ECCC | Aquatic species | Appendix 10-A (ERA), Section 3.2 | <p>Context: It remains unclear if atmospheric deposition from Project related emissions has been incorporated into modelling for the ERA and surface water and sediment quality assessments.</p> <p>Rationale: While expected Project air emissions are unlikely to have direct impacts on the aquatic receiving environment and aquatic biota, this Project effect pathway may have indirect effects through accumulation of COPCs over time or deposition of contaminants that</p> | Incorporate atmospheric deposition from Project-related emissions into water quality modelling and assess any Project related effects to aquatic receptors from this pathway. | Consistent with CSA N288.1-20, Clause 5.1.5, atmospheric depositions to large water bodies such as lakes, are considered negligible; therefore, the air to surface water pathway has been excluded for the ecological risk assessment. The rationale for exclusion of atmospheric deposition to lakes and rivers is explained in detail in Section G9, Appendix G of the COG DRL Guidance Document (Hart, 2019). Typical transfer parameters from source to air and source to water are on a similar magnitude to each other. The transfer parameter from air to water is orders of magnitude lower indicating that atmospheric deposition to the lake would have a negligible effect. Rationale on the exclusion of the air to water pathway can be included in | Per the IR response, the following statement will be added to Section 2.2 in Appendix A to Appendix 10-A "Atmospheric deposition to Whitefish Lake is considered negligible. This is consistent with the COG DRL guidance (COG, 2019) which shows (assuming a modest flow rate for a lake of 0.1 m/s and an assumed water depth of 10 m) that the transfer of constituents from |

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| | | | | are not expected in effluent, which should be evaluated with predicted emissions data incorporated into water quality modelling predictions. | | the ERA in Appendix 10-A. The following statement will be added to Section 2.2 in Appendix A to Appendix 10-A "Atmospheric deposition to Whitefish Lake is considered negligible. This is consistent with the COG DRL guidance (COG, 2019) which shows (assuming a modest flow rate for a lake of 0.1 m/s and an assumed water depth of 10 m) that the transfer of constituents from the atmosphere to large bodies of water (including lakes and rivers) is considered negligible." References: Hart, D. 2019. Derived Release Limits Guidance. COG-06-3090R4-I | the atmosphere to large bodies of water (including lakes and rivers) is considered negligible." |
| IR-198 | HC | Change to an environmental component due to radiological contaminants | Appendix 10-A (ERA) Appendix B, Tables B.7 and B.8 Ref. 19-2638 Appendix 10-A (ERA), Table 4-3 Ref. 19-2638 (p. 4.17) | Context: Section 10 Appendix 10-A (ERA) contains Table 4-3 (p. 4.17), which lists ingestion rates for traditional foods and includes the category “organs” for Mammals. Tables B.7 and Table B.8 in Section 10 Appendix 10-A (ERA) Ref. 19-2638 provide the predicted concentrations of radionuclides for ecological receptors during the project phases and during future centuries, respectively. They list the concentrations of radionuclides in moose and in moose organs, which is presented as a single cumulative organ value. Other terrestrial and aquatic animals (such as the black bear and woodland caribou) that are a part of the traditional diet of nearby Indigenous communities have higher concentrations of radionuclides than moose, yet concentrations are not provided for organs of these species. Rationale: While Health Canada is not aware of transfer factors to individual organs, or to organs in animals that are not ruminants, it would be beneficial to have a better understanding of radionuclide concentrations in the organs of other animals that may be consumed by local Indigenous communities. | 1. Provide more clarification on how the mammalian organ ingestion rates are calculated (which animals and relative contribution percentages). 2. Provide a rationale for why concentrations of radionuclides were not assessed in organs of animals (other than moose) that are consumed as country foods by Indigenous people harvesting in the area. | The response to IR-198 is provided in Attachment IR-198. | No updates to the draft EIS are needed based on this IR response. |
| IR-199 | ECCC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Sections 3.2.1 and 3.3.1, Wheeler River Project IMPACT Model | Context: Model calibrated concentrations of selenium, uranium, and lead- 210 are under-predicted compared to measured baseline concentrations for water quality in the IMPACT modelling based on Figure 3-2. Calibrated concentrations of cobalt are under-predicted and there is poor agreement between model calibrated and measured concentrations of arsenic, lead-210, polonium-210, and radium-226 for sediment quality in Figure 3-3. Rationale: It is unclear how poor agreement between model calibrated and measured baseline concentrations of COPCs impacts the near-field and far-field modelling predictions of COPCs during all Project phases. It is also unclear why measured concentrations of COPCS could not be used directly as model inputs when there was poor agreement. | 1. Provide justification as to why model calibrated concentration inputs of COPCs were preferable for use in predictive modelling of water and sediment quality over measured baseline concentrations. 2. Provide a rationale detailing how under- or over-predicted model calibrated COPC concentration inputs influence IMPACT model predictions and uncertainty for water and sediment quality. Provide specific details on how this may impact the risk analysis for parameters that have been highlighted as having poor agreement between calibrated and measured concentrations (i.e., arsenic, selenium, uranium, lead-210, polonium-210, and radium-226). | 1. Model calibrated concentration inputs of COPCs were preferable over measured baseline concentrations because of the interrelation of metals and radionuclides between water and sediment. In all cases the measured baseline concentrations were used to verify that the modelled relationship between water and sediment for each constituent was considered valid. The geometric mean values of the measured baseline data were preferentially used as the baseline inputs for COPCs that had a good amount of measured data over the detection limit, which is the case for most of the COPCs in Figure 3-2 (where the modelled values overlap with the measured geometric mean values in the plots). In the case of COPCs for which most or all measured values in water were under the detection limit (i.e., 140 out of 142 measured selenium concentrations are below its detection limit), but their sediment concentration measurements were over the detection limit, the baseline water concentration was calculated from the geometric mean of the sediment measurements using the regional water-to-sediment partitioning coefficients (Kd). 2. The "poor" agreement between calibrated and measured concentrations for selenium, uranium and lead-210 is the result of more than 95% of the measured concentrations in water being reported as less then the detection limit for selenium (140 out of 142), uranium (141 out of 142) and lead-210 (136 out of 142). It's unlikely that these three COPCs are under-predicted in water. Poor agreement between modelled and measured concentrations in sediment for arsenic and radium-226 may be a result of only one sampling campaign being available for sediment. The modelled sediment concentrations can be refined in the future when more measured sediment data are available as the Project progresses. Even though arsenic and radium-226 are conservatively over-predicted in sediment, no significant adverse effect on either aquatic or terrestrial populations or communities are predicted during the Project phases or during the future centuries. | No updates to the draft EIS are needed based on this IR response. |

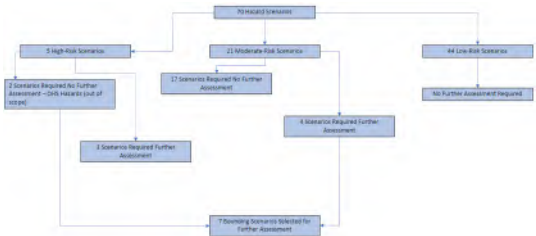
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| IR-200 | HC | Indigenous Peoples' health / Socio-economic conditions | Section 10 (p. 4.10) Appendix 10-A (ERA), Table 4-4 (p. 4.19) | <p>Indigenous consultation should be included in the Country Foods analysis.</p> <p>Context: The Proponent obtained country food consumption data through engagement with a single local fisher/trapper and from a dietary survey administered by CanNorth to the English River First Nations (ERFN) in 2017. However, the potential health risks to consumers of traditional food were only assessed using the data obtained from the CanNorth dietary survey. Section 10 of the EIS <i>states the following</i>: “The diet assumptions for the fisher/trapper are conservative and are based on engagement with a local fisher/trapper. The diet of the fisher/trapper is representative of one person, who consumes a unique composition and quantity of traditional foods (e.g., ingestion rate of 175 kg/yr of caribou, equivalent to approximately 2 to 3 servings per day). Most people fishing, hunting, and trapping in the Local Study Area and Regional Study Area would consume traditional foods more consistent with the average traditional foods consumer diet which was developed from the ERFN country foods study. In comparison, the ERFN country foods study in Section 10 Appendix 10-A (ERA) Table 4- 4 indicates a caribou ingestion rate of 2.6 kg/yr (1 to 2 servings per month) and a total game ingestion rate of 21.3 kg/yr” (p. 4.10).</p> <p>Rationale: Health Canada is in general agreement that the dietary habits of the local fisher/trapper may be an outlier and not necessarily representative of most of the local population. However, a rationale has not been provided to demonstrate whether and how the 2017 ERFN dietary survey results are representative of consumption patterns of local Indigenous communities. Also, it is unclear whether or how the ERFN dietary survey results account for the consumption patterns of vulnerable or more sensitive subgroups (e.g., heavy consumers, children and women of child-bearing age)</p> | <p>1. Evaluate the suitability of using the 2017 EFRN survey results and consider surveying additional community members (such as local hunters/trappers) to obtain more representative country food consumption rates for use in the traditional foods risk assessment, and for communicating the results to the communities.</p> <p>2. Additionally, consider evaluating consumption patterns (and applicable TRVs) of sensitive or vulnerable populations (e.g., elders, toddlers, women of childbearing age) in the traditional food risk assessment and provide risk levels for these sub-groups separately.</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends providing the community with the opportunity to validate the ERFN 2017 survey results.</p> | The 2017 report was authored by ERFN and as such there is no need for Denison to ask ERFN to validate their own report. | No updates to the draft EIS are needed based on this IR response. |
| IR-201 | ECCC | Aquatic species | Appendix 10-A (ERA), Section 5.0 | <p>Context: For the ERA methodology the Proponent followed CSA N288.6-12 for the assessment of risk to aquatic biota from radionuclide and non-radionuclide COPCs. This is the 2012 version, and a more recent 2022 version was publicly released.</p> <p>Rationale: The Proponent should review the most up-to-date version of the standard to ensure no changes to the methodology of the COPC exposure assessment are required for the ERA.</p> | Update the COPC exposure assessment methodology in the ERA using the most recent CSA N288.6-22 standard, as needed. | Denison confirms that the updated CSA N288.6-22 was reviewed and that no changes to the ERA methodology are required. Denison confirms that the ERA is also compliant with CSA N288.6-22. The EIS and ERA (Appendix 10-A) will be updated to reference the most recent 2022 version of the standard, CSA N288.6-22. | Per the IR response all references to N288.6-12 will be replaced with N288.6-22 in the EIS and Appendix 10-A. |
| IR-202 | CNSC | QA/QC | Appendix 10-A (ERA), Section 6.0-Quality Assurance | <p>Context: This section provides only Quality Assurance (QA) of the ERA, including planning and preparation of the ERA.</p> <p>Rational: The Quality Control (QC) aspects are not included. Both QA and QC aspects provide confidence that ERA results are defensible and fit for use in decision-making.</p> <p>The N288.6 (Clause 10.2) requires that “Appropriate QA/QC requirements shall exist for all aspects of the ERA and should be specified prior to conducting the ERA”.</p> | Please include appropriate QC aspects, as per a Clause 10.2 of the N288.6. | <p>The ERA (Appendix 10-A) was completed in alignment with CSA N288.6-22 including the specific QA/QC requirements in Clause 10.2 and 10.3 of the standard. The ERA following the Ecometrix Quality Management System for review and verification ensuring that modelling results were correct and accurate. The ERA report as well went through a thorough review and verification by senior technical staff. The ERA utilized environmental monitoring data collected as part of the baseline monitoring program which followed either Ecometrix' Quality Management System for the monitoring conducted by Ecometrix or the Quality Management System for Denison's other subcontractors. The data collected during the baseline monitoring program was considered fit for use in the ERA.</p> <p>Another layer of review included Denison's review of the ERA. Final acceptance and submission of the ERA with the EIS package indicated Denison's acceptance of the final product. Section 6.1 of the ERA in Appendix 10-A will be updated to include some additional discussion of QA/QC activities. Specifically, the following will be added. "The ERA utilized environmental monitoring data collected as part of the baseline monitoring program which followed either Ecometrix' Quality Management System for the monitoring conducted by Ecometrix or the Quality Management System for Denison's other subcontractors. The data collected during the baseline monitoring program was considered valid and appropriate for use in the ERA. The ERA was reviewed and accepted by Denison in accordance with Denison's QA requirements</p> <p>Denison provides inputs to the ERA based on metallurgical test work that has been conducted under the QA/QC protocols of the Saskatchewan Research Council. The metallurgical test plan and test results are validated by a third-party Qualified Person. Once Denison provides the input values to be utilized in the ERA, Ecometrix summarises the data and provides the summary to Denison for acceptance by a Professional Engineer or a Professional Geologist prior to running the ERA model.</p> | <p>Section 6.1 pf Appendix 10-A will be updated to include the following statement:</p> <p>"The ERA utilized environmental monitoring data collected as part of the baseline monitoring program which followed either Ecometrix' Quality Management System for the monitoring conducted by Ecometrix or the Quality Management System for Denison's other subcontractors. The data collected during the baseline monitoring program was considered valid and appropriate for use in the ERA. The ERA was reviewed and accepted by Denison in accordance with Denison's QA requirements."</p> |
| IR-203 | CNSC | Sediment Quality and Benthic Invertebrates | Appendix 10-A (ERA), Section 6.2 Future Centuries Sensitivity Analysis | <p>Context: This section of the ERA states “If treated effluent was released at the maximum upper bound discharge rate, the modelled concentrations of all COPCs are expected to be below their corresponding sediment quality guidelines.” It appears from Figure 6-2: “Comparison of maximum concentrations of COPCs in sediment at expected and upper bound discharge rate” that cadmium and vanadium would be over their sediment quality guidelines indicated if maximum upper bound discharge rates are used.</p> | Please provide clarity on if cadmium and vanadium are expected to be over the sediment quality guidelines for the maximum upper bound discharge rate scenario. | <p>As part of the sensitivity analysis, if treated effluent is released at the maximum upper bound discharge rate, the modelled vanadium concentration in sediment is expected to be below the Severe Effect Level (SEL) of 160 mg/kg but exceed the Lowest Effect Level (LEL) of 35.2 mg/kg in Whitefish Lake Middle/South. The SEL and LEL values are defined by Thompson et al. (2005).</p> <p>The cadmium concentration in Whitefish Lake Middle/South is expected to be over the CCME sediment quality guideline of 0.6 mg/kg dw for the maximum upper bound discharge rate scenario.</p> | Per the IR response, Section 6.2 of Appendix 10-A will be updated to the following, "If treated effluent was released at the maximum upper bound discharge rate, the modelled concentrations of all COPCs are expected to be below their corresponding sediment quality guidelines, with the exception of cadmium and vanadium. " |

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| | | | | Rationale: It is not clear which is correct; the statement that no exceedances of sediment quality guidelines when considering the maximum upper limit effluent release, or the figures indicating there could be exceedances for cadmium and vanadium. This discrepancy in the ERA should be explained and corrected. | | The plots in Figure 6-2 are correct. The statement in Section 6.2 will be updated to the following, "If treated effluent was released at the maximum upper bound discharge rate, the modelled concentrations of all COPCs are expected to be below their corresponding sediment quality guidelines, with the exception of cadmium and vanadium. " | |
| IR-204 | CNSC | Human health with respect to hazardous contaminants | Appendix 10-A (ERA), 7.1.1, Non-radiological Human Health Risk Assessment | Context: In the human health risk assessment of the non-radiological COPCs, it was determined that the project incremental HQ was predicted to remain below 0.2 for all non-carcinogens and all pathways during all phases of the project, except for selenium for the fisher/trapper at Russell Lake from the fish ingestion pathway. Rationale: Given that the fisher/trapper receptor will likely be exposed to higher concentrations of selenium from the consumption of fish at Russell Lake, there is an elevated risk of selenosis in exposed individuals. This potential for selenosis would be further exacerbated in individuals who consume fish taken from other lakes closer to the mining operation. There is, however, no discussion of mitigation of these risks to exposed individuals. | Please provide a discussion of measures that could be applied to mitigate the risk of selenosis in exposed individuals who consume fish from Russell Lake and other waterbodies closer to the mining operation. Suggestions for mitigation and follow-up measures: CNSC recommends the following: <ul style="list-style-type: none">Selenium abatement technologies may be considered to eliminate or reduce selenium in effluent entering the lake system.If HQs continue to exceed 0.2, then it may be necessary to post fish consumption advisories, in consultation with the Medical Officer of Health for the jurisdiction where the project is located. | Health Canada (2017) conducted a screening assessment of selenium and its compounds under the Canadian Environmental Protection Act. Selenium is an essential element for humans; however, there may be potential human health risks at elevated exposure levels. Selenosis (also known as chronic selenium toxicity), is considered by Health Canada as the critical health effect for selenium. The symptoms of selenosis may include: intestinal upset, hair loss, nail loss, changes in nail morphology, excessive decay and discolouration of teeth, garlic odour in breath, nervous system abnormalities, and fatigue. The BC MOE (2014) identified 7.3 mg/kg dw of selenium in fish as an appropriate limit for subsistence fishing. This would equate to 1.8 mg/kg fw, assuming a dry weight to fresh weight ratio of 0.25 from CSA N288.1-20 for fish. The maximum selenium concentration in Whitefish Lake (LA-5) is predicted to be 1.57 mg/kg fw for northern pike and 2.29 mg/kg fw for white sucker (see Table B.5 in Appendix 10-A). The maximum predicted selenium concentrations in McGown Lake for northern pike and white sucker are 1.02 mg/kg fw and 1.39 mg/kg fw, respectively. The maximum predicted selenium concentrations in Russell Lake for northern pike and white sucker are 0.81 mg/kg fw and 1.06 mg/kg fw, respectively. As such, based on current predictions in lakes where fish consumption is assumed to occur (McGowan Lake and Russell Lake), fish tissue concentrations for selenium are expected to be below the BC MOE limit, indicating people eating fish from these lakes would likely be protected from selenosis. Any further selenium abatement technologies will be considered through the BATEA process during licensing. References: British Columbia Ministry of Environment, Beatty JM, Russo GA. 2014. Ambient Water Quality Guidelines for Selenium. Technical Report Update. Water Protection and Sustainability Branch. Environmental Sustainability and Strategic Policy Division, British Columbia Ministry of Environment. 270 pp Health Canada. 2017. Screening Assessment: Selenium and its compounds. December. https://www.canada.ca/en/environment-climate-change/services/evaluating-existing-substances/screening-assessment-selenium.html#toc71 | No updates to the draft EIS are needed based on this IR response. |
| IR-205 | CNSC | Geology and Groundwater | Section 7, appendix H | Context: In this appendix the analytical concentration of various groundwater samples taken from monitoring wells is reported. Rationale: There is one sample labeled as “Tracer Tank” with no definition available in the current report. It is difficult to judge whether the results presented are relevant to the EIS and how it may impact the findings therein. | Please clarify the definition of “tracer tank”. | The 'Tracer Tank' label referred to the predetermined KCl tracer concentration of 15% (75,000 to 85,000 ppm Cl and K) utilized for injection as part of the 2021 Tracer Test. This clarification will be added to Appendix 7-A, Appendix H. | Per the IR response the clarification will be made as indicated in Appendix 7-A, Appendix H. |
| IR-206 | ISRD | Current use of lands and resources for traditional purposes | Section 11 Section 12 Section 15 Section 16 | Context: Impacts to Lands and Resources Use have been identified by Indigenous Nations and communities. Rationale: Additional information is required to demonstrate whether Indigenous Nations and communities were engaged directly by Denison regarding the cumulative effects assessment, significance determination and residual effects, and thus the overall conclusions on potential adverse impacts of the project on the potential or established Indigenous and/or treaty rights and effects of changes to the environment on Indigenous peoples, pursuant to paragraph 5(1)(c) of the CEEA 2012. | Please describe any outstanding or residual issues or concerns raised by Indigenous Nations and communities that Denison was unable to address. In addition, outline any plans to find solutions or continue discussions with the potentially impacted Indigenous Nations and communities. | Refer to response to IR-28. | Refer to IR-28. |
| IR-207 | CNSC | Current use of lands and resources for traditional purposes | Section 11, Perceived Risks to Lands and Resources | Context: The EIS states: “Resource users may also experience changes in their perception of the quality of resources for consumption such as the palatability of fish or wildlife or have apprehensions about the safety of resources for consumption. These changes may affect the patterns of ILRU during all Project phases including Post Decommissioning. The ERFN refer to this indicator as a “psycho-social’ effect, meaning that even if people know their fears are “ <i>perceived fears, the fear ... is real and has real impacts on ERFN members’ perception of their overall health and well-being</i> ” (ERFN and SVS 2022a).” (p. 11-11) Resource harvesters may experience Project-related disturbances and, depending on how these changes are perceived, it may cause some resource harvesters to avoid the Project Area. Reductions in harvests may occur based on fear or uncertainty about the ongoing quality of country foods. For example, “ <i>People stopped picking berries in this area when Key Lake mine was established because of concerns about health impacts</i> ” (ERFN and SVS 2022b). Rationale: CNSC’s Generic Guidelines for the Preparation of an EIS state: “The EIS will document specific suggestions raised by Indigenous groups for mitigating the effects of changes to the environment on Indigenous peoples (section 5(1)(c) of CEEA 2012). For the mitigation measures intended to address the effects of changes to the | How does Denison plan to work directly with Indigenous Nations and communities who currently use the potentially impacted areas, including the RSA, to mitigate and monitor the perceived risks and/changes to the RSA? Has Denison had discussions with the potential impacted Indigenous Nations and communities on how fear and avoidance behaviors and related impacts on traditional land use will be mitigated, especially within the RSA? Additional information is needed to determine if Denison has engaged directly with the Indigenous Nations and communities to develop potential mitigation measures to address fear and avoidance impacts, such as a community monitoring program, which could help to reduce the perceived risk to lands and resource use through education, collaboration, and long-term monitoring with Indigenous Nations, in order to build trust. Suggestions for mitigation and follow-up measures: It is recommended that Denison consider engaging with potentially impacted Indigenous Nations and communities on the collaborative development and implementation of a monitoring program to help address concerns about potential impacts on lands and resources as a result of the | Denison believes that the EIS conclusions are applicable, as evidenced by continued use of Indigenous communities proximal to other uranium sites in northern Saskatchewan, and in part due to their continued efforts to engage meaningfully with Indigenous communities relative to the Project which support continued relationship and trust building. Denison acknowledges that not all project impacts can be eliminated in their entirety. Denison continues to work with its Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Metis Local on a community specific monitoring regime, suited to each of their interests and needs, in an agreed-upon fashion. One of the key goals of such collaboration with each Indigenous nation will be to provide the information necessary to the communities such that it provides confidence to community members regarding the impacts from the Project to the aspects of the environment which matter the most to them. Denison is committed to continual improvement in relation to such collaborative monitoring programs, in order to adapt to areas of interest which can change over time. Denison expects that important country foods harvested for food and cultural purposes (i.e. moose, fish, etc.), surface water quality, and other areas of interest will form part of this monitoring program. It is expected that the data collected through such monitoring regimes, as described above, would also be relevant to other Indigenous First Nations who may have interest in the Project. The details of monitoring and follow-up plans are being developed to support the separate process of Project licensing and permitting. The specific means by which provincial and federal authorities, and Indigenous Nations and communities will be engaged in developing the follow-up and monitoring program, including the information-sharing program, are | No updates to the draft EIS are needed based on this IR response. |

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| | | | | environment for Indigenous peoples, the proponent must discuss the residual effects with the Indigenous groups prior to submitting the EIS.” These changes may affect the patterns of ILRU during all Project phases including Post Decommissioning. | project. The program(s) could help to monitor changes over time related the potential perceived risk of contamination of the land from Project activities and subsequent effects on the quality of fish, vegetation, and wildlife resources, which in turn could affect the safety of traditional foods and human health, and impacts on culture practices, and overall community well-being that travel to region yearly. | currently under consideration with the Denison project team. It is noted that Section 4.2.1 of the draft EIS provides the variety of ways in which Denison has engaged with Interested Parties to date and it is assumed it would continue to use these means and others that may be identified to fulfil its key corporate principals for developing positive relationships (see draft EIS Section 4.2). | |
| IR-208 | CNSC | Indigenous physical and cultural heritage | Tables 11.1-3, 11.1-4 and 11.1-5 Section 11.1.3.2.6 | Context: Black bear is listed as a species hunted by several Indigenous nations, including Pinehouse residents. CNSC participated in an in-person engagement with Pinehouse residents in October 2022 and bears eating waste was identified as a concern for hunting and consumption. Rationale: Perceived risk of eating animals that are contaminated by hazardous or radiological wastes could deter community members from harvesting animals that are normally part of their traditional diet. Fencing for waste was specified as a deterrent for human trespassers, not animals. | Please specify measures that Denison will take to ensure bears and other animals do not scavenge from waste facilities. | Denison has proposed a number of Project design measures and wildlife-specific mitigation measures that will limit wildlife scavenging activities. Project design measures include waste characterization and segregation, and fencing the domestic and industrial landfills (refer to Section 2.8 Project Design Features and 9.3.5.1 Project Design Measures). Importantly, Denison is proposing to segregate and compost organic wastes on site in a composting system, reducing the volume of material in the landfill generating odours. For the wildlife-specific mitigation measures, refer to Section 9.3.5.2.5 Wildlife Deterrence and Prevention of Wildlife Entrapment and Section 9.3.5.2.8 Waste and Hazardous Materials Management. | No updates to the draft EIS are needed based on this IR response. |
| IR-209 | CNSC | Indigenous Peoples' health / Socio-economic conditions | Section 12.1.4.2.1 (p. 12-22) Section 12.1.5 Section 12.1.6.2 | Context: KML indicates that working at a mine camp could inhibit community members from participating in cultural activities and sharing them with family and community members, resulting in a loss of cultural knowledge and language, thus impact knowledge transmission (p. 12-22). Rationale: Denison addresses this by briefly identifying culturally sensitive policies which would eliminate residual effects (p. 12-30) | Please provide detailed proposed mitigation measure for KML’s concerns related to loss of cultural knowledge and language should they work for Denison. | Denison respects the concern raised by KML regarding language and culture related to working at an industrial operation. Denison and KML will be working on specific items of interest to mitigate these types of concerns through private contractual arrangements, which may include specific mitigation and accommodation measures in this respect. Mitigation measures associated with potential effects to cultural continuity (including knowledge transfer and language) are described in Section 12.1.5 and include: - working with Indigenous COIs to understand culturally important periods relative to harvest times and cultural camps to facilitate Indigenous employees taking time off to participate in such activities; - implementation of Denison's Indigenous Peoples Policy and advancement of reconciliation - Using a commuter rotation system has also shown to be effective in allowing Indigenous employees continued opportunities to spend time on the land, and important factor in the transmission of knowledge and language (see Section 11 for a description of potential effects to land use). In discussions with Indigenous Communities of Interest since the filing of the draft EIS, it has become apparent that Denison should add additional commitment / mitigation measure in relation to this area of interest, as follows: - Encouragement to speak languages of choice while at site, except during safety sensitive situations | Section 12.1.5 of the final EIS will be updated to include the additional commitment / mitigation measure in relation to culture and language, as follows: - Encouragement to speak languages of choice while at site, except during safety sensitive situations. |
| IR-210 | CNSC | Current use of lands and resources for traditional purposes | Section 12.1.4.2.2, Potential Effect 2: Change in Traditional Diet, Perceived Suitability of Country Foods (p. 12-26) | Context: The EIS states: “Project activities could change the perceived suitability of country foods. An ecological risk assessment (ERA) was conducted to consider both radiological and toxicological risks to ecological receptors such as terrestrial and aquatic invertebrates, terrestrial and aquatic vegetation, fish, and terrestrial and aquatic mammals and birds. Results for the radiological assessment predicted no exceedances of the radiation dose benchmark for the ecological receptors. For non-radiological COPCs, no exceedances were predicted except for selenium in fish from Russell Lake, based on a conservative dietary assumption for one resource user. The traditional foods diet for the fisher/trapper is conservative as it assumes that their annual fish consumption (183 kg of fish per year) would be obtained from Russell Lake, meaning the exceedance of the benchmark for selenium from fish would only occur if fish were only sourced from this one lake. This one exceedance could potentially change the perceived safety of country foods for community members and make country foods a less desirable part of a traditional diet. <u>Experience from other uranium operations in northern Saskatchewan suggests that resource use will continue despite the potential selenium exceedance. An examination of members of the Hatchet Lake Denesutliné First Nation who live in Wollaston Lake near the Rabbit Lake operation found that over years of being active on the landscape both with and without the presence of the uranium industry, members had developed their own culturally appropriate practice of risk assessment and management based on their relationship with the land. Hatchet Lake Denesutliné First Nation members appear to be more concerned with the direct effects of uranium mining on the local environment and less concerned about uranium mining’s effects on their health through consumption of plants and animals. This is likely due to their high level of confidence in recognizing affected plants and wildlife and avoiding them (Elias et al. 1997).</u> The usage patterns of the ERFN Trapper have similarly allowed for continued use and access to areas proximal to other uranium operations. The ERFN Trapper had a positive relationship with other uranium operations in the ILRU LSA. He also continued to trap (i.e., used his trapline in Fur Block N-18), fish, and opportunistically pick berries, and consumed those resources during operations (KPI Program 2021). Good relationships between Denison and a new trapper who eventually | Given concerns with psycho-social impacts and the influence of perception discussed by ERFN earlier on in the EIS, does Denison have information on the perspectives from Indigenous Nations and communities to validate this conclusion is applicable? | Denison believes that the EIS conclusions are applicable, as evidenced by continued use of Indigenous communities proximal to other uranium sites in northern Saskatchewan, combined with the fact that ERFN, KML, and the YNLR were offered the opportunity to review select sections of EIS prior to its submission to regulators (see Section 4.3.2.1.4 for ERFN; KML declined the invitation to review the EIS in advance of filing; Section 4.3.4.2.4 for the YNLR). Denison acknowledges that not all project impacts can be eliminated in their entirety. Denison continues to work with its Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Metis Local on a community specific monitoring regime, suited to each of their interests and needs, in an agreed-upon fashion. One of the key goals of such collaboration with each Indigenous nation will be to provide the information necessary to the communities such that it provides confidence to community members regarding the impacts from the Project to the aspects of the environment which matter the most to them. Denison is committed to continual improvement in relation to such collaborative monitoring programs, in order to adapt to areas of interest which can change over time. It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project. See also response to IR-212. | No updates to the draft EIS are needed based on this IR response. |

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| | | | | takes over the trapline from the ERFN Trapper would promote continued use.” (p. 12-26) Rationale: The underlined reference suggests that negative perceptions may not prevent traditional resource users from continuing to consume, due to adaptation to potential risks in the environment. | | | |
| IR-211 | CNSC | Accidents and Malfunctions | Section 14.6.1, Bounding Scenario 1, Vehicle Accident and Aquatic Release of Radioactivity | Context: Scenario 1 describes a spill of uranium concentrate into the lake. It’s not clear how the ecological risk assessment was performed. It is stated that sediment concentrations in post-remediation conditions are expected to exceed the benthic invertebrate benchmark and that these results indicate that a spill of uranium concentrate could potentially affect benthic invertebrate populations following a spill, but the spatial extent would be limited. For water, it is stated that when evaluating the potential effect, a comparison was made between the results of the estimated short-term water quality 1,892 µg/L (1.892 mg/kg) and the guideline (33 µg/L). This indicates that there may be some aquatic species that could be affected, but the effects are expected to be transient as the water concentration quickly drops to a long-term level of 0.19 µg/L. However, when looking at dose to other receptors, the results of the ecological risk assessment indicated short-term ingestion of contaminated water resulting from an accident would not result in potential risks to grouse, vole, or deer, however rationale for how these receptors were chosen is not provided. Rationale: It’s not clear from the EIS, why the receptors grouse, vole, and deer were chosen to evaluate ecological effects from a potential spill, and why they differ from receptors in the ERA. It is also not clear if the pathway from sediment ingestion/contact was considered for semi-aquatic receptors as they could be exposed to the increased concentrations post-spill. It is also not clear if SARA species exposure to sediment and water post-spill was considered. | Please clarify why grouse, vole, and deer were chosen as receptors for the ecological risk assessment performed for accidents and malfunctions scenario 1 and clarify if the sediment pathway to receptors post-spill was considered, as well as if SARA species were considered. | The indicated species were utilized to ensure representation of a variety of both aquatic and terrestrial species that could be affected by the release scenario to ensure relevant potential contaminant pathways were considered in the assessment, understanding however that exposure of local aquatic species was the most direct exposure pathway since Bounding Scenario 1 was a release to the aquatic environment. To clarify, the sediment pathway to receptors post-release was consider in the assessment. Also to clarify, specific SAR were not considered in the assessment; however as noted, representative aquatic and terrestrial receptors were considered that include the exposure pathways to which SAR species would also be subject and therefore the assessment and its results can be more broadly applied. | Based on the response no revisions to the EIS, nor to the A&M technical supporting document (Appendix 14-A) are needed. |
| IR-212 | HC | Human health with respect to hazardous contaminants | Section 14 (p. 14-3) Appendix 16-C (p. 14 & 15) | The follow-up plan does not sufficiently describe how various parties will be engaged in the design, implementation, and review of monitoring programs. Context: Section 14 of the EIS states that “The overarching fear of contamination from the mine is woven in to almost every other concern noted by participants in the TK study. It is worth acknowledging this concern separately given the potential for mental health impacts related to people’s experiences of fear and anxiety” (p. 14- 3). The commitment regarding monitoring and follow-up activities appears limited to “ <i>shar[ing] information in a transparent manner with the General Public, and specifically those Communities of Interest and Nearby Land Users with whom Denison is regularly engaging about the Project. Such an information-sharing program would consider the involvement of the Regulators to make sure the information available addresses the issues identified as concerns</i> ” (p. 14). Rationale: Country food safety is not regulated federally unless foods are sold commercially. Certain aspects of country food safety and availability may be covered by provincial regulators. It is unclear whether and how various levels of government and potentially affected communities would be involved in the development of the follow-up and monitoring program. It is also unclear what the information sharing program entails and how it would inform any adaptive management if monitoring results deviated from the predictions. | 1. Provide details of how local, provincial and federal authorities, and Indigenous Nations and communities will be engaged in developing the follow-up and monitoring program, including the information-sharing program. 2. Describe the steps that will be taken if there are any exceedances of established benchmarks or deviation from predictions. Suggestions for mitigation and follow-up measures: Health Canada recommends that the proponent’s plan for communicating follow-up results (environmental and country foods) aims at, among other things, responding to community concerns regarding country foods to minimize avoidance of this resource. This goes beyond a passive dissemination of information and developing a strategy based on dialogue and the direct involvement of communities in monitoring, surveillance, and risk communication activities. | We refer the reviewer to the following sections of the draft EIS, which are more applicable as it concerns engagement activities within the context of information sharing related to follow-up and monitoring compared to the sections listed in the <i>Reference to EIS, appendices, or supporting documentation</i> column of the IR: <ul style="list-style-type: none">- Draft EIS Section 1 Project Introduction and Overview. Refer to Section 1.7.5 Licensing and Permitting for text describing that the Project is proceeding through sequential EA and licensing process. While a preview of the permits, approvals, and licences required after the EA process is complete is important to consider and provides valuable context, detailed information needed to support licensing and permitting has not be included in the EIS.- Draft EIS Section 2 Project Description. Section 2.9 outlines the timing and framework for the Project’s management system.- Draft EIS Section 4 Engagement. Section 4.2 outlines Denison’s engagement approach. Section 4.7 outlines future engagement activities.- Section 11 Land and Resource Use provides a fulsome assessment of both Indigenous (Section 11.1) and other (Section 11.2) land and resource use. These assessments include the Key Indicator of <i>perceived suitability of lands and resources therein</i>. 1. The details of monitoring and follow-up plans are being developed to support the separate process of Project licensing and permitting. Engagement on licensing requirements, such as the environmental monitoring program and the associated surface water quality and monitoring regime will occur later in 2023 and into 2024. The specific means by which provincial and federal authorities, and Indigenous Nations and communities will be engaged in developing the follow-up and monitoring program, including the information-sharing program, are currently under consideration with the Denison project team. It is noted that Section 4.2.1 of the draft EIS provides the variety of ways in which Denison has engaged with Interested Parties to date and it is assumed it would continue to use these means and others that may be identified to fulfil its key corporate principals for developing positive relationships (see draft EIS Section 4.2). Denison’s plans are in line with Health Canada’s recommendations to go beyond passive dissemination of information and the intent is to solicit involvement of the Interested Parties during follow-up program development and subsequently execution. Denison is committed to sharing information with Indigenous Communities of Interest (COIs) in a mutually agreed-upon fashion. Overall, the approach that will be utilized with respect to Indigenous community engagement will be aligned with Denison’s Indigenous Peoples Policy. Denison’s Indigenous Peoples Policy commits the company to respecting Indigenous knowledge and values regarding environmental stewardship and Indigenous peoples’ connection to the land. The relevant monitoring plans for the species/resources that support a traditional diet will reflect and incorporate these values, and will be reflective of the Indigenous COIs priorities. The monitoring plans when drafted will include more detail about | No updates to the draft EIS are needed based on this IR response. |

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| | | | | | | <p>communication methods and their effectiveness would be assessed through ongoing engagement with communities.</p> <p>Denison will solicit input and involvement in program development and execution from Indigenous COIs. Environmental monitoring results will be presented in an accessible way including a focus on country food if relevant to Indigenous COIs. As the COIs with reserves and residential communities most proximal to the Project, Denison will be collaborating with English River First Nation and Kineepik Metis Local on a community-specific monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. Denison expects that surface water management and monitoring will form part of this information-sharing process. It is expected that fish species that will be monitored will be those species that have been identified as important by ERFN in their 2017 Country Foods Study, as well as using the KML Land and Occupancy Map and associated information. These programs may be adjusted based on community feedback throughout the life of the Project.</p> <p>Regulators will be involved with setting specific requirements for follow-up and monitoring, as well as reporting, through licence conditions (CNSC) and provincial approvals. A number of monitoring and reporting requirements will be generated through the completion of the environmental assessment process. Denison and its lifecycle regulators will be in regular communication throughout the life of the Project as part of routine reporting, site inspections, licence and permit renewals. Denison is committed to ongoing engagement with regulators and recognizes that this will include information sharing related to follow-up and monitoring results and any needed adaptive management plans.</p> <p>It is also noted for further reference that there are existing, non-Denison monitoring programs such as the CNSC's Independent Environmental Monitoring Program (https://nuclearsafety.gc.ca/eng/resources/maps-of-nuclear-facilities/iemp/index.cfm), and the Eastern Athabasca Regional Monitoring Program (www.earmp.ca/). Results from these programs provide relevant information and can complement Denison's Project-specific monitoring program. One forum for discussion of monitoring results is the Northern Saskatchewan Environmental Quality Committee (https://www.saskatchewan.ca/residents/first-nations-citizens/saskatchewan-first-nations-metis-and-northern-initiatives/northern-saskatchewan-environmental-quality-committee).</p> <p>2. The relevant focus for country food intake are changes in COPC concentrations. These are integrated into the CSA N288.6 framework with ongoing updates to the ERA with new monitoring results. There are very few parameters with intake guidelines where advisories would be implemented. Adaptive management triggers and conceptual triggers will be developed as the Project advances.</p> | |
| IR-213 | CNSC | Accidents and Malfunctions | Section 14.5.3 Appendix 14-A | <p>Context: The proponent states that the assessment of accidents and malfunctions began with the initial identification of hazard scenarios. Hazard scenarios were identified using a systematic approach that considered the existence of sources of hazards and initiating events for the Project in consideration of Project activities and components.</p> <p>The hazard identification was conducted to identify a comprehensive list of potential project-related accident and malfunction scenarios associated with the key project components and activities with further details provided in Appendix 14-A. The initial hazards were then screened qualitatively based on likelihood and consequence to determine overall risk level using a risk matrix approach. Bounding scenarios were then selected from this initial list of hazard scenarios.</p> <p>The results of numerical analyses (RESPEC, 2021) of detailed strip model suggest that the deformation imposed on the cemented steel casing from downward movement of the rock mass may exceed the assumed casing-strain yield limits and the failure limit locally after extracting the uranium ore. However, this potential hazard is not identified in the hazard identification.</p> <p>Rationale: Exceedance of steel casing yield limits and failure limit would either compromise the steel casing integrity or damage the steel casing and result in the leakage of injected solution, which could impact on mine operation and contaminate the surrounding groundwater.</p> | Please include the hazard of steel casing yield or damage in the table of hazard identification evaluation and conduct an initial risk screening and further detailed assessment as required. | <p>Table 3-2 of Appendix A in the A&M technical supporting document (Appendix 14-A) includes a hazard scenario "piping failure in the well field" that was characterized as a "low" likelihood scenario (Score 2) with "moderate" consequence (score 3) for an overall risk ranking of "low". This scenario is thought to generally be consistent with and cover off the scenario envisioned by the IR; nevertheless, and as recommended a new hazard scenario will be added to the hazard identification evaluation to specifically reflect the FIRT review comment.</p> <p>The new hazard scenario will be added to Table 3-2 in Appendix A of Appendix 14-A as Scenario 2.4 Well Casing Yield and/or Damage (refer to Attachment: IR-213 for the updated table). For reference, and based on hazard screening analysis, this scenario is evaluated to be a low likelihood scenario (2) with moderate consequence (score 3) for an overall risk ranking of low. The scenario is viewed as a low likelihood scenario due to the proposed multilayer design of the injection / recovery well design. Further, and contrary to the comment, we do not believe the RESPEC (2021) analysis shows an increased likelihood of subsidence that could be an initiating event to a pipe casing failure; rather, anything more than very minor ground subsidence in the well field is interpreted as a very low probability event. Potential subsidence and the analysis thereof is discussed in more detail in response to IR-21 and the reviewer is referred to that response for further information.</p> <p>The scenario is viewed as one having moderate consequence. Despite the fact the scenario would result in a temporary loss of control of mining solution associated with one or a limited number of injection/recovery wells the volume of solution would be limited to the volume of solution in the pipe(s) and the release would occur within the freeze wall where it would be contained limiting the spatial extent of effects and increasing the likelihood of success of recovery.</p> <p>Overall, and based on the screening methodology used for the hazard identification / screening process this scenario has been ranked as having a moderate level of risk and as a result would not be passed on for more detailed analyses in the accidents and malfunctions analysis.</p> | <p>Based on the response, revisions to Appendix 14-A and the draft EIS are needed.</p> <p>With respect to Appendix 14-A the following is noted. The new hazard scenario will be added to Table 3-2 in Appendix A of Appendix 14-A as shown in Attachment: IR-213. In addition, editorial changes to the report reflecting the increase of one additional hazard scenario being evaluated will be made (Section 4.0; " ... a total of 69 70 hazard scenarios were identified and evaluated.") and indicating an increase of one further scenario being characterized as having low overall risk (Section 4.0; "The balance of the scenarios evaluated, 41 42, were characterized as low-risk scenarios, ...").</p> <p>With respect to the EIS, editorial changes will be made in Section 14.5.5 to reflect the editorial changes highlighted above.</p> |
| IR-214 | CNSC | Accidents and Malfunctions | Section 14.5.3 Appendix 14-A, section 3.2.3 | <p>Context: Hazard scenarios were identified using a systematic approach that considered the existence of sources of hazards and initiating events for the Project in consideration of Project activities and components. Details for how each of these project components and activities are considered in the initial hazard scenario identification process are provided in the accidents and malfunctions TSD (see Appendix 14-A; Ecometrix 2022).</p> <p>However, in Table 3-1 to Table 3-14 in Appendix A of Appendix 14-A, the following inconsistencies were identified:</p> <p>i. consequences for the hazards ID# 1.1, 1.5, 1.7, 14.2 include occupational major injuries; however, the severity (S) is</p> | Please clarify or correct all inconsistent and/or inaccurate information in Tables 3-1 to 3-14 in Appendix A of Appendix 14-A. | <p>The clarifications identified by the review comment will be revised in the final version of the Appendix 14-A as recommended. Revisions to Appendix 14-A that also translate to revisions in the draft EIS will be made for consistency.</p> <p>For reference, the proposed revisions to Appendix 14-A are shown in Attachment IR-214 and include editorial changes to Tables 3-1 to 3-14, as appropriate. The tables are annotated with comments in Attachment IR-214 for transparency. Comments include rationale for likelihood or consequence scoring where requested by the IR.</p> <p>It is noted that the revisions highlighted do not affect the outcome of the screening evaluation and do not necessitate consideration of additional bounding scenarios by way or more detailed analyses.</p> | <p>Based on the response, revisions to Appendix 14-A and the draft EIS are needed.</p> <p>As noted, the clarifications identified by the review comment will be revised in the final version of the Appendix 14-A as recommended. The proposed revisions are shown in Attachment IR-214 and include editorial changes to Tables 3-1 to 3-14, as appropriate. The tables are annotated with comments in Attachment IR-214 for clarity to support IR response review.</p> |

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| | | | | <p>denoted as number 2 that appears to be inconsistent with consequence rating number in Figure 14.5-2</p> <p>ii. Hazard ID# 1.5 has a L=2, but it is described as a highly unlikely event, which is inconsistent with the term in Figure 14.5-2</p> <p>iii. Hazards ID# 3.6 and 3.7 have a L=1, but they are described as low probability event that is inconsistent with the term in Figure 14.5-2</p> <p>iv. Hazards ID# 8.2, 8.3, 9.1, 10.1 to 10.5, 11.1, 11.5 have a L=1, but they are described as unlikely events, which are inconsistent with the term in Figure 14.5-2. Rationale needs to be provided how stockpile erosion is considered to have a L=1</p> <p>v. Hazard ID# 12.1 has a L=2 and S=3, but it's risk ranking is moderate, which is inconsistent with the term in Figure 14.5-2</p> <p>vi. Hazard ID# 13.3 has a L=2. Based on the operation experience in the similar projects in the northern Saskatchewan, ponds lining failure and leakage is a very likely event. Rationale needs to be provided to support L=2 or change the number for L.</p> <p>Rationale: Inconsistent or inaccurate/incorrect information was included in Accidents and Malfunctions assessment.</p> | | | <p>Revisions to Appendix 14-A that also translate to revisions in the draft EIS will be made for consistency. Specifically, the revisions identified in the tables will be reflected in changes to the text of Section 14.5.5 of the EIS describing the outcome of the screening process (including revision to Figure 14.5-3). Section 14.5.5 of the EIS will read as follows:</p> <p>“A summary outlining the results of the initial risk screening of accident and malfunction scenarios is provided in this subsection and summarized in Figure 14.5 3.</p> <p>Three of the hazard scenarios characterized as high risk were recommended for further assessment. An additional four moderate/ALARP-moderate scenarios were identified as requiring further detailed assessment for more accurate characterization of risk.</p> <p>Twenty-one of the scenarios evaluated were characterized as moderate-risk scenarios. Generally, the moderate-risk scenarios were deemed to represent a tolerable level of risk in consideration of proposed safeguards and design features that reduce the risk level to ALARP. As previously mentioned, four moderate/ALARP-moderate scenarios require additional detailed assessment for more accurate characterization of risk. The four moderate-risk scenarios that are subsequently assessed in more detail are associated with a contaminant release to the environment, which may have potential effects that are more far reaching than can adequately be assessed by the screening assessment. As such, a more quantitative evaluation was deemed appropriate.</p> <p>The remaining scenarios evaluated (44) were characterized as low-risk scenarios based on low likelihood of occurrence and/or low consequence in consideration of planned existing safeguards and design features. Low-risk scenarios were not carried forward for more detailed analysis as they were considered to be adequately characterized by the screening process.</p>  <p>Figure 14.5-3: Summary – Initial Screening of Accident and Malfunction Scenarios”</p> |
| IR-215 | CNSC | Human health with respect to hazardous contaminants | Section 14.6 | <p>Context: One of the potential risks of a uranium mine and mill is a spill of untreated effluent.</p> <p>Rationale: In the EIS, it doesn’t appear that the scenario of a spill of untreated effluent to the environment has been considered.</p> <p>A failure of the piping containing the untreated effluent could result in an uncontrolled release to the environment and could affect the groundwater, soil quality, and terrestrial biota.</p> | Please evaluate and provide the results for a bounding scenario of a spill of untreated effluent or provide justification for its exclusion. | The scenario envisioned in the IR has in fact been considered in the hazard screening process (Appendix 14-A) and based on that process the scenario was not passed on for more detailed analysis as a Bounding Scenario. More specifically, Table 3-12, Appendix 14-A, considers accident and malfunction scenarios associated with the wastewater treatment system, including equipment and piping failures, effluent clarifier overflows and equipment and control system failures. The overall risk ranking associated with these scenarios were ALARP-moderate, ALARP-moderate and low, respectively, in consideration of likelihood and consequence and design safeguards and features (i.e., mitigations). Per the evaluation methodology outlined in Appendix 14-A and EIS Section 14, these scenarios were not carried forward for further detailed assessment as they do not meet the threshold for such detailed analyses. | Based on the response no revisions to the EIS, nor to the A&M technical supporting document (Appendix 14-A) are needed. |
| IR-216 | CNSC | Human Health with respect to radiation exposure | Section 14.6.1 Section 14.6.7 Appendix 14-A | <p>Context: Radiological doses to human receptors, including workers (i.e., driver(s) of the vehicles), from the Bounding Scenarios 1 (Vehicle Accident Including Rollover, Collision, Run Off Road) and 7 (Vehicle Accident Including Rollover, Collision, Run Off Road) have not been assessed.</p> <p>Rationale: An estimate of the effective doses to human receptors, including workers, are required to determine whether the expected doses meet the dose limits set out in the Radiation Protection Regulations.</p> | Provide estimates (including calculations) of the potential radiological doses to human receptors, including workers, resulting from Bounding Scenarios 1 and 7. | <p>While it is understood that potential radiological doses to human receptors are an important consideration for operations such as that proposed by the Project, issues related to worker health are beyond the scope of the Accident and Malfunctions Assessment (Appendix 14-A), which focuses on environmental receptors. Worker health, including the issue raised by the review comment, will be addressed independently and part of the licensing process as required. This is why chemical toxicity was selected as the basis for the assessment of risk in this case.</p> <p>With specific regard to public risk the following is noted. Radiological risk was not considered an appropriate pathway of exposure in these scenarios since there is little chance of exposure to members of the public. As noted above, chemical toxicity was selected as the basis for the assessment of risk in this case since it is the relevant exposure pathway for these scenarios.</p> | Based on the response no revisions to the EIS, nor to the A&M technical supporting document (Appendix 14-A) are needed. |

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| IR-217 | CNSC | Accidents and Malfunctions | Sections 14.6.1 and 14.6.2 | <p>Context: Highway 914 crosses the Wheeler River 10 km southwest of the access road junction. A vehicle accident, including a rollover, collision, or run off road, at or near the bridge could potentially result in a release of uranium concentrate and release of fuels and chemicals into the surface water at this location. Denison believes that a release of uranium concentrate and a release of fuels and chemicals at this location would bound the releases at any other water crossing along the transportation corridor. However, no information on what other water crossings along the transportation corridor exist and how bounding scenarios 1 and 2 would bound the risk of releasing uranium concentrate and fuels and chemicals at other crossings.</p> <p>Rationale: The release of uranium concentrate and fuels and chemicals at water crossings would contaminate the water body at the crossings and pose a risk to the environment and public health.</p> | Please provide information on all water crossings along the transportation corridor and justification why bounding scenarios 1 and 2 would bound the effects of the accidental releases of uranium concentrate and fuels and chemicals at these crossings. | <p>As recommended by the reviewer a review of water crossings associated with the transportation route have been identified. This information is provided in a technical memorandum that accompanies this IR response/disposition table (please see Attachment IR-217). For reference, the analysis considers Hwy 914 south from the project site to its junction with Hwy 165. Hwy 165 was further considered east to Hwy 2 and west to Hwy 155. The information in the technical memorandum will be added to Appendix 14-A during preparation of the Final EIS.</p> <p>As noted by the reviewer, the potential aquatic environment release scenarios focused on the Wheeler River crossing location. This location was chosen as it represents an important location to resource users in the study area. The scenarios provide examples of the consequences of such releases to local receptors. That is, the results of the assessment of the releases at this location would be expected to be representative of crossings along the transport route since the key endpoint in the assessment is overall risk, as defined for the assessment process as probability multiplied by consequence. For reference, the crossing analysis reference above and presented in the technical memorandum has identified in excess of 100 water crossings along the transportation route as described. It is not practical to assess each of these crossings. While the specific conditions at these crossings may differ in size or nature, the results of the analysis presented can generally be applied more broadly as indicated above. The approach used is consistent with past practice for comparable assessments for uranium projects in the province.</p> | Based on the response, revisions to Appendix 14-A are needed. Specifically, the technical memorandum provided as Attachment IR-217 will be added in its entirety as an appendix (Appendix B) to technical supporting document Appendix 14-A. |
| IR-218 | CNSC | Accidents and Malfunctions | Sections 14.6.1.1 and 14.6.1.4 | <p>Context: Table 14.6-1 indicates that the average flow of Wheeler River south of Russel Lake is 17,340 L/s or 17.34 m³/s. This rate is used for uranium dissolution rate calculation. However, in section 14.6.1.4, it states that the average annual flow is 24.3 m³/s. In Table 14.6-3, the last two rows appear to be added wrongly.</p> <p>It also states that sediment quality results are shown in Table 14.6-5 for post-remediation conditions. During minimum flow conditions, the affected volume is expected to be smaller, resulting in a higher sediment concentration. In comparison, higher flow conditions are expected to result in a greater footprint and lower concentrations. However, in Table 14.6-5, the average sediments concentration and porewater concentration appear to be incorrect and switched between average flow and maximum flow.</p> <p>Rationale: Inconsistent/inaccurate information provided in the EIS.</p> | Please clarify and correct the inconsistent information on average flow rate of Wheeler River at the crossing and incorrect information in Table 14.6-3, and average sediment concentration and porewater concentration under average and maximum flow conditions in Table 14.6-5. | Acknowledged. The transcription errors identified will be corrected in the final EIS as recommended. Refer to Attachment IR-218 for revised Table 14.6-5 and Table 8-5. | <p>Based on the response, revisions to the EIS Appendix 14-A are needed. Specifically, revision to the transcription errors noted will be provided, as follows:</p> <p><u>Revisions to Section 14:</u></p> <ul style="list-style-type: none">- The last two rows of Table 14.6-3 will be removed.- From Section 14.6.4.1, second to last sentence in first paragraph, “The flow rates considered for this assessment were 5th percentile annual flows of 10.9 m³/s (minimum flow), the average annual flow of 24.3 17.3 m³/s (average flow), and the 95th percentile annual flow of 24.67 m³/s (maximum flow).”- Table 14.6-5 to be revised as shown in Attachment IR-218. <p><u>Revisions to Appendix 14-A:</u></p> <ul style="list-style-type: none">- From Section 8.1, second to last sentence in first paragraph, “The rivers flows considered for this assessment are 5th percentile annual flow of 10.9 m³/s (minimum flow), the average annual flow of 24.3 m³/s (average flow), and the 95th percentile annual flow of 24.67 m³/s (maximum flow).”- Table 8-5 to be revised shown in Attachment IR-218. |
| IR-219 | CNSC | Accidents and Malfunctions | Sections 14.6.1.1.1 and 14.6.1.4.1; Sections 5.1.1 and 8.1 of Appendix 14-A | <p>Context: When assessing the release characterization of Bounding Scenario 1, the proponent assumed that 95% of the released uranium concentrate can be recovered from the release location without sufficient justification, and that different water column depths, i.e., 10 cm and 5 cm, and average water depth of 1.2 m at the release location were used without explanation.</p> <p>Rationale: As the recovery rate of the uranium concentrate would have an impact on the assessment of its potential effects, it is necessary to understand how the recovery rate and water level were selected for assessing this bounding scenario.</p> | Provide further rationale for assuming 95% recovery rate and for using different water column depths for uranium concentrate release characterization. | <p>The rationale for the 95% recovery is explored in Section 8.1 of Appendix 14-A where the hypothetical uranium concentrate release is examined. The density of uranium concentrate particles is high (8.3 g/cm³) and settling of these particles in the aquatic environment is expected to be rapid (USDOE 2001). As such the concentrate is not expected to be transported far from the incident/release location. Figure 8-2 from Appendix 14-A shows the modeled distribution of deposited uranium concentrate from the release location under different flow scenarios and is reproduced below for reference. As can be seen in the figure most (>95%) of the mass of the uranium concentrate would settle within a short distance of the release, even under high flow conditions. This indicates that the hypothetical release would be confined to a small area.</p> <p>Given the relatively small area affected it is reasonable to assume that the affected area can be successfully remediated and that there would be a very high level of uranium recovery.</p> <p>For these reasons, it is believed the 95% recovery rate is a reasonable assumption.</p> <p><u>Reference</u> USDOE (United States Department of Energy). 2001. Characteristics of Uranium and Its Compounds. U.S. Department of Energy, Office of Environmental Management, Depleted Uranium Hexafluoride Management Program, Fall 2001. https://web.evs.anl.gov/uranium/pdf/UraniumCharacteristicsFS.PDF</p> | Based on the response no revisions to the EIS, nor to the A&M technical supporting document (Appendix 14-A) are needed. |
| IR-220 | CNSC | Accidents and Malfunctions | Section 14.6.1.1.1 Appendix 14-A, Section 5.1.1 | <p>Context: The proponent states that based on drum deformations performed in a previous analysis (McSweeney et al. 2004), if a drum experienced a crush force of 100,000 lbs., then the deformation of the drum would cause the lid to detach from the drum. Using this drum failure mechanism, and assuming the drums weigh 450 kg and are arranged four across in the truck, at a speed of 48 km/h, the front 25% of the drums would fail, at 60 km/h to 97 km/h 55% would fail, at 145 km/h 75% would fail, and at ≥193 km/h all would fail. Given that the</p> | Please provide information and/or rationale as to whether drum stacking would impact drum failure at different speeds and confirm whether 55% drum fail for such an accident is still valid. | <p>While the review comment correctly indicates that drum stacking would impact drum failure, Denison will not stack drums for shipment and the analysis has been completed based on that assumption. The assumption is supported given that the trucks that will be used for transport are 26 ft long by 10 ft wide and can accommodate 13 rows of drums with 5 drums per row for 2 ft diameter drums. As noted in the draft EIS and Appendix 14-A it is anticipated that 40 drums would be shipped from the site per day.</p> | Based on the response no revisions to the EIS, nor to the A&M technical supporting document (Appendix 14-A) are needed. |

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| | | | | <p>speed of the truck is likely between 60 km/h to 97 km/h, it was concluded that less than 55% of the drums would fail upon a traffic accident scenario.</p> <p>It is assumed to be 40 drums per shipment, so some stacking or rows of drums should be expected in this scenario. The drums stacked above could be at greater risk of deformation in a traffic accident. It is not clear whether drums stacking was considered in the previous study cited by the proponent and whether less than 55% fail is still an adequate percentage of drum failures in such traffic accident scenarios if drums stacking is needed.</p> <p>Rationale: Drum failure percentage will impact the release quantity of uranium in such an accident scenario and then impact the consequence assessment. Therefore, the drum failure should be adequately assessed and supported with sufficient information and justification.</p> | | <p>For further reference, the following is also noted with respect to the McSweeney et al. (2004) document on which the drum failure mode is based. The document discusses the most common failure mode of the top of the drum coming off - that is, for the scenario assessed in the A&M evaluation 55% of the drum lids are assumed to fail (come off) at truck speeds between 60 and 97 km/h. Conservatively the analysis assumed that all of the contents of these drums would be released to the environment, though this is not likely to be the case.</p> <p>References: McSweeney, T. I., S. J. Maheras, and S. B. Ross. 2004. Radioactive Materials Transport Accident Analysis. Proceedings of 14th International Symposium on the Packaging and Transportation of Radioactive Materials (PATRAM 2004). Berlin, Germany, September 20–24, 2004. Paper #274.</p> | |
| IR-221 | CNSC | Accidents and Malfunctions | Section 14.6.1.3, Appendix 14-A, Section 7.1 | <p>Context: It is projected that there would be about 100 drums packaged per mill operating day. One trip per day for 330 days per year is assumed for the probability evaluation. This means 100 drums per trip, which is inconsistent with description in section 14.6.1.1.1 where assuming 40 drums in one shipment per day.</p> <p>Rationale: Shipments per day will impact the probability evaluation, and number of drums per trip will impact the release of uranium during an accident.</p> | Please clarify the number of shipments per day and number of drums per shipment that are expected and re-calculate the probability as necessary. | <p>In Section 7.1 of Appendix 14-A and Section 14.6.1.3 its states that there would be approximately 100 drums packaged per mill operating day. This was incorrectly stated in both Appendix 14-A and Section 14 of the draft EIS.</p> <p>As noted elsewhere in Project documentation there will be 40 drums packaged per day and Denison has confirmed this number.</p> <p>The 40 drums per day can be transported in one shipment per day and therefore the calculation of probability that has assumed one trip per day is correct and need not be revised.</p> <p>The text of Appendix 14-A and the EIS will be revised accordingly.</p> | <p>Based on the response, revisions to the EIS Appendix 14-A are needed. Specifically, revision to the number of drums of uranium concentrate that will be package per day (40 and not 100) will be provided.</p> <p>The revision to Appendix 14-A, Section 7.1 would be as follows: "In the case of the accident scenario envisioned, calcined uranium concentrate would be packed into standard 205 L (45 gal) steel drums for shipping. It is projected that there would be about 40 100 drums packaged per mill operating day (Wheeler River project description documentation). It was also assumed that a traffic accident on the bridge or within 40 m from either side of the bridge has the potential for release to the Wheeler River.</p> <p>The revision to the Section 14.6.1.3 of the EIS would be as follows: "In the case of the accident scenario envisioned, UOC would be packed into standard 205 L (45 gal) steel drums for shipping. It is projected that there would be approximately 40 100 drums packaged per mill operating day (Denison 2019). It was also assumed that a traffic accident on the bridge, or within 40 m of either side of the bridge, would have the potential for release to the Wheeler River."</p> |
| IR-222 | CNSC | Accidents and Malfunctions | Section 14.6.2.4 | <p>Context: Bounding Scenario 2 consists of the aquatic release of fuel and hazardous chemicals due to traffic accidents. The EIS states that amongst the fuels considered for this scenario, the consequences of the release of gasoline and solvents are bounded by the consequences associated with the release of diesel. Both gasoline and solvents are lighter with higher vapour pressure; therefore, they have a shorter half-life in the aquatic environment and a lesser tendency for adsorption to sediments and suspended solids in the water column. There is no other justification provided to show that the release of diesel can bound other chemicals such as sulfuric acid and sodium hydroxide that are heavier than diesel.</p> <p>Rationale: The release of either sulfuric acid or sodium hydroxide during accident could change the water PH significantly at the releasing location, which would post a negative impact on the local environment.</p> | Please provide further justification that the consequences of the release of sulfuric acid and sodium hydroxide can be bounded by the consequences associated with the release of diesel. | <p>Strictly speaking the review comment is correct in that the release of organic chemicals, including fuel does not bound the non-organic chemicals such as acids or bases and this will be clarified for context in the final EIS as well as Appendix 14-A for clarity.</p> <p>The following is noted however and provides rationale the release of fuel (diesel) was carried forward for more detailed analysis. Through the hazard identification process (see Appendix 14-A Section 3.0 and Appendix A), the overall risk of the release of acids and bases was characterized as "moderate" and "ALARP" and as such consistent with the A&M assessment methodology was not carried forward further evaluation. Rather, since the release of organic compounds (such as diesel) would have the potential for downstream transport as a compound in distinct liquid phase from that of the water in the receiving environment. In this sense it produces a greater challenge of potential contamination over a larger spatial extent and timespan than the release of acid, while coincidentally necessitates the need for / opportunity for proactive response and clean-up. In contrast, the released acids and bases dissolve in water relatively quickly and effects to local biota can be expected to be experienced on a more local basis and over a shorter timeframe. There is little likely mitigation that can be applied in that scenario and therefore, the risk mitigation measures are limited to those that prevent accidents or reduce the probability to ALARP as mentioned in the draft EIS and Appendix 14-A.</p> | <p>Based on the response, revisions to the EIS Appendix 14-A are needed. Specifically, clarity around the choice to carry the diesel releases as opposed to the release of acid will be provided. The following will be added to Section 8.2 of Appendix 14-A, <i>"For the purpose of assessing the potential effects on the aquatic environment from a release of fuels and hazardous chemicals, as described in Section 5.2, the release of diesel fuel was chosen as a representative scenario, rather than other chemical such as acids and bases. Through the hazard identification screening process (see Appendix A), the overall risk of the release of acids and bases was characterized as "moderate" and "ALARP" and as such consistent with the scenario screening assessment methodology was not carried forward further evaluation. Rather, since the release of organic compounds (such as diesel) would have the potential for downstream transport as a compound in distinct liquid phase from that of the water in the receiving environment. In this sense it produces a greater challenge of potential contamination over a larger spatial extent and timespan than the release of acid, while coincidentally necessitates the need for / opportunity for proactive response and clean-up. In contrast, the released acids and bases dissolve in water relatively quickly and effects to local biota can be expected to be experienced on a more local basis and over a shorter timeframe. There is little likely mitigation that can be applied in that scenario and therefore, the risk mitigation measures are limited to those that prevent accidents or reduce the probability to ALARP."</i></p> |
| IR-223 | CNSC | Accidents and Malfunctions | Section 14.6.4.1 | <p>Context: The EIS states that the 3D strip numerical model predicted that stresses and displacements did not show instability in the altered</p> | Please provide information on the stresses and displacements/deformation of the area northeast of the | Additional conservative modelling scenarios were run which determined that for altered sandstone properties, both ore zone and immediately surrounding rock is marginally stable | No updates to the EIS in response to this IR. |

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| | | | Appendix 7-A, Appendix K | <p>sandstone or basement rock at the location where a freeze wall would be placed around the Phoenix Deposit boundary (RESPEC 2021). The potential damage to the freeze wall due to mine-induced stresses and displacements under this scenario is excluded.</p> <p>Rationale: One outer section of the freeze wall (i.e., north-east freeze wall of the phase 4 mining area) and some internal cross walls are located in the desilicified zone. The RESPEC 2021 report (i.e., Appendix K of Appendix 7-A) appears not to have included the desilicified zone in the geomechanical modeling, nor is provided the stresses and the displacements/deformation of the area northeast of the phase 4 ore body where a significant extent of the desilicified zone exists.</p> | <p>phase 4 ore body from the geomechanical studies to demonstrate the resulted stresses and displacements will not impact on the freeze wall integrity after IRs for geomechanical studies for ore extraction are addressed.</p> <p>Technical Discussion Required: Yes</p> | <p>(1.0 < factor of safety [FS] < 1.25), and no-failure conditions are apparent (RESPEC 2023; included here as Attachment: IR-21). The predicted surface displacement is negligible at approximately 2.4 to 2.8 mm. For desilicified sandstone properties, failure conditions are predicted in 12.6 % of the modeled desilicified sandstone volume, which is located within 20 – 35 meters of the ore zone. The updated results are considered negligible by the author. Notable observations from modelling include that based upon the geological model of the Phoenix deposit, the volume of the desilicified sandstone is approximately 4% of the volume of altered sandstone. Approximately 0.05% volume of altered sandstone is desilicified sandstone that is located immediately above the low-grade ore zone.</p> <p>Freeze walls, when fully developed, are capable of withstanding significant external pressures because the ice in the pore voids greatly improves the bulk strength of the soil. For example, in the province of Saskatchewan ground freezing is used to support the sinking of deep potash mine shafts which must penetrate through the Mannville formation at a depth between 400 and 500 m below surface. The Mannville formation is often described as saturated, unconsolidated beach sand and it would not support shaft excavation in a thawed state. Freezing is used to create a structural and impermeable wall up to 5m thick which can resist a stress gradient driven by full hydrostatic and/or lithostatic pressures on the outside of the wall, and an open to atmosphere excavation within the shaft. This loading condition is much more extreme than any condition the freeze walls at the Phoenix deposit will experience because there is no mechanism in the ISR process to create a zero stress “atmospheric” state on the ore side of the freeze wall. While freeze walls are very strong when fully developed, they are also plastic in nature. This means that they can slowly deform without failing in response to localized ground deformations. As the freeze wall deforms towards a lower stress zone, it maintains its thickness and integrity. While the above example referred to potash shafts, other examples can be drawn from the experience at the McArthur River or Cigar Lake uranium mines. NGL is very familiar with both projects as the author of this memorandum was the responsible engineer for the initial freeze designs and oversight at both mines. At McArthur River, open stopes are generated directly adjacent to a freeze wall that is a nominal 4 m thick. At Cigar Lake, open mine cavities 10 m high and several meters in diameter commonly exist within the frozen ground. Neither site has had a breach of the freeze wall during mining activity. Given that the freeze wall at Denison will be much thicker than at McArthur River and that it is located up to 25 m from the ore zone, it is not anticipated that it will be exposed to a stress environment that will put it at risk.</p> | |
| IR-224 | CNSC | Human Health with respect to radiation exposure | Section 14.6.5.4 Appendix 14-A | <p>Context: For the Bounding Scenario 5 (Process System and Piping Failure), doses to receptors at distances of 100 and 500 metres (0.25 and 0.01 mSv respectively) are predicted. The assessment also indicated that the dose to the unprotected worker staying inside the processing plant during the spill could exceed the 50 mSv dose limit specified by CNSC if workers did not leave the area quickly after the spill.</p> <p>The proponent did not provide the dose calculations for deriving the dose estimates.</p> <p>Rationale: The method used to estimate effective, equivalent, and committed dose is required to be verified. Sample dose calculations should be included, to confirm use of acceptable input data.</p> | <p>Provide the dose calculations for deriving the dose estimates for workers and members of the public for Bounding Scenario 5 (Process System and Piping Failure).</p> | <p>As noted in Appendix 14-A (see Section 5.5, 8.5) and the draft EIS (see Section 14.6.5) the dose calculations presented for Bounding Scenario 5 are based on scenarios presented in the US Nuclear Regulatory Commission (NRC) issued Generic Environmental Impact Statement (GEIS) for In-Situ Leach Uranium Milling Facilities (US NRC 2009). In the GEIS, the potential environmental effects from the postulated accidents involving the operation of in situ recovery facilities located in four geographic regions of the western United States were assessed. One of the scenarios assessed involved the release of radon from failed or leaked thickener. The assessment assumed 20% of the contents of the thickener was released inside the processing building (US NRC 2009). Typical radon concentrations in circulating lixiviant range from 300 to 7,000 Bq/L (Brown 2008). The GEIS used a concentration of approximately 4,000 Bq/L for its assessment and this is in the range of activity of radon that is expected in lixiviant before entering the processing building.</p> <p>For transparency, a hyperlink to the US NRC document is as follows: https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1910/index.html The reviewer is directed to Chapter 4, Section 4.2.11.2.2 Radiological Impacts to Public and Occupational Health and Safety From Accidents for further reference.</p> <p>References Brown, S. 2008. The New Generation of Uranium In Situ Recovery Facilities: Design Improvements Should Reduce Radiological Impacts Relative to First Generation Uranium Solution Mining Plants, WM 08 Conference, February 25 – March 1, 2008, Phoenix, AZ Abstract #8414. US NRC (United States Nuclear Regulatory Commission). 2009. Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities. Final Report. NUREG-1910, Vol. 1</p> | <p>Based on the response no revisions to the EIS, nor to the A&M technical supporting document (Appendix 14-A) are needed. As noted, a hyperlink to the US NRC document is as follows: https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1910/index.html and the reviewer is directed to Chapter 4, Section 4.2.11.2.2 Radiological Impacts to Public and Occupational Health and Safety From Accidents for further reference.</p> |
| IR-225 | CNSC | Human Health with respect to radiation exposure | Section 14.6.5.4 Appendix 14-A | <p>Context: With the Bounding Scenario 5 (Process System and Piping Failure), the proponent states that Denison ensures that the process is designed to include control measures to reduce the exposure to both workers and members of the public as low as achievable. The measures would ensure that the processing plant is adequately ventilated, and that spills or leaks are detected by loss of system pressure, observation, or flow imbalance.</p> <p>It is not indicated where these additional measures have been detailed/elaborated within the EIS.</p> <p>Rationale: Control measures to reduce the exposure to both workers and members of the public as low as achievable, that are identified in the assessment of Bounding Scenario 5, must be formally documented to ensure that they are carried over into the engineered design of the processing plant.</p> | <p>Provide details on how the control measures to reduce the exposure to both workers and members of the public, identified in the assessment of Bounding Scenario 5, have been formally documented and incorporated in the engineered design of the processing facility.</p> | <p>As highlighted in the hazard identification section of the A&M technical supporting document (Appendix 14-A) the control measures to reduce exposure to workers and the public in relation to Bounding Scenario 5 include:</p> <ul style="list-style-type: none">• Development and implementation of the Occupational Health and Safety Program, including specific plans, procedures and PPE that would protect workers, in particular from the exposures envisioned by Bounding Scenario 5.• Development and implementation of the Emergency Response Plan which includes the procedures for the chemical spill emergencies.• Personnel training and orientation for related to spill response and management• Inspection and maintenance of the equipment and process components to ensure their integrity and reliability. This will aim to lower the probability of such events.• Building ventilation to maintain the workplace air quality.• Ambient air monitoring for post-accident assessment. <p>Where programs, plans and procedures are referenced above, such documentation is in the process of being developed as part of Project-related licensing and would be available for review and acceptance by the CNSC as part of that process.</p> <p>In addition to the control measures noted above, the design criteria considered for the EA included</p> <ul style="list-style-type: none">• Equipment Shielding• Reducing time near facilities• Increasing distance in elevate zones | <p>Based on the response no revisions to the EIS, nor to the A&M technical supporting document (Appendix 14-A) are needed.</p> |

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| | | | | | | <ul style="list-style-type: none">Control systems with safe shut down interlock <p>Denison has recently completed feasibility designs for the Project in 2023 and has incorporated design for safety principles (DFS), including: Eliminate – Remove hazardous materials, processes and activities. Minimize – Use smaller quantities of hazardous substances, minimize the number of hazardous activities or process / equipment items. Substitute – Replace a hazardous material with one that is less hazardous, substitute a hazardous activity for one that is less hazardous. Moderate – Minimize the impact of a release of hazardous material or energy, by changing the layout, adopting less hazardous operating conditions or a less hazardous form of a material, facilities, or by reducing the number of people exposed. Simplify – Design facilities to eliminate unnecessary complexity, thus minimizing causes of hazards and human errors.</p> <p>While DFS is often applied to process design and process safety hazards, it can be applied to design in general and in areas other than design. Examples of DSF principles include:</p> <ul style="list-style-type: none">manning philosophies – minimize the number of staff required for operations and maintenance, during construction, installation and hook-up and/or commissioningprocess design – maximize simplicity of plant, maximize use of technology and equipment that is environmentally friendly, minimize hydrocarbon inventories, moderate operating conditions, minimize leak potential, maximize integrity of containment envelope from internal to external in-design effects and accidental loads. <p>Detailed design to support Project licensing and permitting will begin later in the year. Any engineering design control measures identified in Bounding Scenario 5 will be included in the detailed design and will be provided for acceptance by the CNSC during Project licensing.</p> | |
| IR-226 | CNSC | Accidents and Malfunctions | Sections 14.6.6.1 and 14.6.6.4 | <p>Context: It is stated that in the case of the accident and for a release amount of 1 kg inside the processing plant, the dose to offsite receptors at 200 m from the project site was calculated to be less than the CNSC public dose limit of 1 mSv. The analysis also indicated that the dose to a worker in a full-face-piece powered air-purifying respirator who stays in the area would be 88 mSv, which exceeds the annual worker dose limit of 50 mSv.</p> <p>Rationale: Section 14.6.6.1 indicates that 2 kg of uranium concentrate could be released in case of the accident. No rationale is provided why 1 kg rather than 2 kg uranium concentrate is used for dose calculation. If 2 kg is used as the source term, the dose to offsite receptors at 200m and workers in the area would be higher.</p> | Please provide the rationale for using a source term of 1 kg rather than 2 kg of uranium concentrate for the dose calculation to offsite receptors and workers. If sufficient rationale cannot be provided, the doses to offsite receptors and workers should be recalculated using 2 kg uranium concentrate, and the results provide. | The rationale for the 1 kg source term is provided in Section 5.6 of Appendix 14-A. The 2 kg source term was calculated but as noted was thought to be an overly conservative value based on the conservatism layered upon conservatism. The professional decision was made to use the source term of 1 kg consistent with the referenced 2009 US NRC study as a more realistic but still conservative value. | Based on the response no revisions to the EIS, nor to the A&M technical supporting document (Appendix 14-A) are needed. |
| IR-227 | CNSC | Accidents and Malfunctions | Section 14.6.6.1.1 | <p>Context: Bounding Scenario 6 involves a fire and/or explosion within the processing plant, resulting in the release of a large amount uranium to the atmosphere. The airborne source term for this scenario is estimated with equation developed by the United States Department of Energy (USDOE), where the respirable faction is assumed to only include particles of 10 mm and smaller.</p> <p>Rationale: No rationale was provided to support the consideration of only 10 mm and smaller particles. As provided in Table 14.6-3, the particle size of uranium <15 mm is less than 20%. Majority of the uranium particle size is larger than 10 mm. The airborne source term is an important factor for the effects assessment and should be calculated with transparent and justified information/data.</p> | Provide rationale for only considering 10 mm and smaller particles for the respirable fraction. | <p>Note that the assessment in Appendix 14-A assumed a particle size of 10 µm, not 10 mm as stated by the reviewer.</p> <p>As noted in Appendix 14-A (Section 5.6) a 10 micron diameter particle size (or smaller) is a commonly assumed size fraction as a respirable/inhalable particle and is referenced by various organizations as such US EPA (see https://www.epa.gov/pm-pollution/particulate-matter-pm-basics).</p> <p>Uranium particles emitted from the fire would be secondary particles or aerosols that are formed during the fire. In most cases these aerosols are sub-micron in size. In consideration of this, the 10 micron diameter assumption is conservative assumption since it essentially contemplates that that all the particles are therefore respirable. Moreover, as noted in Section 5.6 of Appendix 14-A the value “1” has been used for the respirable fraction (RF) to develop the exposure source term. This again is conservative because it assumes that all the uranium content formed as particles are respirable.</p> | Based on the response no revisions to the EIS, nor to the A&M technical supporting document (Appendix 14-A) are needed. |
| IR-228 | CNSC | Human Health with respect to radiation exposure | Section 14.6.6.4 Appendix 14-A | <p>Context: For the Bounding Scenario 6 (Facility Fire and/or Explosion), the predicted dose is less than 1 mSv to a member of the public 200 metres away from the project site. The analysis also indicated that the dose to a worker in a full-face powered air-purifying respirator who stays in the area would be 88 mSv, which exceeds the annual worker dose limit of 50 mSv.</p> <p>The proponent did not provide the dose calculations for deriving the dose estimates.</p> <p>Rationale: The method used to estimate effective, equivalent, and committed dose is required to be verified. Sample dose calculations should be included, to confirm use of acceptable input data.</p> | Provide the dose calculations for deriving the dose estimates for workers and members of the public for Bounding Scenario 6 (Facility Fire and/or Explosion). | <p>As noted in Appendix 14-A (see Section 5.6, 8.6) and the draft EIS (see Section 14.6.6) the dose calculations presented for Bounding Scenario 6 are based on scenarios presented in the US Nuclear Regulatory Commission (NRC) issued Generic Environmental Impact Statement (GEIS) for In-Situ Leach Uranium Milling Facilities (US NRC 2009) and the dose calculations are presented therein. In the GEIS, the potential environmental effects from the postulated accidents involving the operation of in situ recovery facilities located in four geographic regions of the western United States were assessed. One of the scenarios assessed involved the release of yellow cake inside the processing plant due to an explosion in the dryer. The scenario considered a release of 1 kg and conservatively assumed the fraction respirable was 100 percent.</p> <p>For transparency, and details related to the analysis, a hyperlink to the US NRC document is as follows:</p> <p>https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1910/index.html</p> <p>The reviewer is directed to Chapter 4, Section 4.2.11.2.2 Radiological Impacts to Public and Occupational Health and Safety From Accidents for further reference.</p> <p>References Brown, S. 2008. The New Generation of Uranium in Situ Recovery Facilities: Design Improvements Should Reduce Radiological Impacts Relative to First Generation Uranium Solution Mining Plants, WM 08 Conference, February 25 – March 1, 2008, Phoenix, AZ Abstract #8414. US NRC (Unite States Nuclear Regulatory Commission). 2009. Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities. Final Report. NUREG-1910, Vol. 1</p> | Based on the response no revisions to the EIS, nor to the A&M technical supporting document (Appendix 14-A) are needed. As noted, a hyperlink to the US NRC document is as follows: https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1910/index.html and the reviewer is directed to Chapter 4, Section 4.2.11.2.2 Radiological Impacts to Public and Occupational Health and Safety From Accidents for further reference. |

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| IR-229 | CNSC | Human Health with respect to radiation exposure | Section 14.6.6.4 Appendix 14-A | <p>Context: With the Bounding Scenario 6 (Facility Fire and/or Explosion), the proponent states that Denison would ensure that the design of the plant includes control measures to reduce the exposure to both workers and members of the public to levels that are as low as achievable. The measures would ensure that the processing plant is adequately ventilated.</p> <p>It is not indicated where these additional measures have been detailed/elaborated within the EIS.</p> <p>Rationale: Control measures to reduce the exposure to both workers and members of the public as low as achievable, that are identified in the assessment of Bounding Scenario 6, must be formally documented to ensure that they are carried over into the engineered design of the processing plant.</p> | Provide details on how the control measures to reduce the exposure to both workers and members of the public, identified in the assessment of Bounding Scenario 6, have been formally documented and incorporated in the engineered design of the processing facility. | <p>As highlighted in the hazard identification section of the A&M technical supporting document (Appendix 14-A) the control measures to reduce exposure to workers and the public in relation to Bounding Scenario 6 include:</p> <ul style="list-style-type: none">• Development and implementation of the Occupational Health and Safety Program, including specific plans, procedures and PPE that would protect workers, in particular from the exposures envisioned by Bounding Scenario 6.• Development and implementation of the Emergency Response Plan which includes the procedures for fire and explosion related emergencies.• Personnel training and orientation for related to spill response and management• Inspection and maintenance of the equipment and process components to ensure their integrity and reliability. This will aim to lower the probability of such events.• Fire safety plan and firefighting systems to ensure fire safety and effective fire fighting system to ensure the damage from the fire is limited.• Ambient air monitoring for post-accident assessment. <p>Where programs, plans and procedures are referenced above such documentation is in the process of being developed as part of project-related licensing and would be available for review and consideration as part of that process.</p> <p>In addition to the control measures noted above, the design criteria considered for the EA included</p> <ul style="list-style-type: none">• Equipment Shielding• Reducing time near facilities• Increasing distance in elevate zones• Control systems with safe shut down interlock <p>Denison has recently completed feasibility designs for the Project in 2023 and has incorporated design for safety principles (DFS), including:</p> <p>Eliminate – Remove hazardous materials, processes and activities.</p> <p>Minimize – Use smaller quantities of hazardous substances, minimize the number of hazardous activities or process / equipment items.</p> <p>Substitute – Replace a hazardous material with one that is less hazardous, substitute a hazardous activity for one that is less hazardous.</p> <p>Moderate – Minimize the impact of a release of hazardous material or energy, by changing the layout, adopting less hazardous operating conditions or a less hazardous form of a material, facilities, or by reducing the number of people exposed.</p> <p>Simplify – Design facilities to eliminate unnecessary complexity, thus minimizing causes of hazards and human errors.</p> <p>While DFS is often applied to process design and process safety hazards, it can be applied to design in general and in areas other than design. Examples of DSF principles include:</p> <ul style="list-style-type: none">• manning philosophies – minimize the number of staff required for operations and maintenance, during construction, installation and hook-up and/or commissioning• process design – maximize simplicity of plant, maximize use of technology and equipment that is environmentally friendly, minimize hydrocarbon inventories, moderate operating conditions, minimize leak potential, maximize integrity of containment envelope from internal to external in-design effects and accidental loads. <p>Detailed design to support Project licensing and permitting will begin later in the year. Any engineering design control measures identified in Bounding Scenario 5 will be included in the detailed design and will be provided for acceptance by the CNSC during Project licensing.</p> <p>Denison is completing feasibility designs for the Project in 2023. Detailed design to support Project licensing and permitting will begin later in the year. Any engineering design control measures identified in Bounding Scenario 6 such as ventilation will be included in the detailed design and will be provided to the CNSC during Project licensing.</p> | Based on the response no revisions to the EIS, nor to the A&M technical supporting document (Appendix 14-A) are needed. |
| IR-230 | CNSC | Accidents and Malfunctions | Section 14.6.7.4 | <p>Context: It is stated that a conservative penetration time of 15 min was applied in the assessment. Based on this assumption, the maximum depth of contamination could be 90 cm (for penetration rate of 0.1 cm/s). It is not clear why the penetration time of 15 minutes is considered conservative as the penetration time would depend on the time needed for the emergency response team to respond.</p> <p>It is also stated that the wide range of the calculated velocities is a result of variation of soil conditions and the slope of the surface. The distance that the groundwater can travel under these extreme (i.e., conservative) conditions ranges from 0.15 m to 100 m. It is not clear how the groundwater travel distance of 0.15m and 100m is calculated.</p> <p>Rationale: The penetration time will influence the penetration depth of the released materials, which in turn, considering the groundwater travel distance, will impact the potential areas and volumes of contaminated soils and shallow groundwater.</p> | Please provide justification for applying 15 minutes of penetration time, and why it is considered conservative. In addition, please provide information on how the groundwater travel distance of 0.15 m and 100 m was obtained. | <p>The calculations showed that the release of 30 m³ partially saturates soil to the depths less than 1 m. Contamination deeper than 1 m is not expected due to released diesel availability and volume.</p> <p>If the penetration rate is slower than what was used in calculations, the released hydrocarbon would stay on the surface and the depth of contamination would be less. Therefore, 15 minutes is a conservative assumption that produces the maximum depth of contamination for the volume of hydrocarbon released.</p> <p>Eventually the depth of the contamination is more dependent on the volume of release than the time of the penetration. If the penetration is faster, the contamination would occur faster but would be limited by volume so would not penetrate deeper.</p> <p>With respect to the groundwater travel distance the distances provided in the Section 14.6.7.4 of the draft EIS the following are noted. The values provided are the upper and lower bound values associated calculated from the range of input parameters in the report. The calculations are based on the attenuation / degradation of diesel at the release site which is expected to occur within 75 days (Berry and Burton, 1997; Ledezma-Villanueva et al., 2015). In review of the text of Section 14.6.7.4 in preparation of this response a typo was noted and therefore to address the typo and provide some further clarity with respect to the groundwater travel distance the following revision will be made. The third from the last paragraph of Section 14.6.7.4 will be changed as follows (proposed ne text in bolded for reference):</p> <p><i>“The wide range of the calculated velocities is a result of variation of soil conditions and the slope of the surface. Studies by Ledezma-Villanueva et al. (2015) and Berry and Burton (1997) show that residual contamination in soil and groundwater is degraded within 75</i></p> | Based on the response, revisions to the EIS Appendix 14-A are needed. Section 14.6.7.4 in the EIS would be revised per the IR response. A similar revision would be made to Appendix 14-A. |

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| | | | | | | <p><i>days. The distance that the groundwater can travel under these extreme (i.e., conservative) conditions ranges from 0.15 m 0.03 m to 100 m.</i></p> <p>• <i>Dmax = 1.5 × 10-5 m/s x 75 days x 24 x 3600 ~ 100 m</i> • <i>Dmin = 4.4 × 10-9 m/s x 75 days x 24 x 3600 ~ 0.03 m</i></p> <p><i>As highlighted by the calculation, Øduring this time period, no major migration of groundwater is expected. Thus, the contamination of soil and shallow groundwater is expected to be limited to a small area near the release location, given that release site remediation would occur well within the 75 day window.”</i></p> <p>References Berry, K.A.T. and D/L. Burton. 1997. Natural attenuation of diesel fuel in heavy clay soil. Can. J. Soil. Sci. 77: 469–477. Ledezma-Villanueva, A. J. M. Adame-Rodríguez, I.A. O’Connor-Sánchez, J.F. Villarreal-Chiu and E.T. Aréchiga-Carvajal. Biodegradation kinetic rates of diesel-contaminated sandy soil samples by two different microbial consortia. Ann. Microbiol. (2016) 66:197–206.</p> | |
| IR-231 | CNSC | Accidents and Malfunctions | Sections 14.6.6.4 and 14.6.6.5 | <p>Context: The EIS states that in the unlikely event of an unmitigated accidental release of uranium due to a dryer explosion, doses to the workers are expected to have a moderate effect, while doses to members of the public are expected to have a minor effect. Based on this evaluation, the severity of the consequences of this accident and malfunction scenario is predicted to be moderate. In consideration of both probability and consequences, the overall risk related to Bounding Scenario 6 is predicted to be low.</p> <p>Rationale: When there is an explosion within the process plant, it is likely there will have worker fatality. The severity of the consequences of an explosion would be catastrophic and the risk of Bounding Scenario 6 would be higher.</p> | Please re-evaluate the consequence and the risk of Bounding Scenario 6 by considering the potential worker fatality resulted from an explosion. | <p>There was no attempt to minimize the consequence of the explosion scenario with respect to a potential fatality of a worker in the draft EIS. The hazard screening evaluation for this scenario that was presented in Appendix 14-A did acknowledge worker fatality as a potential consequence on an explosion; however, the more detailed evaluation of the scenario as presented in Bounding Scenario 6 focused on the release, for which we believe the consequence ratings were appropriate. Protections afforded to workers are assumed to be ALARP and therefore from this perspective there is no further analysis specific to a potential worker fatality that could be considered further within the assessment.</p> <p>It is acknowledged that the text could have been more explicit as to the above and additional text will be added to the text of the EIS and to Appendix 14-A.</p> | Based on the response, revisions to the EIS Appendix 14-A are needed. Specifically, clarity around the decision to carry the exposure scenario forward for further analysis, rather than the potential fatality aspect of the explosion will be provided. The following text will be added to Section 5.6 of Appendix 14-A, <i>“For reference it is acknowledged that this accident scenario could result in significant worker injuries and/ore fatalities and therefore this the reason that it was rated as “catastrophic” from a consequence perspective in the hazard identification screening evaluation (see Appendix A). The more detailed evaluation of the scenario as presented herein as Bounding Scenario 6 focuses on the release of uranium to the atmosphere. Protections afforded to workers in the processing plant are assumed to be ALARP and therefore from this perspective there is no further analysis specific to a potential worker fatality that could be considered further within the assessment.”</i> |
| IR-232 | ECCC | Change to an environmental component due to hazardous contaminants | Appendix 14-A, Table 3-7, ID# 7.1 Appendix 14-A, Table 5-5 | <p>Context: The Proponent indicates in Appendix 14-A, Table 3-7 that a release of sulfuric acid is a low consequence event therefore would not require further assessment. However, according to a Safety Datasheet on high concentrated sulfuric acid (ICSC 0362 - SULFURIC ACID, concentrated (> 51% and < 100%) (ilo.org)), the substance is incompatible with certain materials and can give off toxic fumes. Furthermore, it reacts with various metals to produce hydrogen gas, which is explosive.</p> <p>The Proponent provides estimates of chemicals, including sulfuric acid, to be transported to site in Appendix 14-A, Table 5-5. The annual consumption of sulfuric acid is estimated at 15,417 m3, in 617 trucks per year, but the concentration is not stated.</p> <p>Rationale: Given the high reactivity and inherent corrosive nature of sulfuric acid combined with the volume and concentration that may be stored on site, ECCC requests that the Proponent provide a detailed risk assessment related to a terrestrial spill of sulfuric acid, specifically at the processing plant.</p> | <p>1. Provide the volume and the concentration of sulfuric acid that will be stored on site.</p> <p>2. Provide a detailed risk assessment of the fate and behavior of sulfuric acid during a release into the environment.</p> | <p>In response to Question 1 the following is noted. It is expected that a maximum of 143 m³ of 93% sulfuric acid will be stored on site at any given time. Per Section 2.2.7.6.3 of the draft EIS, bulk storage tanks for chemicals that will be used for mining, processing, and water treatment, including sulfuric acid, will be located inside the processing plant, in a separate contained space away from the processing equipment. The storage tanks will sit inside appropriately designed and sized concrete secondary containment basins. The secondary containment basin for each applicable chemical system will be physically separated from the containment basins for other chemical systems.</p> <p>In response to Question 2 the following is provided. We do not feel a detailed risk assessment of the fate and behaviour of a sulfuric acid release to the environment is warranted at this time. The A&M assessment has considered the transport and use on site of sulfuric acid and in neither case did the screening assessment conclude that additional more detailed assessment was needed. As noted in response to IR 222, through the hazard identification process (see Appendix 14-A Section 3.0 and Appendix A), the overall risk of the release of acids and bases was characterized as "moderate" and "ALARP" and as such consistent with the A&M assessment methodology that scenario was not carried forward further evaluation. It was reasoned that released acids and bases dissolve in water relatively quickly and effects to local biota can be expected to be experienced on a more local basis and over a shorter timeframe. There is little likely mitigation that can be applied in that scenario and therefore, and the risk mitigation measures are limited to those that prevent accidents or reduce the probability to ALARP as mentioned in the draft EIS and Appendix 14-A.</p> <p>As noted above sulfuric acid will be stored in a dedicated area with secondary containment provided. There is no pathway from storage to the environment on which to assess risk and therefore consideration of such risks are not warranted.</p> <p>The hazard identification process considered use of sulfuric on site and its release in the process plant through a piping failure and concluded a low overall risk. It was specifically considered a low consequence event because the release would be contained in the process plant and there was no plausible pathway for the acid to the environment outside the plant.</p> <p>Overall, the risks of transport, storage and use sulfuric acid are well understood and characterized, and risks from sulfuric acid resulting from the Project to workers and the environment will be mitigated to ALARP.</p> | Based on the response no revisions to the EIS, nor to the A&M technical document (Appendix 14-A) are needed. |
| IR-233 | HC | Human health with respect to hazardous contaminants | Appendix 14-A, Section 8.7 (p. 8.10) | <p>An effects assessment for a transportation accident scenario involving radioactive materials was not included.</p> <p>Context: The proponent provided an effects assessment relating to a diesel spill on the ground (Section 14 Appendix 14-A, Section 8.7). However, no information was provided regarding the potential human health effects of a uranium concentrate release at the two locations considered (Section 14 Appendix 14-A p. 8.10).</p> | <p>1. Assess and describe the potential health effects (chemical and radiological) of a transportation accident involving a uranium concentrate spill at the following locations:</p> <p>a) km 160 of Hwy 914, which is the location of a cultural camp that has been established by the ERFN.</p> <p>b) km 67 of Hwy 914, which is a gathering location for the Kineepik Métis Local associated with the Northern Village of Pinehouse.</p> | <p>Such a release as envisioned by the Information Request was considered in the A&M assessment (Appendix 14-A) and summarized in the draft EIS. The assessment focused generically on hazardous chemicals and utilized the release of diesel fuel to ground as a means to describe the potential spatial extent of effects and resulting consequences.</p> <p>A release of uranium concentrate to ground as the result of a transportation accident was not directly quantitatively evaluated for two primary reasons. Firstly, given the relative importance of such an event it is assumed that containment and removal would be high priorities within the emergency response and spill response plans. Response and isolation of</p> | Based on the response no revisions to the EIS, nor to the A&M technical document (Appendix 14-A) are needed. |

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| | | | | <p>Rationale: An accident involving radioactive material may have an impact on human receptors, based on the proximity of receptors and the proposed response protocols.</p> | <p>c) All other potential sites of importance for the public and Indigenous peoples.</p> | <p>the material is expected to be rapid, and clean-up is expected to be timely, efficient and complete. Secondly, the spatial extent of effects is expected to be small in size and essentially limited to the immediate vicinity of the accident location given the small size of the gamma field that would be associated with the uranium concentrate. In these regards exposure to members of the public is expected to be mitigated and based on the A&M assessment methodology did not warrant consideration from a detailed perspective beyond initial screening.</p> <p>As noted in the review comment, the release to ground accident scenario focused on the two locations of interest along Hwy 914. The locations were developed with the Denison team and reflected the result of and input from Denison’s Interested Party engagement activities. These locations can serve more broadly to represent release to ground scenarios at additional locations along the transportation corridor. Since the outcomes of the accident scenarios are specifically tied to conditions at the release location as the are to the nature of the release it would not be practical to conduct such an assessment at all points of interest as suggested by the review comment. The use of representative locations, such as was done in the current A&M assessment, is consistent with past practice on similar project proposals.</p> | |
| IR-234 | CNSC | Effect of Environment | Section 15.2.2 | <p>Context: Effects of seismic events on the uranium extraction and post decommissioning are not assessed.</p> <p>Rationale: Seismic events could further exacerbate the stability of the voids induced by the uranium extraction, which will result in extra stresses and displacements/deformation in the overlying rock formations. These extra stresses and displacements/deformation could impact on the mine operation and post decommissioning groundwater flow and contaminant transport.</p> | <p>Please provide an assessment of seismic events on the mine-induced voids stability and the resulted effects on the mine operation and post decommissioning.</p> <p>Technical Discussion Required: Yes</p> | <p>See response to IR-64 that concerns potential for ground subsidence.</p> <p>To clarify, the portion of the deposit being mined is never truly a void and what remains will be a honeycomb texture with water filled interstices. The mined area is filled with a fluid at all times, whether it be a mining solution, groundwater, or the neutralizing solution. This is different from a more traditional underground operation such as Cigar Lake where there is physical excavation of the orebody, leaving a temporary air-filled space. Although the uranium ore is high-grade by global standards it is not entirely massive in nature. As such, the uranium will be leached in a 'honeycomb' texture leaving behind a structure of partial intact rock mass with the remaining area being filled by fluid. This retains the pressure balance of the mining zone with the adjacent water-saturated rock masses.</p> | No EIS updates are anticipated to address this IR. |
| IR-235 | ECCC | Fish and fish habitat | Section 15.5.2, Expected Environmental Conditions | <p>Context: In this section it is stated that: “Table 15.5-1 and Table 15.5-2 summarize the predicted mean values of the climate variables for the Tomblin Lake regional grid unit, following the RPC4.5 and RCP8.5 scenarios, respectively, as indicated by the Climate Atlas (PCC 2019).”</p> <p>RCP4.5 represents predicted climate conditions of a moderate carbon future.</p> <p>RCP8.5 represents predicted climate conditions under a high carbon future.</p> <p>The values shown in Tables 15.5-1 and 15.5-2 show averages of 25.9 and 26.7 mm for RCP4.5 and 25.9/27.5 mm for RCP8.5. These values do not correspond to the source indicated by the Proponent.</p> <p>Rationale: Based on the Proponent’s description we would expect to find the same values for “Max 1-Day Precipitation (mm)” in the Climate Atlas for RCP4.5 and RCP8.5 scenarios. ECCC was unable to duplicate the results.</p> <p>ECCC queried the Climate Atlas for Tomblin Lake and returned a result of “Region Geikie River.” https://climateatlas.ca/find-local-data</p> <p>ECCC then queried the Climate Atlas for Max 1 Day Precipitation (mm). https://climateatlas.ca/data/grid/782/maxdaypr_2030_85/line https://climateatlas.ca/data/grid/782/maxdaypr_2030_45/line</p> <p>The results displayed an array of values ranging from 83.6 mm (2050) to 87.3mm (2092) for a Regional Concentration Pathway RCP8.5 scenario and values ranging from 48.9mm (2050) to 89.5 mm (2083) for an RCP4.5 scenario.</p> <p>These values do not match the averages shown in Tables 15.5-1 and 15.5-2.</p> | <ol style="list-style-type: none"> 1. Provide the source of the data displayed in Max 1-Day Precipitation (mm) category in Tables 15.5.1 and 15.5-2. 2. Provide detailed calculations for the following average values: <ul style="list-style-type: none"> • 25.9 mm 26.7 mm in Table 15.5-1: Predicted Climate Conditions of a RCP4.5 Moderate Carbon Future • 25.9 mm 27.5 mm in Table 15.5-2: Predicted Climate Conditions of a RCP8.5 High Carbon Future 3. Explain how the data shown in Tables 15.5.1 and 15.5.2 were used in the precipitation risk assessment. 4. Denote the differences between “mean”, “value/max value”, and “fluctuation”, in the calculation of extreme event risk. 5. Compare model derived data against: <ol style="list-style-type: none"> 1. Natural variability of the observed data. 2. Variability in the statistics generated via observation based time series. <p>Technical Discussion Required: Yes</p> | <p>As a preamble to this IR response, Denison notes that ECCC used a different spatial scale (Geike River is a ‘large grid’ area) in the Climate Atlas compared to what was presented in Section 15 of the EIS for Tomblin Lake (which is a ‘small grid’ area). Although Tomblin Lake region is within the Geike River region, this difference in spatial scale explains the discrepancies noted by ECCC in their IR context and rationale and explains why ECCC was unable to duplicate the results.</p> <p>1. The links to the Tomblin Lake regional grid unit are as follows.</p> <p>Tomblin Lake 4.5: https://climateatlas.ca/data/grid50k/074H06/maxdaypr_2030_45/line</p> <p>Tomblin Lake 8.5: https://climateatlas.ca/data/grid50k/074H06/maxdaypr_2030_85/line</p> <p>The Tomblin Lake chart data were downloaded from the Climate Atlas for each scenario.</p> <p>2. We used average function in excel to calculate mean values from the chart data.</p> <p>Historical Mean = Average of annual mean historical values from 1976 to 2005. As shown in Table 15.5-1, the historical mean for the Max 1-Day Precipitation was 24.1 mm.</p> <p>Ensemble mean – Near term = Average of predicted annual mean values from 2021 to 2050. As shown in Table 15.5-1, the near term mean for the Max 1-Day Precipitation was 25.9 mm under the RCP4.5 scenario. As shown in Table 15.5-2, the near term mean for the Max 1-Day Precipitation was 25.9 mm under the RCP8.5 scenario.</p> <p>Ensemble mean – Far term = Average of predicted annual mean values from 2051 to 2080 As shown in Table 15.5-1, the far term mean for the Max 1-Day Precipitation was 26.7 mm under the RCP4.5 scenario. As shown in Table 15.5-2, the far term mean for the Max 1-Day Precipitation was 27.5 mm under the RCP8.5 scenario.</p> <p>3. The information in Section 15 was not used in Section 8. Section 8 PMP was conservative to account for any changes in future precipitation.</p> <p>4. The ensemble model is made up of many different models (compilation). The variability is depicted for each model, and the ensemble model predicted data are presented as the annual mean and include the 10th and 90th percentiles for each annual mean.</p> <p>5. The data in Section 15 was not used in other assessments and the PMP used in Section 8 is conservative.</p> | No EIS updates are anticipated to address this IR. |
| IR-236 | ECCC | Fish and fish habitat | Section 15.5.2, Expected Environmental Conditions | <p>Context: It is stated that, “Table 15.5-1 and Table 15.5-2 summarize the predicted mean values of the climate variables for the Tomblin Lake regional grid unit...”</p> <p>As per the Proponent’s description, Tomblin Lake was chosen as representative location for Wheeler when Climate Atlas was used as data source.</p> <p>Rationale: In those two tables, for the “Max 1-Day Precipitation (mm)” the historical average is given as 24.1mm. Local time series analysis for the climatic region in which Wheeler Project is located provide averages (for 1-day max precipitation) of approximately 30+ mm.</p> <p>It is the Proponent’s responsibility to keep the required database current and up to date, because the length of the time series influences all derived statistics. Statistical analysis of extreme events is</p> | <ol style="list-style-type: none"> 1. Provide a clear explanation on how the historical mean for 1-Day Max Precipitation was calculated. 2. Compare the values obtained via various means (ex: copied from the internet, modeled via some online algorithm, derived from specialty literature), against time series analysis based on observations. <p>Technical Discussion Required: Yes</p> | <p>1. In the draft EIS Tables 15.5-1 and 15.5-2, the maximum 1-day precipitation values were obtained from the chart data file downloaded from the Climate Atlas for the Tomblin Lake regional grid (refer to IR-235 for links to the datasets on Climate Atlas). The Historical Mean value was calculated as the average of annual mean historical values from 1976 to 2005 = 24.1 mm.</p> <p>2. The values provided in Section 15 for the maximum 1-day precipitation are correctly referenced and summarized from the Climate Atlas and have been used appropriately in the assessment. The discrepancy in spatial scale and how it effects the representation of the data between Geike River and Tomblin Lake is described in IR-235. See also response to AD-15.</p> <p>As discussed during the April 19, 2023 meeting between Denison and ECCC, the final EIS will be updated to include new tables comparing precipitation estimates for existing and future climate to as context for the Project design PMP. These have been included here as Attachment IR-236; Attachment IR-236 will be appended to Appendix 6-C of the final EIS.</p> | <p>The information in Attachment IR-236 will be added as Appendix D Summary of Precipitation Values Presented in the EIS to Appendix 6-C in the final EIS.</p> <p>The following sentence will be added to Section 15.5.2 in the final EIS:</p> <p>“Please refer to Appendix D to Appendix 6-C for a summary of precipitation values presented in the EIS.”</p> |

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| | | | | highly dependent of the mean with extreme values reaching values 3 to 4 times higher than the mean. | | | |
| IR-237 | CNSC | EA follow-up and monitoring program | Appendix 16-C throughout, including Table 1.5-1: Wheeler River Monitoring and Follow-up Program Summary (p. 8-15) | <p>Context: CNSC’s Generic Guidelines for the Preparation of an EIS state: “The EIS should provide discussion on the follow-up program’s requirements, and include:</p> <ul style="list-style-type: none">objectives and structure of the follow-up program and the VCs targeted by the programtabular summary and explanatory text of the main components of the program including:<ul style="list-style-type: none">a description of each monitoring activity under that component<u>which of the two generic program objectives the activity is relevant to (e.g., verify EA predictions, determine effectiveness of mitigation measures)</u>the specific statement from the EA that goes along with that generic objective and will be the focus for that activity (e.g., program objective: verify predicted effects; environmental assessment effect: no potential adverse effects)the specific monitoring objective for that activityplanned schedule<u>roles and responsibilities to be played by the proponent, regulatory agencies, Indigenous people, local and regional organizations and others in the design, implementation and evaluation of the program results</u><u>possible involvement of independent researchers</u><u>program funding sources</u>information management and reporting (reporting frequency, methods and format)<u>possible opportunities for the proponent to include the participation of the public and Indigenous groups, during the development and implementation of the program</u> <p><u>The follow-up program plan should be sufficiently described in the EIS to allow independent judgment as to the likelihood that it will deliver the type, quantity and quality of information required to reliably verify predicted effects (or absence of them) and confirm the effectiveness of mitigation measures.”</u> (Section 11)</p> <p>Rationale: The Summary of Monitoring and Follow-up Programs provided in Appendix 16-C contains very high-level information, and while some of the aspects detailed in the Generic EIS Guidelines are included, the aspects underlined are missing or appear incomplete.</p> <p>Further, all information from throughout the EIS should be incorporated into this Summary. For example, the EIS notes that: “Groundwater samples will be collected at least monthly and semi-annually in the wells within the freeze wall and on the freeze wall perimeter, respectively” (p. 7-109) and that “At least five to seven multi-well clusters are proposed across the mined area (Figure 7.8-2). Sampling will include KI parameters or the full suite of COPC at different times in the remediation process” (p. 7-111).</p> <p>These details (only examples) are not included in Appendix 16-C.</p> | <p>It is recognized that this document will evolve over the planning process and be finalized prior to the EA Decision; however, as plans are developed and revised, CNSC staff expect that updates will be made to this document and provided with any future versions of the EIS.</p> <p>Appendix 16-C Summary of Monitoring and Follow-up Programs must include sufficient details to allow CNSC staff to determine the likelihood that it will deliver the type, quantity and quality of information required to reliably verify predicted effects (or absence of them) and confirm the effectiveness of mitigation measures. This includes concrete monitoring plans (sampling locations, frequency, etc.).</p> <p>Additionally, please incorporate any relevant information included in the EIS into this Summary.</p> | Please see response in Attachment IR-237. | Section 16-C in the final EIS will be updated to reflect the final summary of monitoring and follow-up programs. Compared to the version contained in the draft EIS, it will be updated to include changes resulting from the FIRT review process and the Saskatchewan Ministry of Environment review process. This section will align with the Project’s Commitment Report which will be provided as part of the final EIS documentation. Refer to Attachment IR-237 where <u>bold underlined</u> text indicates where Denison commits to revising or adding information into the final EIS. |
| IR-238 | CNSC | Current use of lands and resources for traditional purposes | Various sections of the EIS, including: Section 8 Section 9 Section 10 Section 11 Section 12 Section 15 Section 16 Appendix 16-C (p. 3) | <p>Context: The EIS indicates that “further detailed [follow-up and monitoring programs] will be developed as Project designs are finalized that may influence the nature, frequency, and locations of monitoring. In addition, input from regulatory agencies, the public and Indigenous Peoples will be considered.” (Appendix 16-C, p.3)</p> <p>It is not clear in several section(s) of the EIS and the Indigenous Engagement Report, whether Denison has provided the interested Indigenous Nations and communities with the opportunity to participate in the development, implementation, and review of monitoring and mitigation measures, as per the guidance of REGDOC-3.2.2 and CNSC’s Generic EIS Guidelines.</p> <p>Rational: As outlined in Section 11 of CNSC’s Generic Guidelines for the Preparation of an EIS, please include roles and responsibilities to be played by the proponent, regulatory agencies, Indigenous people, local and regional organizations and others in the design, implementation and evaluation of the monitoring program results as well as possible opportunities for the proponent to include the participation of the public and Indigenous Nations and communities, during the development and implementation of the program.</p> | <p>Please provide additional information to demonstrate whether Indigenous Nations and communities were engaged directly on the potential mitigation and monitoring measures to address the concerns raised regarding potential impacts of the project on the potential or established Indigenous and/or treaty rights.</p> <p>Provide a rationale if this engagement has not been completed. As the Project develops, please provide concrete actions Denison will take in the follow-up and monitoring programs to engage Indigenous Peoples to alleviate concerns and incorporate their interests, and when this engagement is planned to take place.</p> | <p>Denison provided ERFN, KML, and the YNLR with the opportunity to review select sections of EIS prior to its submission to regulators (see Section 4.3.2.1.4 for ERFN; KML declined the invitation to review the EIS in advance of filing; Section 4.3.4.2.4 for the YNLR).</p> <p>Mitigation and monitoring was part of an in-person engagement tour undertaken in 2022 with the Indigenous and non-Indigenous Communities of Interest. Further, information about mitigation and monitoring measures were mailed out in booklets, and will be topics revisited in engagement activities set to occur in fall 2023.</p> <p>As the Indigenous Communities of Interest with reserves and residential communities most proximal to the Project, Denison has committed to collaborating with English River First Nation and Kineepik Metis Local on a monitoring regime, suited to each of their interests and needs. As part of these programs, Denison and the Indigenous community of ERFN and KML will be sharing information in an agreed-upon fashion. Denison expects that important country foods harvested for food and cultural purposes (i.e moose, fish species, etc.), surface water quality, and other areas of interest will form part of this monitoring program, including the potential to report on wildlife-vehicle mortality or other such areas of potential concern as they evolve over time.</p> <p>It is expected that the data collected through such monitoring regimes as described above would also be relevant to other Indigenous nations who may have interest in the Project.</p> <p>See also response to IR-28, IR-125, IR-128, IR-129 and IR-212.</p> | No EIS updates are anticipated to address this IR. |

¹ **Additional Lung Cancer Mortality from PM2.5: Recommended Approach and Sample Calculation**
Health Canada, Water and Air Quality Bureau, October 2022

Health Canada (2022) provides a quantitative estimate of the risk of lung cancer associated with exposure to PM2.5 in Canada. The pooled hazard ratio (HR) for lung cancer mortality in the Canadian population is 1.127 (95% CI: 1.085, 1.170) per 10 µg/m3 increase in long-term exposure to ambient PM2.5. The slope coefficient (β) for this relationship is 0.01196, as derived below:

$$e^{(\beta \times 10 \text{ }\mu\text{g}/\text{m}^3)} = \text{pooled hazard ratio per } 10 \text{ }\mu\text{g}/\text{m}^3$$

$$e^{(\beta \times 10 \text{ }\mu\text{g}/\text{m}^3)} = 1.127$$

$$\beta \times 10 \text{ }\mu\text{g}/\text{m}^3 = \ln 1.127$$

$$\beta = (\ln 1.127)/(10 \text{ }\mu\text{g}/\text{m}^3)$$

$$\beta = 0.01196$$

The additional lung cancer mortality (over the baseline rate) from PM2.5 derived from a given source can be determined using the equation below, based on the attributable fraction or (HR-1)/HR (Greco et al. 2020):

$$ALCM = \left[\left(e^{\beta \cdot Exposure} - 1 \right) / e^{\beta \cdot Exposure} \right] \cdot Baseline \text{ rate} \cdot Years$$

ALCM = additional lung cancer mortality cases per 100,000 population

β = 0.01196 (slope coefficient from meta-analysis in Health Canada (2022))

Exposure = estimated PM2.5 exposure concentration from the relevant source(s) (µg/m3) (does not include baseline PM2.5 exposure)

Baseline rate = 45.5 per 100,000 (current Canadian Age Standardized Mortality Rate (ASMR) for lung cancer from Canadian Cancer Statistics Advisory Committee 2021); the Canadian baseline rate is appropriate as the slope coefficient was derived from Canada-wide studies and an updated ASMR of Canada (if available) would be appropriate for use in the calculation

Years = years of project or project phase

Sample calculation:

Project estimates an exposure from relevant source(s) of 0.067 µg/m3 over 50 years of operation

$$ALCM = \left[\left(e^{\beta \cdot Exposure} - 1 \right) / e^{\beta \cdot Exposure} \right] \cdot Baseline \text{ rate} \cdot Years$$

$$ALCM = \left[\left(e^{0.01196 \cdot 0.067} - 1 \right) / e^{0.01196 \cdot 0.067} \right] \cdot 45.5 \cdot 50$$

ALCM = 1.8 additional lung cancer mortality cases per 100,000

References:

- [1] Canadian Cancer Statistics Advisory Committee in collaboration with the Canadian Cancer Society, Statistics Canada and the Public Health Agency of Canada. Canadian Cancer Statistics 2021. Toronto, ON: Canadian Cancer Society; 2021. Available at: cancer.ca/Canadian-Cancer-Statistics-2021-EN
- [2] Greco, S.L., MacIntyre, E., Young, S. et al. An approach to estimating the environmental burden of cancer from known and probable carcinogens: application to Ontario, Canada. BMC Public Health 20, 1017 (2020). <https://doi.org/10.1186/s12889-020-08771-w>
- [3] Health Canada. Lung cancer and ambient PM2.5 in Canada: a systematic review and meta-analysis.
- [4] Health Canada, 2022. Available online at: <https://publications.gc.ca/site/eng/9.907038/publication.html>

Attachment: IR-06

| | |
|---|---|
| Number | IR-06 |
| Dept. | CNSC |
| Project effects link | Geology and groundwater |
| Reference to EIS, appendices, or supporting documentation | Section 2.2.1.4, Wellfield for In Situ Recovery Mining |
| Context and Rationale | <p>Context: This Section of the EIS indicates that a tracer test was completed in 2021 and a feasibility field test was initiated in 2022. No information from these tests is included in the EIS and no reporting timelines are provided.</p> <p>Rationale: Guidance from the IAEA (2001) and best practices highlighted by regulatory regimes in other countries such as the United States (IAEA, 2016) and Australia (Geoscience Australia, 2010) indicates that single and multi-well trial (feasibility) testing for mining and remediation techniques should be carried out before a licence for full-scale operations can be granted . This is part of the requirement for proponents to demonstrate to government authorities that all potential risks have been considered during the life of operation and post-remediation of the mine.</p> <p>Additionally, Section 8.5.2 of the Generic EIS Guidelines states: “Units may be characterized as aquifers or aquitards, and unit descriptions should include their geochemical characteristics, vertical and lateral permeabilities, transport mechanism (diffusion versus advection) and the directions of groundwater flow”,</p> <p>And that “The applicant or licensee should present a conceptual and numerical hydrogeological model that discusses the hydrostratigraphy and groundwater flow systems”.</p> <p>Outcomes from the tracer test inform model parameters such as effective porosity (see IR-78), dispersion, and dispersivity (see IR-96). The wellfield leach tests and remediation trails ultimately inform environmental monitoring during site activities, and the source term for the groundwater model. This source term represents the contaminants which flow through the desilicified zone into Whitefish Lake, which represents a source of contamination considered in the ERA.</p> <p>References:</p> |

| | |
|-------------------------|--|
| | <p>[1] International Atomic Energy Agency (IAEA). 2001. Manual of Acid in Site Leach Uranium Mining Technology. IAEA-TECDOC-1239. Vienna. 283 p.</p> <p>[2] International Atomic Energy Agency (IAEA). 2016. In Situ Leach Uranium Mining: An Overview of Operations. IAEA Nuclear Energy Series No. NF-T-1.4. Vienna. 76 p.</p> <p>[3] Commonwealth of Australia (Geoscience Australia). 2010. Australia’s in situ recovery uranium mining best practice guide. ISBN 978-1-921672-95-8. Canberra. 33 p.</p> |
| Information Requirement | <p>1. Please provide a summary of the results of field tests (i.e., tracer tests, wellfield leach tests, and remediation trials) in the EIS, or provide a technical supporting document with this information, and ensure the documentation is appropriately referenced in the EIS.</p> <p>2. Please indicate how outcomes from these field tests inform the design of In Situ Recovery . This information should include:</p> <ul style="list-style-type: none"> • feasibility of meeting remediation targets. • groundwater flow conditions and validation of flow models. • mobilization of contaminants (e.g., Al, Se or V). • potential for free gas evolution/two-phase flow. • identifying composition of lixiviant and production solutions. • success despite presence of >2% carbonate minerals (siderite, FeCO₃) in the ore zone (see Table 4-3 of Appendix 7-A). • site-specific data to parameterize, validate, and refine solute transport models (hydraulic conductivity, effective porosity, dispersivity, diffusion, etc.). <p>3. Please provide further information of proposed operations including % recovery, uranium concentrations, optimal liquid/solid ratios, anticipated reagent consumption, etc.</p> |

Response to IR-06 Part 1

Denison used the ISR mine design and the 3D hydrogeology and contaminant transport numerical modelling of the injection and extraction wells to determine the potential interactions between mining activities and the environment. Two key outputs from the ISR mine design and 3D hydrogeology modelling work were used as inputs for the groundwater assessment (Section 7): 1) The extent of mining solution migration away from the injection and recovery well screens, as defined by the mining area (50m above the ore zone and within the freeze wall) and 2) groundwater quality of the mining area following remediation. Monitoring will be completed during operations and decommissioning to confirm these inputs.

During the operation phase, and under normal operational conditions there is no interaction between the mining area and surface or down gradient environment, and the assessment focuses on the post-decommissioning period following removal of the freeze wall, once the groundwater flow paths return to pre-mining conditions.

Denison provided the FIRT team with a presentation and summary of the test work completed to date on June 16, 2023, to address IR-06. Summaries of relevant field and lab tests including the 2021 Tracer Test, 2022 Feasibility Field Test (FFT), and various site-specific lab tests are provided as part of this IR response and additional details will be provided to support licence applications.

Tracer test

An ion tracer test was completed in 2021 and the key results are summarized as follows:

- The test achieved the commercial-scale production flowrate assumed in the 2018 Pre-Feasibility Study (SRK 2018).
- The test demonstrated hydraulic control of injected solution. No elevated values of the tracer were observed in the monitoring wells surrounding the commercial-scale test pattern.
- The test established breakthrough times between injection and recovery wells, spaced 5 to 10 meters apart, that were consistent with previous proof of concept hydrogeological modelling conducted by Petrotek Corporation.
- The clean-up phase completed after the conclusion of the tracer test demonstrated the ability to remediate the test pattern. The clean-up phase was successful; the tracer concentrations were reduced to as low as 4% of peak test levels within eight days of remediation.

Feasibility Field Test (FFT)

The purpose of the FFT was to validate previous field and laboratory testing and determine the feasibility of the ISR mining methodology. The leaching and neutralization phases of the FFT were completed in 2022. The leaching phase was designed to assess the effectiveness of the ISR mining method. This phase included controlled injection of an acidic solution into the mineralized zone with recovery of the solution through existing test wells. The neutralization phase involved the injection of a mild alkaline (basic) solution into the leaching zone to neutralize the area and verify the groundwater in the area is returned to acceptable, permitted conditions.

The FFT provided the following results:

Leaching Phase:

- Recovered approximately 14,400 lbs U₃O₈ over ten days of active leaching following completion of initial acidification of the Leaching Area.
- Returned maximum uranium head grade of recovered solution of 43 g/L when the leaching phase of the FFT was completed, with grades still rising (indicative of the ramp-up segment of a well production profile).
- Achieved suitable acidification for ISR mining within 7 days post initial injection at 5 metre well spacing (GWR-41) and within 17 days for 10 metre well spacing (GWR-38).
- Demonstrated ability to achieve and maintain uranium mass flow rate consistent with the assumptions in the 2018 Pre-Feasibility Study (SRK 2018).
- Further demonstrated hydraulic control of injected solution during the FFT, reporting no responses in the monitoring wells outside of the designed FFT test area.
- Confirmed breakthrough times between injection and recovery wells, consistent with the Project's hydrogeological model and the previously completed tracer test.

Neutralization Phase:

Sampling of groundwater monitoring wells around the FFT site has confirmed the successful restoration of the leaching zone to environmentally acceptable pH conditions, as outlined in the applicable regulatory approvals for the FFT and summarized in Table IR-06-1 below.

Table IR-06-1: Feasibility Field Test Leaching Zone Remediation Targets compared to Interim (December 2022) Groundwater Well Monitoring Results

| Parameter | Units | Leaching Zone Remediation Target | Neutralization Phase Results ¹ |
|-----------------|----------|----------------------------------|---|
| pH | pH units | 3.5 | 6.24 |
| Aluminum (Al) | mg/L | 9.1 | 3.3 |
| Arsenic (As) | mg/L | 0.7 | 0.05 |
| Barium (Ba) | mg/L | 0.2 | 0.07 |
| Calcium (Ca) | mg/L | 535 | 203 |
| Cadmium (Cd) | mg/L | 0.3 | 0.00001 |
| Cobalt (Co) | mg/L | 0.24 | 0.0001 |
| Chromium (Cr) | mg/L | 0.38 | < 0.0005 |
| Copper (Cu) | mg/L | 0.19 | 0.001 |
| Iron (Fe) | mg/L | 390 | 144 |
| Potassium (K) | mg/L | 45 | 185 |
| Magnesium (Mg) | mg/L | 8.92 | 22.6 |
| Molybdenum (Mo) | mg/L | 0.16 | 0.04 |
| Sodium (Na) | mg/L | 628 | 193 |
| Nickel (Ni) | mg/L | 1.17 | 0.02 |
| Lead (Pb) | mg/L | 2 | 0.04 |
| Sulfate | mg/L | 4,147 | 1114 |
| Selenium | mg/L | 0.47 | 0.0002 |
| Uranium | mg/L | 501 | 85 |

| Parameter | Units | Leaching Zone Remediation Target | Neutralization Phase Results ¹ |
|-----------|-------|----------------------------------|---|
| Vanadium | mg/L | 19.3 | 0.2 |
| Zinc | mg/L | 17.1 | 0.5 |

¹ Results are the average of three groundwater monitoring wells (GWR-038, -040 -041) sampled in December 2022

Response to IR-06 Part 2

Field programs conducted over the past 4.5 years were focused on de-risking key elements related to the implementation of the ISR mining methodology specific to the Phoenix deposit in a high-grade Athabasca Basin setting. These key elements were focused on:

- Permeability
- Leachability
- Containment
- Processing

De-risking programs were carried out in the lab and field setting initially on an individual basis. As the programs progressed, elements were combined in additional test work ultimately culminating in the FFT, where all elements were evaluated in a single test to inform the design of ISR.

Response to IR-06 Part 2a: Feasibility of meeting remediation targets

Groundwater remediation targets provided in the draft EIS were derived from metallurgical test results completed from 2017 to 2021 with over 125 kg of material recovered from Phoenix deposit that underwent leaching and neutralization test work (see response to IR-67). In 2022 and 2023, metallurgical test work continued to further optimize remediation and strategies and confirm test work results presented in the draft EIS. It is expected that metallurgical test work will continue in the future to further optimize remediation targets, and this will be advanced through updates to the Decommissioning Plan.

The FFT provided additional confirmation that pH target and remediation targets could be met. Data gathered during the neutralization phase of the FFT provide confidence that groundwater targets proposed in the draft EIS can be met technically and economically.

Based on laboratory testing and the results of the 2022 field testing, subsurface remediation is planned to consist of rinsing the ore zone with 35 pore volumes of fresh water, slowly raising the pH and then pumping about 75 pore volumes of basic solution through the same portion of the ore zone. This basic solution will in effect further raise the pH to a level that impedes further leaching of the deposit and reduces aqueous concentrations of contaminants of concern to below their environmental target levels.

Response to IR-06 Part 2b: Groundwater flow conditions and validation of flow models

Background of Data Collection

Hydrogeological investigations have been ongoing in the field and in laboratories since 2014. Packer, open hole, and cross hole tests have been completed in conjunction with exploration drilling programs. As well, permeability tests have been completed on sections of available competent core within the

Phoenix deposit. Open hole water level surveys have been completed across the site in 2015, 2017, 2021 and 2022. The hydraulic conductivity related field and laboratory test work data are summarized in Table IR-06-2.

Table IR-06-2: Hydraulic Conductivity Related Data Set from Phoenix and Regional Wells

| Test Type | Location | Number of Data Points ¹ |
|---|-----------------|------------------------------------|
| Field – Packer / Injection / Pumping / Slug | Athabasca Group | 56 |
| | Unconformity | 173 |
| | Basement | 20 |
| Lab – Permeability | Athabasca Group | 721 |
| | Unconformity | 1149 |
| | Basement | 1250 |
| Total | | 3,369 |

Note: ¹ This is not necessarily the number of tests conducted, as a single test can yield multiple data points.

Additionally, the following hydrogeological characterization work has been completed at Phoenix:

- Geophysics surveys including:
 - Neutron survey x 5
 - Borehole or nuclear magnetic resonance (BMR or NMR) x 10
 - Sonic x 1
 - Acoustic televiewer x 9
 - Gamma/caliper x 9
 - Electromagnetic flow meter (EMFM) x 9
- Tracer Test (2021)
 - Advanced FFT (2022)

Lithology at Phoenix is considered in terms of nine HGUs that have been defined to be present adjacent to or define the main Phoenix mineralized zone (Phases 1 to 5) including:

- HGUs 1a and 1b: Athabasca Group (overlying the mineralized zone)
- HGU 2a: Upper clay cap
- HGUs 2b, 2c, 2d: Main body of the mineralized zone
- HGU 2e: Lower clay cap
- HGUs 3a and 3b: Weathered and unweather basement.

In the mineralized zone, HGUs 2b, 2c and 2e (in that order) have the highest hydraulic conductivities.

Hydraulic conductivity values in the mineralized zone in Phase 1 average $1\text{E-}06$ m/s, with the southeastern half of the phase generally having higher values than the northwestern half. Phases 1 and 3 do not appear to be hydraulically connected. In Phase 2 there is considerably less data than for Phase 1. There appears to be no hydraulic connection between Phases 1 and 2. Based on aquifer testing and electromagnetic flow meter (EMFM) data, mineralized zone hydraulic conductivity values in Phase 2 ($\sim 4\text{E-}06$ m/s) are on the same order of magnitude as those in Phase 1 and approximately one order of magnitude greater than those in Phases 3 and 4. In Phase 3 the mineralized zone hydraulic conductivity values ($\sim 6\text{E-}07$ m/s) average one order of magnitude lower than those in Phase 2. The mineralized zone Phase 4 has been tested at four locations. With one exception, all values obtained from pumping, injection and slug tests have been in the range $1\text{E-}08$ to $8\text{E-}07$ m/s. The hydraulic conductivity values ($\sim 3\text{E-}07$ m/s) are on the same order of magnitude as those in Phase 3. Much of the mineralized zone water in Phase 4 is capillary bound, but there are some reasonably fractured intervals in Units 2c, 2d and 2e. Comparison of mineralized zone hydraulic conductivities, averaged by mining phase, indicates that Phases 1 and 2 have the highest values due to the large presence of a thick and relatively continuous section of HGU 2b in these phases. Phases 3 and 4 have intermediate values and Phase 5 has the lowest permeability due to a thinner HGU 2b unit, and relative abundance of the clay zones in this phase.

There are several lines of evidence (from laboratory testing, observations during the FFT and geomechanical modelling of the deposit) that localized hydraulic conductivity increases may occur due to the dissolution of uranium from the mineralized zone.

Numerical Modelling

Numerical groundwater modelling has been conducted by SRK (2018), Petrotek (2020 and 2021), and Ecometrix (draft EIS Appendix 7-C). The degree of complexity and the purposes of these models have varied. SRK (2018) created a two-dimensional model that was bound by geological outline of the defined mineral resource in the mineralized zone as part of their PFS. This simplified approach was used based on the assumption that there was a freeze cap above the deposit (the earlier version of the freeze wall). Homogenous K values were assigned to the model and incrementally increased by roughly half an order of magnitude to estimate flow rates.

Petrotek (2020, 2021) built and calibrated several models which had differing purposes. These models were calibrated to the observed responses to aquifer tests conducted in 2019, 2020 and 2021 but they assumed that there was no vertical heterogeneity within mineralized zone and only simulated the response in Phases 1 and 3. Potential well configurations and well spacings were investigated and used to predict the response to the 2021 tracer testing. A high degree of variability in the travel times from the various injection wells and to the pumping wells was found. The variability was attributed to the high degree of heterogeneity in hydraulic conductivity and storage within the mineralized zone. One of the main purposes of this work was to provide a demonstration of proof of concept for application of ISR to the Phoenix deposit.

EcoMetrix (draft EIS Appendix 7-C) developed a regional three-dimensional FEFLOW groundwater flow and transport model that was used to both evaluate residual effects from the FFT and then as part of Denison's draft EIS to examine the post decommissioning effects on regional receptors. The model was calibrated to the regional groundwater flow patterns, was consistent with their conceptual model and was also consistent with the observed hydrochemistry in the Upper and Lower Sandstone Aquifer systems. The groundwater flow in the vicinity of the deposit was observed and simulated in the calibrated groundwater model to travel eastward within the Lower Sandstone Aquifer before moving upward through the desilicified zone in the Athabasca Group sandstone units and overlying overburden deposits toward Whitefish Lake.

As part of the Feasibility Study, Denison retained Dr. Walter Illman and his Ph.D candidate Ning Luo from the University of Waterloo. The University of Waterloo group conducted hydraulic tomography (HT) analysis of the hydraulic test data from the Phoenix deposit to aid in the characterization of the subsurface heterogeneity in K and specific storage (S_s). The areas of the HT model, with high confidence estimation were incorporated into the 2023 WSP FEFLOW model as they represented the best estimation of the 3D distribution of the hydraulic conductivity and storativity. The FEFLOW model is a numerical representation of the site hydrogeology and groundwater flow regime in the mineralized zone and was calibrated to hydraulic testing data that has been collected for the site. FEFLOW model specified well designs including well screen locations and any planned permeability enhancements to specific wells or HGUs within wells.

The FEFLOW results were used as an input into GoldSim (GoldSim V14, Technology Group, LLC). GoldSim is a mathematical model that uses the outputs from FEFLOW to estimate the uranium dissolution by HGU and by extraction well with time. GoldSim simulated the dynamic nature of the lixiviant injection and uranium recovery systems associated with the wellfield.

Recovery Curve

The test work and derivation of the recovery curve from laboratory testing that has been standardized to one condition and grade. The recovery curve indicates the concentration of uranium bearing solution (UBS) produced as a function of pore volumes (PVs) recovered. Therefore, by determining the hydrogeological flow field for an array of injection and recovery wells and the related PVs recovered with time, an aggregate wellfield recovery can be calculated by applying the recovery curve to each recovery well's PV distribution.

The recovery curve is scaled in the modelling to account for variations in in situ grade.

Hydrogeological Modelling

The numerical groundwater flow modelling methodology was conducted using FEFLOW and was described earlier. The physical setting of the mineralized zones was numerically represented in FEFLOW based on the Denison geological block model. FEFLOW was used as the basis of wellfield layout and the

simulation of the lixiviant flow within the mineralized zone. For production modelling, the following values for each of the FEFLOW numerical elements in 3 dimensions was output:

- Production unit or well capture zone that element belonged to
 - Flow per unit time
 - Element volume
 - Effective porosity
 - HGU and uranium in situ grade

Wellfield Production Modelling

Using the FEFLOW simulation outputs for each mesh unit, GoldSim calculated the uranium recovery based on the number of PVs through the unit and the corresponding concentration of U_3O_8 in each recovery well. The mesh units are aggregated based on the associated recovery well number from FEFLOW.

Wells are started and stopped in GoldSim to simulate the progression of mining in the wellfield. Well starting is set manually. The end of operation for each well is determined by a cutoff recovery grade. In this way the overall production from the wellfield is controlled to provide process plant feed of the required flow and grade over time. At a detailed level, well operating times can be adjusted to smooth the mass flow rate of uranium to the plant, within the limits of the model granularity.

Optimizing the production rate and total quantity required several iterations of FEFLOW and GoldSim modelling. GoldSim outputs were analyzed to identify wells that were under-performing compared to expectations. The number and position of injection and recovery wells and their flow rates were adjusted based on these results, and the FEFLOW model was re-run. This iterative process involved examination of the under-performing areas and adjustment to the flows in these areas in both FEFLOW and GoldSim.

Throughout the optimization iterations, the number of unexpected low-performing wells was reduced. When it appeared the effort had reached its asymptote the remaining low performing wells were reviewed. A statistical analysis showed that four wells patterns or production blocks were outliers. These four wells that were located in areas with otherwise consistent recovery had shown more reasonable response in prior iterations. The results from these four production units was therefore assumed to be non-representative. It was assumed these production units can be mined by varying the pumping rates, wellfield stimulation and/or adding possibly adding additional wells. Recovery from these four wells were therefore added at the average rate per HGU for their Phase and included in the overall production.

Data gathered during the field tests have been utilized for both the EA groundwater model as well as the mining model.

Response to IR-06 Part 2c. Mobilization of contaminants (e.g., Al, Se or V)

Contaminants mobilized during the FFT were similar in concentration compared to the UBS solutions that were collected during lab scale core and column leach testing at SRC which suggests that the testing Denison conducted at lab scale and the information collected is representative of the deposit. The column test assay results in Table IR-06-3 below include the maximum as well as weighted average from all phases of the leaching and remediation test. The FFT result presented in Table IR-06-3 below was the sample with the highest concentration of uranium during the test.

Table IR-06-3: Potential for Mobilization of Contaminants - Comparison of Results from Lab Scale Column Tests and Groundwater Results from the Feasibility Field Test

| Analyte | Column Tests | | FFT |
|----------|--------------|--------------|-----------------------|
| | Max | Weighted Avg | GWR-041, Oct 13, 2022 |
| U, ppm | 48222.3 | 13902.0 | 43400 |
| Al, mg/L | 783.9 | 284.1 | 180 |
| Fe, mg/L | 7029.1 | 1757.4 | 1200 |
| Ca, mg/L | 1135.1 | 445.8 | 1100 |
| Mg, mg/L | 672.3 | 170.5 | 10 |
| K, mg/L | 329.6 | 54.0 | 150 |
| Na, mg/L | 927.4 | 52.0 | 90 |
| Pb, mg/L | 16.4 | 3.3 | 1 |
| Mo, mg/L | 296.6 | 24.8 | 15 |
| P, mg/L | 44.5 | 6.8 | 20 |
| Cd, mg/L | 6.2 | 0.2 | 0 |
| Mn, mg/L | 263.3 | 57.9 | 83 |
| Cr, mg/L | 14.1 | 0.8 | 5 |
| V, mg/L | 148.3 | 33.8 | 22 |
| Sr, mg/L | 17.1 | 2.5 | 16 |
| Ba, mg/L | 6.4 | 1.9 | 5 |
| Cu, mg/L | 1610.8 | 280.8 | 2 |
| Zn, mg/L | 1276.2 | 38.8 | 5 |
| Co, mg/L | 49.3 | 4.1 | 1 |
| Ni, mg/L | 166.2 | 6.6 | 1 |
| As, mg/L | 95.9 | 10.4 | 3 |
| Se, mg/L | 1.6 | 0.1 | 1 |
| S, mg/L | 24115.4 | 14740.9 | 12333 |

Response to IR-06 Part 2d. Potential for free gas evolution/two-phase flow

Calcium carbonate is known to be present in the deposit in relatively low percentage amount. The reaction between acid and calcium carbonate can release CO₂ gas and therefore cause two phase flow, especially when going from the hydrostatic pressure of the deposit to the atmospheric pressure at surface which will encourage degassing of solution. It is expected two-phase flow will occur during the mine life, especially as carbonate containing material are being decomposed with the sulfuric acid of the lixiviant. The FFT provided confirmation that the proposed radon degassing surge tank directly fed by

downhole recovery pump is adequate for operations and does not pose additional Health & Safety or environmental risks.

Response to IR-06 Part 2e. Identifying composition of lixiviant and production solutions

As part of the metallurgical test program, over 125kg of core from the Phoenix deposit has been leached in a variety of settings, including bottle rolls, column tests, and intact core tests. This has helped to predict concentrations of both the lixiviant as well as the production solutions.

The lixiviant (mining solution) concentrations will vary depending on each individual well production profile. To ensure reagent consumption is effective and efficient it will be varied during the life of each well dependent on its characteristics.

The initial acidification of the well requires a lower acid content to ensure the formation does not plug due to precipitation, whereas during periods of high production the well can accept a higher acid concentration. Towards the end of the recovery curve, the uranium is more difficult to access and therefore the strength of the acid or the flow rate to the well need to be optimized to ensure efficient use of reagents.

It is expected that the lixiviant concentrations will vary between 0-60 g/L H₂SO₄, and 0-20g/L H₂O₂ and will be situationally dependent. There is also the capability to add Fe₂(SO₄)₃, however it is not expected that this will be required in significant concentration due to the natural abundance of iron in the deposit.

Table IR-06-4: Representative Concentration Ranges of Uranium Bearing Solution

| | Lower-end Concentrations | Upper-end concentrations |
|-----------------|---------------------------------|---------------------------------|
| U, ppm | 2976 | 116395 |
| Al, mg/L | 25.8 | 8506.1 |
| Fe, mg/L | 134.0 | 21737.9 |
| Ca, mg/L | 99.7 | 10736.0 |
| Mg, mg/L | 21.7 | 1776.4 |
| K, mg/L | 8.0 | 756.2 |
| Na, mg/L | 7.0 | 5361.9 |
| Pb, mg/L | 0.1 | 124.5 |
| Mo, mg/L | 0.1 | 64.8 |
| P, mg/L | 4.0 | 276.6 |
| Cd, mg/L | 0.1 | 66.4 |
| Mn, mg/L | 8.0 | 980.7 |

| | Lower-end Concentrations | Upper-end concentrations |
|----------|--------------------------|--------------------------|
| Cr, mg/L | 0.1 | 145.9 |
| V, mg/L | 3.4 | 942.4 |
| Sr, mg/L | 0.6 | 178.8 |
| Ba, mg/L | 0.1 | 104.8 |
| Cu, mg/L | 1.7 | 1337.9 |
| Zn, mg/L | 2.7 | 987.9 |
| Co, mg/L | 0.5 | 114.9 |
| Ni, mg/L | 0.1 | 216.4 |
| As, mg/L | 0.1 | 96.5 |
| Se, mg/L | 0.1 | 203.2 |
| S, mg/L | 1751.3 | 29671.1 |

Response to IR-06 Part 2f. Success despite presence of >2% carbonate minerals (siderite, FeCO₃) in the ore zone (see Table 4-3 of Appendix 7-A)

The metallurgical test work and FFT completed to date has shown that carbonate minerals present in deposit does not pose a material impact on the ISR mining method proposed for the project.

Response to IR-06 Part 2g. Site-specific data to parameterize, validate, and refine solute transport models (hydraulic conductivity, effective porosity, dispersivity, diffusion, etc.)

Please see summary above under response to IR-06 Part 2b under the heading Background of Data Collection.

Response to IR-06 Part 3

Expected total recovery from deposit is 80.6%. Average uranium concentrations recovered from wellfield is estimated to be 22.5/L U. The nominal case ISR wellfield reagent consumptions are shown in the Table IR-06-5.

Table IR-06-5 Nominal ISR Wellfield Reagent Consumptions

| Area | Reagent | kg/kg U in feed | kg/m³ UBS feed |
|---------------------|-----------------------|------------------------|----------------------------------|
| In situ leach (ISL) | 93% sulphuric acid | 1.40 | 12 |
| | 70% hydrogen peroxide | 0.40 | - |
| | 50% ferric sulphate | 0.024 | - |
| ISL remediation | 50% sodium hydroxide | | 15 |

Solutions recovered contain minimal solids based on test work completed to date. Any entrained solids in solutions will be removed through the precipitation circuits of the process plant. Should they contain appreciable of uranium, solids can be processed at another licensed facility.

References:

Petrotek. 2020. Interim Hydrogeologic Report – Wheeler River Project Phoenix Deposit. Unpublished report prepared for Denison Mines Corp. March 2020.

Petrotek 2021. Groundwater Model Report Phase 1, Phoenix Deposit Wheeler River Project. Prepared for Denison Mines. December 2021.

SRK Consulting. 2018. Prefeasibility Study Report for the Wheeler River Uranium Project, Saskatchewan, Canada. Report prepared for Denison Mines Corp. October 2018

Attachment: IR-10

| | |
|---|---|
| Number | IR-10 |
| Dept. | ECCC |
| Project effects link | Fish and fish habitat |
| Reference to EIS, appendices, or supporting documentation | Section 2.2.1.4.2.3, Tertiary Containment of Mining Solution - Freeze Wall |
| Context and Rationale | <p>Context: The Proponent stated that as a tertiary means of containment for the mining area, the uranium deposit is proposed to be surrounded by a freeze wall that extends from the surface to the basement rock, isolating the mining area from regional groundwater. Current plans are for the freeze wall to be a minimum of 10 m thick, be installed 25 m away from the uranium deposit, and extend 30 m into the basement rock (Figure 2.2-6).</p> <p>As explained in Section 2.2.1.4.2.2, mining solution will be injected into the ore zone under pressure and will likely react, not just with the uranium in the ore zone, but also the binding or cementing material in the sandstone. This means that some portion of the sandstone above the uranium layer and perhaps some portions of the freeze wall will dissolve, thereby creating more void than just the thickness of the uranium layer or horizon. The void may affect the integrity of the freeze wall as containment.</p> <p>Rationale: It is not clear how the Proponent will monitor the freeze wall to verify whether portions of the freeze wall are being dissolved in the mining process and how it plans to verify the integrity of the freeze wall as a containment for the mining solution. In addition, if the dissolution reaction of the uranium ore is exothermic, then the heat generated may also affect the integrity of the freeze wall.</p> |
| Information Requirement | <ol style="list-style-type: none"> 1. Explain how the integrity of the freeze wall will be maintained as a means of containment that prevents migration of the mining solution out of the ore zone into the receiving environment. 2. Demonstrate that the mining solution injected under pressure will not compromise the integrity of the freeze wall as a containment. |

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| | <p>3. Demonstrate how both exothermic and chemical reactions of the mining solution used to dissolve the uranium ore will not compromise the integrity of the freeze wall as a containment.</p> <p>Technical Discussion Required: Yes. ECCC would like to better understand the chemical constituents that compose the mining solution and the chemical reactions that it will cause</p> |
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Response:

The general theme of the comments and questions stated above seem to be related to:

- verification of the freeze wall extents;
- response of the freeze wall to potential chemical interaction with the lixiviant;
- response of the freeze wall to induced hydraulic or lithostatic stress; and
- response of the freeze wall to potential exothermic processes related to ISR.

The alignment of the freeze wall is located 25 m offset from the lateral extent of the recoverable ore and the freeze wall will grow in thickness both towards the ore and away from the ore. The freeze wall will solidify all liquid porewater and develop into a contiguous impermeable barrier many metres thick. Ground temperature monitoring will be installed on both the ore and non-ore sides of the freeze wall to confirm the thickness of frozen ground and to validate thermal finite element models of the entire area. Thermal models can very accurately represent real conditions because ground thermal properties used in the analyses only vary by a factor of two to four across all ground types, unlike hydraulic or strength properties, which can vary by many orders of magnitude across relatively short distances.

The figures below are an example of field data validating modelled predictions for a shaft freeze wall at depth.

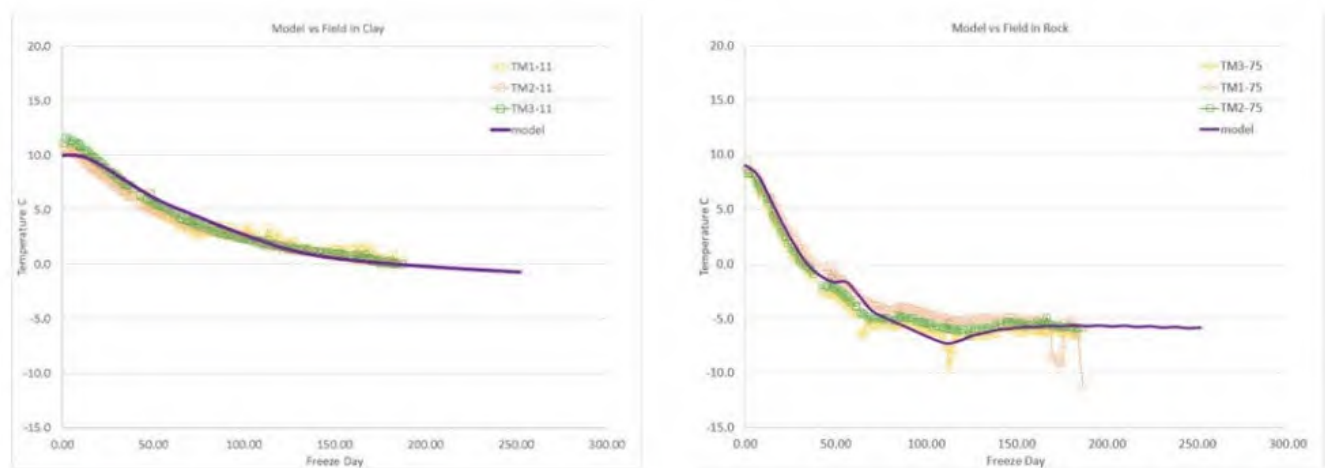


Figure 1: Illustration of a calibrated FEM model for freezing in clay (left) and rock (right). Temperatures were measured offset from the freeze wall pipe locations and compared with model predictions at the same location.

The injection and recovery wells will be set up such that they are within the confines of the ore itself and migration of fluids towards the freeze wall and through non ore ground between the ore and freeze wall should be minimized because hydraulic gradients will induce preferential flow to recovery wells and away from the freeze wall. Having said that, if significant excursion of lixiviant were to occur and it were to contact the freeze wall, it is not expected to chemically dissolve the in situ ice. The freezing point depression of the lixiviant proposed for this project was determined to be -1°C and, as such, it would freeze off and become immobile before significant volume could negatively impact the freeze wall. If the lixiviant were to dissolve some of the host soil / rock binding material at the freeze wall surface, it would occupy the resulting void space, but then freeze off, which would halt further migration within the freeze wall.

Freeze walls, when fully developed, are capable of withstanding significant external pressures because the ice in the pore voids greatly improves the bulk strength of the soil. For example, in the province of Saskatchewan, ground freezing is used to support the sinking of deep potash mine shafts, which must penetrate through the Mannville formation at a depth between 400 and 500 m below surface. The Mannville formation is often described as saturated, unconsolidated beach sand and it would not support shaft excavation in a thawed state. Freezing is used to create a structural and impermeable wall up to 5 m thick, which can resist a stress gradient driven by full hydrostatic and/or lithostatic pressures on the outside of the wall, and an open to atmosphere excavation within the shaft. This loading condition is much more extreme than any condition the freeze walls at the Phoenix deposit will experience because the interior side of the freeze wall where active ISR mining is occurring is not open to atmosphere and is fluid filled in the same way that the regional groundwater system is on the exterior side of the freeze wall, creating a balanced pressure system, where loading is equal on both the interior and exterior sides.. While freeze walls are very strong when fully developed, they are also plastic in nature. This means that they can slowly deform without failing in response to localized ground deformations. As the freeze wall deforms towards a lower stress zone, it maintains its thickness and integrity. While the above example referred to potash shafts, other examples can be drawn from the experience at the McArthur River or Cigar Lake uranium mines. At McArthur River, open stopes are generated directly adjacent to a freeze wall that is a nominal 4 m thick. At Cigar Lake, open mine cavities 10 m high and several metres in diameter commonly exist within the frozen ground. Neither site has had a breach of the freeze wall during mining activity. Given that the freeze wall at Denison will be much thicker than at McArthur River and that it will be located up to 25 m from the ore zone, it is not anticipated that it will be exposed to a stress environment that will put it at risk.

The leaching process has the potential to be exothermic and generate heat, which may flow toward the freeze wall. In this instance, there is low sulphur content in the ore zone and the exothermic reaction will be minimal. Despite this, all thermal modelling in support of the freeze design assumed that the freeze wall had to develop and be sustained in the presence of an ore zone that generated a nominal amount of heat—sufficient enough to sustain a minimum temperature of 10°C even though it would naturally tend to cool below this in response to the freeze system. It is understood that the lixiviant may be heated as part of the pre-injection process, so some accounting for heat in the ore zone was included in the analysis to date. Should the lixiviant generate more exothermic reaction than predicted, there is a very low risk of it degrading the freeze wall in any significant amount. Referring back to the potash mine shaft freezing illustration, it is not uncommon for in shaft excavation activity and concrete work to

generate temperatures between 30 and 60°C that act on a freeze wall only 5 m thick and only a few metres away from the exposed shaft wall. In this extreme case, the freeze wall is more than capable of removing the generated heat. The physics of heat flow are such that heat generated by the ISR process would be free to flow towards the freeze wall; however, most of it would flow to the coldest location (e.g., the actual freeze pipes at the mid-point of the wall thickness) before it is manifested as an observable significant rise in ground temperature. Even if the heat were to warm the ore side of the freeze wall, it would not impact the non-ore side of the wall (which is where half of the total wall thickness resides). This heat may penetrate to the center of the wall but if the refrigeration plant is operating, that heat can not then flow “up gradient” on the non-ore side of the wall and thaw that side.

The concentration of the lixiviant (max ~8% sulfuric acid conc.) has a freezing point of ~-4°C. The lixiviant itself will not react chemically with the freeze wall, other than having a slightly different freezing point than formation water. The main reaction expected is dissolution of uraninite with the combination of sulfuric acid, hydrogen peroxide, and ferric iron. This reaction is exothermic, but there are several natural mitigating factors of the wellfield that aid in minimizing heat transport to the freeze wall:

- The wellfield will have flexibility in terms of reagent concentrations being added. With the bulk of the uranium being contained within a higher-grade core (interior to the deposit), the exterior of the deposit will see either lower injection/recovery flows or lower concentrations of lixiviant to be efficient with reagent consumption. Whether the concentration or flow is reduced, this limits the reaction rate and therefore total heat generation at the extremities of the deposit.
- There is no refortification of reagents underground compared to typical uranium tank leaching. This prevents additional heat generation from dilution of sulfuric acid or hydrogen peroxide.
- The heat capacity of lixiviant/UBS should be higher than the ore in the deposit, which means the UBS solution will carry the majority of the heat to surface rather than keeping the heat of reaction at depth.
- In the event the freeze wall thickness monitoring network detected an actionable thinning to the freeze wall, the concentration of lixiviant could be decreased which would reduce the heat generated per m³ of lixiviant and re-establish the desired freeze wall thickness.

To summarize the risk of the degradation of the freeze wall due to exothermic reaction, it is almost impossible—with the freeze plant operating—to practically add sufficient sustained heat to thaw the proposed freeze wall to the point hydraulic containment is compromised. Sufficient operational controls will be in place to verify the freeze plant is operating, to measure the temperature in the ore zone, and to measure the temperature on adjacent sides of the freeze wall so that early detection of any upset conditions can be identified and addressed. Options for addressing issues are to lower the temperature of the freeze system to draw more heat out, to increase the freeze coolant flow rates in freeze wells nearer to active ISR cells, or to adaptively manage the lixiviant injection and recovery rates in cells located nearer the freeze wall.

Attachment: IR-18

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| Number | IR-18 |
| Dept. | ECCC |
| Project effects link | Change to an environmental component due to hazardous contaminants |
| Reference to EIS, appendices, or supporting documentation | Section 2.2.3.9, Project Description Appendix 8-E |
| Context and Rationale | <p>Context: In Table 2.2-1 the upper bound Industrial Wastewater Treatment Plant (IWWTP) effluent quality final discharge targets for Constituents of Potential Concern (COPCs) are provided. General parameters (e.g., temperature, pH, etc.), and several Schedule 4 Substances with maximum authorized concentrations (lead, nickel, suspended solids, and un-ionized ammonia) under the Metal and Diamond Mining Effluent Regulations (MDMER) have not been provided in this table. There are several COPCs (aluminum, mercury, iron, nitrate, thallium, phosphorus and manganese) for effluent characterization under Schedule 5 Section 4 of the MDMER that have not been provided in this table. Additionally, no information on water quality guidelines has been provided in this table.</p> <p>Furthermore, it is stated that the final effluent quality discharge target for uranium is 0.057 mg/L. However, the Canadian Council of Ministers of the Environment (CCME) water short term (acute) water quality guidelines for the protection of aquatic life is 0.033 mg/L. The proposed effluent discharge target for uranium exceeds the acute water quality guidelines, indicating effluent may pose the risk of being acutely lethal to aquatic biota at end-of-pipe.</p> <p>Rationale: ECCC requests the Proponent include the general water quality parameters that influence water quality thresholds, parameters in Schedule 4 and Schedule 5 Section 4 of the MDMER, and their respective water quality guidelines for consideration and transparency.</p> <p>Discharges from the proposed Project will alter water quality in the immediate receiving area, and this may include some sublethal effects on aquatic biota, which must be minimized. It remains the Proponent's responsibility to adhere to the MDMER to ensure that effluent at the end-of-pipe from all final discharge points be non- acutely lethal and meet requirements for prescribed deleterious substances under Schedule 4 of the regulations.</p> |
| Information Requirement | 1. Update Table 2.2-1 and Appendix 8-E to include all general parameters required for environmental effects monitoring: pH, temperature, hardness, alkalinity, and conductivity. |

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| | <p>2. Update Table 2.2-1 and Appendix 8-E to include missing Schedule 4 Substances under the MDMER with maximum authorized concentrations: lead, nickel, suspended solids, and un-ionized ammonia.</p> <p>3. Update Table 2.2-1 and Appendix 8-E to include missing Schedule 5 Section 4 parameters required for effluent characterization under the MDMER: aluminum, mercury, iron, nitrate, thallium, phosphorus and manganese.</p> <p>4. Include all acute and chronic water quality thresholds for each parameter in Table 2.2-1 and Appendix 8-E.</p> <p>5. Describe additional mitigation measures that can be considered to minimize impacts to aquatic biota from uranium concentrations in effluent.</p> |
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Supporting table to the response provided in IR table:

Table 2.2-1 - Upper Bound Industrial Wastewater Treatment Plant Effluent Quality (updated)

| Constituent | Unit | Screening Concentration | Source of Screening Concentration | Predicted Site Discharge Concentration |
|--|------|-------------------------|-----------------------------------|--|
| Chloride | mg/L | 120 | SEQG/CCME | 600 |
| Sulphate (Hardness) | mg/L | 429 | BC MOE* | 3915 |
| Sulphate | mg/L | 128 | BC MOE | 3915 |
| TDS | mg/L | 500 | SEQG | 6420 |
| TSS | mg/L | 15 | Schd 4 - MDMER | 6 |
| Arsenic | mg/L | 0.01 | SEQG/CCME | 0.006 |
| Cadmium | mg/L | 0.0003 | SEQG/CCME* | 0.0018 |
| Chromium | mg/L | 0.001 | SEQG/CCME | 0.025 |
| Cobalt | mg/L | 0.0003 | FEQG | 0.0030 |
| Copper | mg/L | 0.004 | SEQG/CCME* | 0.022 |
| Lead | mg/L | 0.005 | CCME | 0.0003 |
| Molybdenum | mg/L | 0.07 | WHO | 2.5 |
| Nickel | mg/L | 0.07 | WHO | 0.014 |
| Selenium | mg/L | 0.001 | SEQG/CCME | 0.042 |
| Uranium | mg/L | 0.02 | SEQG/CCME | 0.057 |
| Vanadium | mg/L | 0.12 | FEQG | 0.059 |
| Zinc | mg/L | 0.1 | FEQG** | 0.042 |
| Mercury | mg/L | 0.000026 | SEQG/CCME | 0.000001 |
| Ammonia (as N) | mg/L | 5.74 | SEQG/CCME | 3.9 |
| Un-ionized Ammonia | mg/L | 1.00 | MDMER Sched 4 | 0.0078 |
| Phosphorus | mg/L | 0.015 | BC MOE | N/A |
| Thorium-230 | Bq/L | 0.6 | HC | 0.9 |
| Radium-226 | Bq/L | 0.11 | SEQG | 0.15 |
| Lead-210 | Bq/L | 0.2 | HC | 0.419 |
| Polonium-210 | Bq/L | 0.1 | HC | 0.15 |
| Notes (1) Bolded values are those that exceed the screening concentrations * Hardness induced guideline, assuming hardness >250 mg/L ** Hardness induced guideline, assuming hardness >250 mg/L, pH=7.0, DOC = 5.26 mg/L Un-ionized ammonia calculated | | | | |

Attachment: IR-20, IR-67, IR-69

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| Number | IR-20 |
| Dept. | NRCan |
| Project effects link | Fish and fish habitat |
| Reference to EIS, appendices, or supporting documentation | Section 2.3.3.1.1 Appendix 7-C |
| Context and Rationale | <p>Context: The proponent's objective for mining area remediation is to restore the groundwater within the confines of the freeze wall to an acceptable remediation target (EIS, sec. 2.3.3.1.1). The proponent's acceptable decommissioning objectives for groundwater quality are provided in EIS Table 2.3-3 and in Table 3-5 of Appendix 7-C. These objectives were based on laboratory core flood tests performed by flushing samples of ore with groundwater and groundwater amended with sodium hydroxide or sodium bicarbonate. The composition of the remediated groundwater observed in the core flood tests serves as the source term for the post-decommissioning reactive transport modeling presented in section 4 of Appendix 7-C.</p> <p>Rationale: In NRCan's opinion, it is important for reviewers to be able to assess the level of remediation achieved in order to reach the proponent's decommissioning groundwater quality objectives. Therefore, the proponent should provide complete water quality data for the pregnant lixiviant that remains in the ore zone after the end of mining and prior to any remediation.</p> |
| Information Requirement | NRCan requests that the proponent revise Table 3-5 of Appendix 7-C to show the water quality in lixiviant remaining in the ore zone at the end of mining, prior to remediation activities. |

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| Number | IR-67 |
| Dept. | CNSC |
| Project effects link | Geology and groundwater |
| Reference to EIS, appendices, or supporting documentation | Section 7.6.2.1 (Remediation Objectives) |
| Context and Rationale | <p>Context: Metallurgical testing, including batch reaction, coreflood testing and column tests are mentioned frequently throughout Sections 2 and 7 of the EIS. Outside of the composition of restored solutions from coreflood tests #2B and 3C, results from these various tests are not reported in the EIS or any associated Appendices. Rationale: The results from metallurgical testing are important to a number of items discussed in the EIS, including (but not limited to): evolution of hydrochemistry during remediation, source of salts in Lower Sandstone Aquifer porewaters, process plans, industrial wastewater treatment, estimating composition and volume of process precipitates, and composition of mining fluids and leachate. In particular, the EIS posits that mining area decommissioning objectives are achievable based on metallurgical testing and provides these objectives in Table 2.3-3. CNSC staff need to understand the specifics of this metallurgical testing, given</p> |

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| | its importance for the development and justification for mining and remediation activities. Denison must also provide information demonstrating that the proposed restoration actions and remediation targets are As Low As Reasonably Achievable (ALARA). |
| Information Requirement | 1. Please provide a summary of the results and the analysis of results of the metallurgical tests within the EIS, or provide the technical supporting document with this information, and ensure the documentation is appropriately referenced in the EIS. This should include sample information for cores (e.g., mineralogy, location, U content, depth), test conditions (e.g., duration, # of iterations, column length, flow rate, temperature, pressure, sample frequency, influent/effluent composition), as well as results and how they are pertinent to the development of ISR activities. 2. Please provide further clarification/justification on how results from two singular coreflood tests (i.e., Coreflood #2B and Coreflood #3C) can justify large-scale remediation activities and targets following solution mining. 3. Please provide material demonstrating that the proposed restoration actions and remediation targets are ALARA. |

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| Number | IR-69 |
| Dept. | NRCAN |
| Project effects link | Fish and fish habitat |
| Reference to EIS, appendices, or supporting documentation | Section 7.6.2.2.3 Appendix 7-C, sections 3.1 and 3.2 |
| Context and Rationale | <p>Context: For hydrogeological and geochemical assessments in support of ISR projects, the proponent identifies two aspects of primary importance (Appendix 7-C, sec. 3.1). These are a) groundwater remediation (Appendix 7-C, sec. 3.1.1); and b) the assimilative capacity of host rocks downgradient from the ore zone (Appendix 7-C, sec. 3.1.2). According to the proponent, the objective of groundwater remediation at decommissioning is to achieve water quality in the mined zone that does not pose a risk to receptors at the point of exposure. Assimilative capacity refers to the ability of groundwater-rock reactions to naturally sequester or attenuate COPCs migrating from the ore zone during the post-decommissioning period.</p> <p>Rationale: However, in NRCAN's opinion, the proponent has neglected to mention the most fundamental aspect for hydrogeological and geochemical assessments in support of ISR projects. That aspect is the choice of ISR lixiviant and its effects on the mineralogy and hydrogeochemistry of the ore zone during mining operations. The proponent provides information on the pre-mining mineralogy (Appendix 7-C, sec. 3.2.1) and hydrogeochemistry (Appendix 7-C, sec. 3.2.2) but no information on their expected changes as a result of ISR mining. This information is important when considering source terms in reactive transport modeling.</p> |
| Information Requirement | NRCAN requests that the proponent provide a detailed description of the expected mineralogical and hydrogeochemical changes occurring within the ore and barrier zones as a result of the injection of acidic lixiviant. |

Response:

It is also important to note that Denison is completing a sequential EA and licensing process for the Project (see draft EIS Section 1). Detailed ISR mining-related information needed to support licensing

and permitting has not been included in the EIS; it will be provided to regulators as part of permitting and licensing.

For the EIS, an initial understanding of the mining area remediation was needed to initiate the assessment of migration of constituents of potential concern in groundwater out of this area in the post-decommissioning period. The findings and conclusions of the EIS were also used, in turn, to inform and bound the engineering and feasibility work. The coreflood 2b and 3c, plus the Pre-Feasibility work (Denison, 2018) on mining area remediation (Section 2 (decommissioning section), Section 7, Appendix 7-C) was used in the draft EIS. This IR response provides additional information to support the selection of these studies.

Response to #1

1.0 Summary of Test Work

This response is focused on the metallurgical test work done to support an understanding of the:

- a) mineralogy and hydrogeochemical changes in the ore and barrier zones as a result of the lixiviant (mining solution) injections (see IR-69);
- b) the composition of the uranium bearing solution (UBS) at the end of mining and prior to any remediation (see IR-20); and
- c) water quality and secondary mineral phases formed during remediation of the ore zone (IR67; this IR).

Metallurgical testing completed, the objectives and results of the work, and the information carried forward for discussion in this response are summarized in Table 1.

Further details on the metallurgical testing, including the sample information for cores (e.g., mineralogy, location, U content, depth), test conditions (e.g., duration, # of iterations, column length, flow rate, temperature, pressure, sample frequency, influent/effluent composition) are provided in the sections below. All data presented herein are from the metallurgical test programs used to support the 2018 Prefeasibility Study (Denison 2018) and the Feasibility Study (Denison 2023).

Table 1: Summary of Metallurgical Testing

| Years | Description | Objective | Results | Information informing IR-20, IR-67 and IR-69 |
|-----------|--|--|--|--|
| 2017-2018 | Batch leach tests and bottle roll/agitation leach tests | Early testing of leaching with alkaline and acidic based lixivants | Supported decision for Acid Leaching | No discussion herein; very preliminary testing. |
| | A column leach test conducted using sulfuric acid followed, which also included simulated groundwater restoration tests. | Initial column test with acid leaching and evaluation of groundwater remediation | Early indication of groundwater remediation needs | Water Quality of UBS at the end of mining and Restoration Phase/flushing solution (groundwater remediation) |
| 2021 | Column leach tests on blended crushed ore | Test leach recoveries on a range of feed grades. Determine potential recovery and generate a representative sample for process plant testing. | Operationally, the feed sample for Column 1 is was verified as a reasonable blend to represent ISR wellfield production of UBS. Groundwater remediation with groundwater and alkaline solutions | Water Quality of UBS at the end of mining and Restoration Phase/flushing solution (groundwater remediation). Mineralogy. |
| 2022 | Column leach and remediation tests on crushed and screened core from individual hydrogeologic units | <ul style="list-style-type: none">•Develop information to support geochemical modelling of the deposit, including leaching and neutralization phases.•Generate a detailed chemical and mineralogical characterization of the dominant hydrogeological units(HGUs) within the ore zone•Evaluate behaviour of different HGUs during ISR and neutralization, in particular those hosting the majority of the resource.•Compare the efficacy of neutralization of different HGUs, with the use of dilute sodium hydroxide | Uranium leachability was found to vary amongst the HGUs. Also, there were some indications of an HGU ("2A") to be avoided during operations to prevent clay mobilization. | Water Quality of UBS at the end of mining. |
| 2018 | Static uranium ore dissolution (jar) test on intact core | Room temperature, 1,138 hours (48 days) exposure of drill core to concentrated sulphuric acid (35 g/L) in a very slow-motion shaker. | Provided visual indication that with sufficient soak time, lixiviant will penetrate into intact high grade uranium pieces. The incomplete recoveries at the end of the tests can be attributed largely to requiring longer residence time | No discussion herein; testing limited to visual information. |
| 2018-2022 | Coreflood tests on intact core in 2018 to 2022 | Simulate the in situ field conditions, to understand and develop the lixiviant conditions necessary for successful full-scale ISR. Objectives were to: evaluate the rate of uraninite dissolution and changes in permeability of the core with leaching; generate laboratory scale test results applicable to planning the 2022 field test; and delineate a life-of-well-pattern production profile. | <p>Results were inconsistent in the early work (Coreflood 1 to 3C) due to highly variable reagent dosages in this pioneering work. Coreflood 4 and 5 (2021-ongoing).</p> <p>In Coreflood 4, as uranium mass gradually leached away, there was a mild trend of increasing flow rate at the same pressure, indicating permeability increase. Lessons learned from past testing, particularly with respect to reagent adjustments, were put into practice with this testing to enable completion of the longest test run to support the feasibility work. In total, 51.8% of the initial dry mass of the sample was removed by leaching; 50% of this was the result of uranium leaching. Feed grade was 26.66% U3O8.</p> <p>In Coreflood 5 is ongoing and is focused on HGU 2B, which has the majority of contained uranium, highest grade and highest natural permeability. The methodology was different from the other coreflood tests in that the flow was directed through a pencil hole in core. Cumulative recovery at end of February 2023 was 33%.</p> | Water Quality of UBS at the end of mining and Restoration Phase/flushing solution (groundwater remediation). Mineralogy. |
| 2022 | Feasibility field test (FFT) leaching and remediation in 2022 | The FFT was a full-scale proof of concept in an ISR method; to demonstrate injection of lixiviant and recovery of UBS from the CSW test pattern. Injection was into 1 well (GWR-041). | After pH below 3 was achieved in GWR-041, active leaching of uranium began. UBS grade from GWR-041 rose while pH declined. Uranium grade trended upwards to 25 g/L over four days, while injection pressure decreased. This suggests that leaching played a role in reducing resistance to flow. A peak sample grade of 43 g/L U was collected from GWR-041 after a further three days, so the acid injection phase was ended (on October 12). A global leaching recovery curve could be developed using the field testing and coreflood tests. | No discussion included herein. |

1.1 2018 Column Leach and Groundwater Restoration Test

In early 2018, a column leach test with acid lixiviant was performed. The core material used for testing came from three drill holes. Select intervals of overlying very low-grade sandstone was blended with very high-grade intervals to create a composite feed grade of 24.2% U. Details on the core material used in the leach tests are provided in Appendix A to this response, in Table A1.

A total of 137 pore volumes (PVs) of uranium bearing solution (UBS) was generated at flow rate ranging between 2 to 4 PV/d. A 90% recovery was achieved with a peak individual sample uranium grade of 27.4 g/L and average UBS grade of 8.4 g/L U. Following the leaching, the column was flushed with simulated groundwater to simulate groundwater restoration. Analytical results from the first pore volume of water removed from the column during the restoration phase are incorporated into the range in UBS composition at the end of mining presented in Table IR-20, IR-67, IR-69-2.

Table 2 addresses IR-20. This table summarizes information from the metallurgical testing with respect to composition of the UBS at the end of mining, prior to remediation. See further discussion below in Section 1.3.

Flushing of the column with simulated groundwater (Phase 1 of restoration) was continued for 84 pore volumes. Phase 2 (RPV 84-108) circulated simulated ore zone water quality fortified with 1 g/L Bicarbonate [from NaHCO_3]. The test simulated the operation of a Reverse Osmosis (RO) water treatment step where solution exiting the column would be treated prior to being re-introduced. Phase 3 (RPV 108-114) re-established injection of simulated groundwater quality. The objective of this phase was to displace the bicarbonate and to ensure ground water stability once the circulation of fluid is halted. Analytical results for groundwater collected during this restoration process are shown in Table 9 and Table 10. Information presented in those tables is discussed further in Section 2.0.

1.2 Column and Coreflood Tests

The following were common to all column and coreflood tests performed:

- The pore volume was determined by pumping water (deionized water, site groundwater) into each column or core until filled.
- Temperature was controlled to 10°C by placing the apparatus in a walk-in cooler.
- An online UBS or Remediation/Flushing Solution sample was taken daily.

Table 2:UBS Chemistry at end of Leaching (Mining)

| Test | Units | Coreflood 2B (2021) | Coreflood 3C | Number of Samples | Range of Values of UBS constituent concentrations across Metallurgical tests from 2018-2021 representative of End of mining conditions | | Baseline Ore Zone Groundwater Chemistry |
|----------------------------|----------|------------------------|--------------|-------------------|--|----------|---|
| Sample Name | | D-CF2B-57 | D-CF3C-142 | | Minimum | Maximum | GWR-032 (2021-06-04) |
| Acidity | mg/L | | | 5 | 65000 | 87000 | |
| Bicarbonate | mg/L | - | - | 6 | 0 | <1 | 118 |
| Carbonate | mg/L | | | 5 | <1 | <1 | <1 |
| Chloride | mg/L | | | 1 | <10 | 1220 | 220 |
| Hydroxide | mg/L | | | 0 | <1 | <1 | <1 |
| P. alkalinity | mg/L | | | 0 | <1 | <1 | <1 |
| pH | pH units | 2.1 | 1.1 | 13 | 0.63 | 2.10 | 6.83 |
| Specific Conductance | uS/cm | | | 9 | 52100 | 303000 | 860 |
| Eh | mV | | | 10 | 580 | 870 | |
| Sum of ions | mg/L | | | 5 | 52700 | 70100 | 504 |
| Total alkalinity | mg/L | | | 5 | <1 | <1 | 97 |
| Total hardness | mg/L | | | 5 | 202 | 1480 | 182 |
| Nitrate | mg/L | | | 5 | <4 | <40 | <0.04 |
| Fluoride | mg/L | | | 5 | 1 | 34 | 0.23 |
| Total dissolved solids | mg/L | | | 5 | 8970 | 47900 | 599 |
| Calcium | mg/L | 557 | 723 | 13 | 58 | 723 | 55 |
| Magnesium | mg/L | 47 | <63 | 13 | <10 | 240 | 11 |
| Potassium | mg/L | 148.8 | <86 | 13 | 6.2 | 149 | 4.6 |
| Sodium | mg/L | 17.9 | <77 | 13 | 6.0 | 12300 | 81 |
| Aluminum, dissolved | mg/L | 1738 | 71 | 13 | 69 | 4609 | 0.0006 |
| Antimony, dissolved | mg/L | | | 5 | 0.040 | 1 | <0.0002 |
| Arsenic, dissolved | mg/L | <0.1 | <1 | 13 | <0.1 | 21 | 0.2 |
| Barium, dissolved | mg/L | <0.1 | <1 | 13 | <0.05 | <0.5 | 0.063 |
| Beryllium, dissolved | mg/L | | | 5 | 0.07 | 0.4 | <0.0001 |
| Boron, dissolved | mg/L | | | 1 | <1 | <10 | 0.43 |
| Cadmium, dissolved | mg/L | <0.1 | <1 | 13 | 0.018 | 1.809 | <0.00001 |
| Chromium, dissolved | mg/L | 9.1403 | <1 | 13 | <0.1 | 9.140 | <0.0005 |
| Cobalt, dissolved | mg/L | 5.41 | <1 | 12 | 0.5 | 15 | <0.0001 |
| Copper, dissolved | mg/L | 5.16 | 10.23 | 13 | 5.2 | 964 | <0.0002 |
| Iron, dissolved | mg/L | 3309 | 4094 | 13 | 820 | 4094 | 4.2 |
| Lead, dissolved | mg/L | 0.97 | 19.45 | 13 | 0.20 | 19 | <0.0001 |
| Manganese, dissolved | mg/L | 16.35 | <81 | 13 | 2.70 | 41 | 0.22 |
| Molybdenum, dissolved | mg/L | 1.65 | 59.57 | 13 | 1.65 | 60 | 0.0038 |
| Nickel, dissolved | mg/L | 15.7 | <1 | 13 | <1 | 27 | 0.001 |
| Selenium, dissolved | mg/L | 18.4 | <1 | 13 | <0.025 | 26 | <0.0001 |
| Silver, dissolved | mg/L | | | 5 | <0.005 | <0.05 | <0.00005 |
| Strontium, dissolved | mg/L | 5.2 | <1 | 7 | 0.60 | 5 | 1.66 |
| Thallium, dissolved | mg/L | - | - | 5 | 0.05 | <0.2 | <0.0002 |
| Tin, dissolved | mg/L | - | - | 5 | 0.07 | 0.30 | - |
| Titanium, dissolved | mg/L | | | 5 | 2.80 | 32 | <0.0002 |
| Uranium, dissolved | mg/L | 7.45E+03 | 3.88E+04 | 13 | 7.70E+02 | 3.88E+04 | 1.10E-02 |
| Vanadium, dissolved | mg/L | 160.88 | 62.57 | 13 | 6.16 | 161 | <0.0001 |
| Zinc, dissolved | mg/L | 134.37 | 4.03 | 13 | 2.30 | 331 | 2.62 |
| Sulfur | mg/L | 9,263 | 22,877 | 13 | 5211 | 209411 | 4.3 |
| Phosphorous | mg/L | - | 75.4 | 13 | 2 | 75 | <0.01 |
| Silica, soluble, dissolved | mg/L | - | - | 6 | 31 | 192 | 13.3 |
| Radium-226* | Bq/L | - | - | 4 | 230 | 3000 | 180 |
| Radium-228* | Bq/L | - | - | 1 | 5 | 5 | - |
| Lead-210* | Bq/L | - | - | 4 | 600 | 1700 | 2200 |
| Polonium-210* | Bq/L | - | - | 4 | 290 | 2000 | 110 |
| Thorium-230* | Bq/L | - | - | 4 | 21000 | 220000 | 7 |
| Thorium-232* | Bq/L | - | - | 4 | 2 | 12 | - |
| Radium-226* | mg/L | - | - | 4 | 6.29E-06 | 8.21E-05 | 4.92E-06 |
| Thorium-230* | mg/L | - | - | 4 | 2.75E-02 | 2.88E-01 | 9.17E-06 |

Notes

* Analytical results for radionuclides are limited. The ranges of radionuclide concentrations (Bq/L) provided are considered conservative because they reflect composite samples collected over the ISR leaching period in the 2021 column samples, not UBS at the end of mining

Analytical results for Coreflood 2B and 3C are provided (in addition to the range of UBS Constituent Concentrations) because results from the remediation portion of these tests was used for development of the Restored Solutions modelled in the draft EIS (Appendix 7-C)

Used to highlight baseline groundwater quality in the ore zone for comparison with UBS Composition at end of mining.

2021 UBS Column Tests

The objective of the 2021 column tests was to test leach recoveries on a range of feed grades. Four samples were generated from nine drill holes, all proximal to the WS Shear where most of the resource lies. The samples contain varying amounts of uraninite, sulphides, clay and iron and represent blends of the various hydrogeologic units within the deposit (HGUs). Samples were crushed to -10 mm. Columns with a diameter of ~100 mm were packed with the samples. Four column tests were conducted, with details for each sample listed in Table 3.

The 2021 column tests used the full-size distribution of crushed core and achieved relatively high mineral liberation in contact with lixiviant. This results in relatively rapid leach kinetics compared to intact core. The initial flow rate was calculated based on a retention time of eight hours (3 column pore volumes per day (PV/d)).

Table 1: Summary of Samples for Column Test 1 to 4

| Column No. | Sample ID | Mass (g) | Feed U ₃ O ₈ (wt%) ^a | HGUs in Blend ^b | Hole IDs | Number of PVs - Leaching | Number of PVs - Remediation |
|------------|-------------|----------|---|----------------------------|--------------------|--------------------------|---|
| 1 | Sample A | 27,338 | 48.1 | 2A/B/C/D | GWR-10, 16, 19, 21 | 116 | 6.7 (D.I. Water) |
| 2 | Sample B | 18,619 | 46.1 | 2B | GWR-10, 19, 23, 26 | 120.4 | 16.5 (Site GW, 10g/L NaOH Solution) |
| 3 | Sample D | 9,180 | 1.8 | 2A/C/D/E | GWR-15, 16, 19, 26 | 14.7 | 15.5 (Site GW, 10g/L NaOH Solution) |
| 4 | Samples C&E | 8,742 | 26.9 | 2A/C/D/E | GWR-01, 19, 22 | 29.7 | 11.2 (Site Water, 1.5g/L NaHCO ₃) |

Notes

^a Back Calculated

^b HGUs = Hydrogeological Units in the Ore Zone

A single pass flow of dilute sulfuric acid and hydrogen peroxide lixiviant was run between 22 to 38 days. Lixiviant strength was generally decreased over the course of each run. UBS composition from each of the column leach tests at the end of leaching is shown in Table 2.

On completion of the leaching tests, each column was flushed with water (de-ionized water or groundwater) and for columns #2, #3 and #4, neutralization of groundwater was evaluated using alkaline solutions. Solutions used and porewater volumes flushed are summarized in Table 3. Analytical results for solution composition during the remediation phase are included in Table 9 and Table 10.

Mineralogy of the column samples pre-testing were analyzed by XRD and QEMSCAN; the mineral assemblages aligned with the overall understanding of the ore zone mineralogy, provided as Table IR-20, IR-67, IR-69-A2 (Appendix A to this response). XRD results for the fine particles are provided as Table 4. These results show the formation of secondary sulphate minerals during the uranium ore leaching process. The other mineral phases are associated with the (pre-mining) ore zone mineralogy, provided in the draft EIS as Table 3-1 of Appendix 7-C, and provided herein in Appendix A as Table 2.

Table 4: XRD Results for Fine Particles in UBS, Column Experiments #1 to #4 (2021)

| Mineral Phase | Column #1 | Column # 2 | Column #3 | Column #4 |
|---------------|-----------|------------|-----------|-----------|
| Anglesite | 18.1 | 9.8 | - | 6.6 |
| Anhydrite | 7 | - | - | - |
| Biotite | - | 38 | 24.2 | 8.3 |
| Chlinochlore | 62.6 | 21.2 | 20.3 | 20.1 |
| Gypsum | - | 4.4 | - | - |
| Kaolinite | - | 22 | 41.1 | 57 |
| Quartz | - | - | 5.4 | - |
| Pyrite | 12.3 | 4.6 | 8.9 | 7.1 |

Notes

Secondary Minerals

2022 Column Leaching and Remediation Tests

A suite of 5 column leaching tests was undertaken to support remediation planning. Whereas core flood testing may more realistically represent the ISR conditions with respect to operational conditions (i.e., using intact core and pressure applied), this phase of column testing used crushed material to accelerate the testing process and, thus, provide key information on the remediation phase and prepare for the (2022) field feasibility study.

The 2022 column testing program consisted of five 100mm diameter columns loaded with samples from different HGUs providing characterization of ore variability. The samples were selected from a blend of assay sample splits of fresh core from GWR-054 through GWR-061, supplemented by preserved core from GWR-016, GWR-022 and GWR-024 stored frozen by Denison. The hole locations are shown Figure 1 ranging along the length of the deposit. Intervals from five to eight different drill holes were composited to meet required sample mass and/or to meet representativeness for each HGU.

The samples were hand crushed to minimize fines generation, to a maximum size of 30 mm. Minimum size fraction was +0.212 mm by wet screening out fines. This was designed to promote flow through the column and minimize exposed mineral surface area. Overall procedures were like 2021 column tests. The lixiviant was a mixture of sulphuric acid and hydrogen peroxide and was prepared using Wheeler River groundwater. Lixiviant was injected upwards in essentially flooded plug flow conditions. The flow rate was calculated based on ~0.67 measured column PV/d. Test parameter variables were minimized, so the differences between HGUs could be distinguished.

Initially, all five columns were fed lixiviant from a common tank. The low-grade columns 2A and 2E were run until fully leached. From that point forward, 2A and 2E were fed from a separate tank to perform groundwater flush and neutralization. A summary of details of the column tests including pore volumes during leaching, during post-leaching flushing with groundwater, and during neutralization are provided in Table 5.

UBS composition at the end of the leaching period is provided in Table 2, and groundwater quality following the groundwater flushing and neutralization is provided in Table 9 and Table 10.

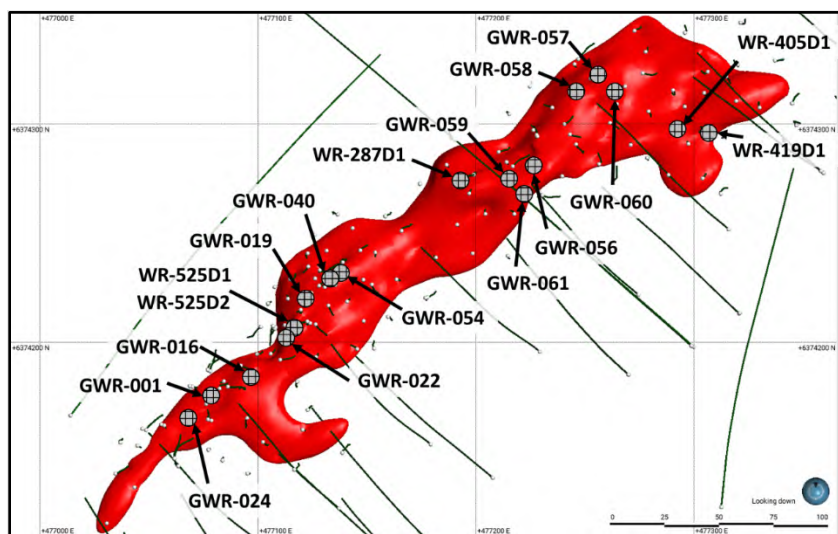


Figure 1: Metallurgical Hole Locations for 2022 Column Leach Testing

Table IR-20, IR-67, IR-69-2: 2022 Column Leach Testing Details

| Columns | 2a | 2b | 2c | 2d | 2e |
|---|-------------------------|-------|-------|-------|------|
| Estimated Grade (wt % U ₃ O ₈) | 5.0% | 58.3% | 41.3% | 46.1% | 1.6% |
| | Numbers of Pore Volumes | | | | |
| Phase 1: Groundwater equilibration | 2.9 | 3.1 | 3.0 | 2.8 | 3.1 |
| Phase 2: In-Situ Recovery (ISR) | 20.8 | 66.7 | 64.1 | 62.4 | 19.4 |
| Phase 3: Groundwater Flushing | 15.0 | 16.2 | 15.1 | 11.6 | 14.9 |
| Phase 4: Neutralization | 4.4 | 4.2 | 11.0 | 2.6 | 3.7 |
| Total Pore Volumes | 43.1 | 90.3 | 93.1 | 79.4 | 41.1 |
| pH at end of Phase 2 | 0.93 | 0.95 | 0.91 | 0.91 | 0.95 |
| pH at end of Phase 4 | 9.53 | 7.1 | 3.8 | 7.22 | 7.87 |

QEMSCAN was done on the column pre-testing and at the end of the flushing period. The results are presented as Table 6. Mineral phases that reflect basement-derived materials in the ore zone residuals include biotite, spodumene, petalite and garnet.

Table 6: 2022 Column Leach Test QEMSCAN results

| QEMSCAN | Column 2a | | Column 2b | | Column 2c | | Column 2d | | Column 2e | |
|-------------------|--------------------|--------------------------|--------------------|--------------------------|--------------------|--------------------------|--------------------|--------------------------|--------------------|--------------------------|
| | Pre-Test (Feed) | Post-Test (Residuals) | Pre-Test (Feed) | Post-Test (Residuals) | Pre-Test (Feed) | Post-Test (Residuals) | Pre-Test (Feed) | Post-Test (Residuals) | Pre-Test (Feed) | Post-Test (Residuals) |
| Mineral | 2A-BATCH-1 | DCL-2a-R | 2B-BATCH-1 | DCL-2b-R | 2C-BATCH-1 | DCL-2c-R | 2D-BATCH-1 | DCL-2d-R | 2E-BATCH-1 | DCL-2e-R |
| Anglesite | | 3.84 | | 3.28 | | 3.99 | | 14.18 | | 1.15 |
| Biotite | 4.84 | 1.38 | 0.25 | 0.44 | 4.26 | 0.83 | 1.16 | 1.41 | 2.96 | 1.98 |
| Bornite | 0.36 | 0.07 | | | | | 0.70 | 1.15 | 0.43 | 0.20 |
| Calcite | | | 0.42 | 0.69 | | 0.14 | | | | |
| Chalcocite (CuS) | | | 1.54 | | 0.28 | | 0.31 | | 1.28 | |
| Chalcopyrite | 12.37 | 13.03 | 0.71 | 2.27 | 0.11 | 0.16 | | 0.25 | 8.76 | 3.48 |
| Chlorite | | | | 3.15 | | | | | | |
| Clinocllore-(Fe) | | 11.34 | | | | 0.8 | | 9.39 | | 52.26 |
| Covellite (CuS) | 0.35 | 0.38 | 0.19 | 2.61 | 0.39 | 1.34 | 0.06 | 0.18 | 0.10 | 0.20 |
| Fe-oxide | | 0.03 | | | | 1.15 | | 0.53 | | 0.03 |
| Galena | 0.63 | 0.40 | 0.43 | 1.23 | 0.25 | 0.3 | 0.53 | 3.06 | 0.10 | 0.02 |
| Garnet | 0.25 | | | | 2.52 | | 1.47 | | 0.43 | |
| Goethite-Clay mix | 4.31 | 0.03 | 0.35 | 0.10 | 7.37 | 16.78 | 10.95 | 1.66 | 1.52 | 0.41 |
| Illite | 0.21 | 0.52 | | 0.05 | | | | | 0.32 | 0.67 |
| Ilmenite | | 0.08 | | | | 0.09 | | | | 0.47 |
| Kaolinite | 42.04 | 40.41 | 1.52 | 3.28 | 7.12 | 11.67 | 0.75 | 2.09 | 62.20 | 28.63 |
| Muscovite | 9.46 | 6.09 | 0.79 | 3.35 | 0.81 | 1.2 | 0.15 | 2.06 | 13.69 | 8.79 |
| Petalite | | 0.15 | | 0.05 | | | | 0.03 | | 0.02 |
| Pyrite | 8.48 | 10.44 | 1.49 | 3.38 | 0.98 | 1.58 | 0.12 | 0.09 | | 0.84 |
| Quartz | 4.40 | 9.11 | | 1.05 | 0.05 | 0.42 | | 1.74 | 1.01 | 0.12 |
| Rutile | 0.61 | 0.58 | 0.07 | 0.04 | 0.04 | 0.04 | | | 0.44 | 0.32 |
| Sphalerite | 0.56 | 0.41 | | 0.04 | 0.03 | | | 0.02 | | |
| Spodumene | | 0.17 | | 0.05 | | 0.16 | | | | 0.05 |
| Uraninite | 10.70 | 1.07 | 92.10 | 74.89 | 75.74 | 58.72 | 83.73 | 61.93 | 6.67 | 0.29 |
| Zircon | 0.36 | 0.45 | 0.06 | 0.02 | | 0.04 | | | | |
| Siderite | | | | | | 0.54 | | | | |

2018-2022 Coreflood Tests

Core testing machines (CTM) were typically used to study in situ oil recovery processes, for flooding uranium deposit drill core with lixiviant to simulate ISR conditions on a micro scale which are referred to as coreflood tests. All drill cores tested were from vertically oriented drill holes allowing the flow from end to end of the coreholder to simulate flow in the vertical direction of the deposit. This is tangential to the intended predominantly horizontal flow path between wells in situ.

From late 2019 to mid-2021, coreflood tests numbered 1, 2A, 2B, 3A, and 3C were performed. The main objective was to simulate the in situ field conditions, to understand and develop the lixiviant conditions necessary for successful full-scale ISR. Priority was placed on testing a large number of samples over short durations. Tests were ended early, so, uranium recoveries were low relative to later testing (generally < 10%). Results for Coreflood 2B and 3C are discussed further herein.

Coreflood 2B and 3C

Details for the testing of Coreflood 2B and 3C are provided in Table 7.

Table 7: 2021 Coreflood Test Details

| Coreflood | 2B | | 3C | |
|---|-----------------------|--|-----------------------|--|
| Corehole | GWR-024 | | GWR-019 | |
| Core Dimensions (average diameter, average length), in mm | 60 x100 | | 78*70 | |
| Core Pore volume (mL) | 36.9 | | 53.1 | |
| Estimated Grade (wt % U3O8) | 24 | | 70.7 | |
| | Number of Pore Volume | pH (at end of Leaching or Remediation Phase) | Number of Pore Volume | pH (at end of Leaching or Remediation Phase) |
| In-Situ Recovery (ISR) | 34.4 | 2.1 | 82.7 | 0.98 |
| Groundwater Flushing | 22.7 | 1.91 | 91.6 | 2.83 |
| Neutralization with NaOH | 55.6 | 11.92 | - | - |
| Neutralization with NaHCO ₃ | - | - | 62.4 | 6.87 |
| Post-Neutralization Groundwater Flush | 9.3 | 11.47 | 17.2 | 6.43 |
| Total Pore Volumes | 122 | - | 253.9 | - |

The UBS composition at the end of leaching for Coreflood 2B and 3C is provided in Table 2. The analytical results for these samples were provided in Table 2 because Corefloods 2B and 3C were the primary basis for the development of the restored solutions. UBS composition during flushing for these coreflood tests is discussed further in Section 2.0 and is summarized in Table 9 and Table 10.

At the end of testing, the core from Coreflood 2B was frozen. The frozen core was cut in the middle into two sides. XRD, QEMSCAN and SEM was done on one half of the sample, on the inside cut. The XRD results indicated:

- 19.5 wt% Kaolinite
- 26.7 wt % Montmorillonite
- 45.3 wt % Dickite
- 2.9 % Fluorite
- 5.6 % Pyrite

The cumulative uranium recovery for core 2B was low, and thus the sample (post-leaching) has a mineralogical composition comparable to that of the unmined ore zone. The portion of the sample that underwent mineralogical analysis was also rich in clay minerals. The QEMSCAN results are shown in Figure 2. The SEM image (not shown) shows the presence of uraninite, pyrite, and sphalerite.

The QEMScan shows a minor amount of mineral phase suggestive of a small amount of jarosite (“Fe-Al-Si-S”) closely associated with pyrite. This suggests formation of oxidation products/secondary minerals in the core with exposure to lixiviant.

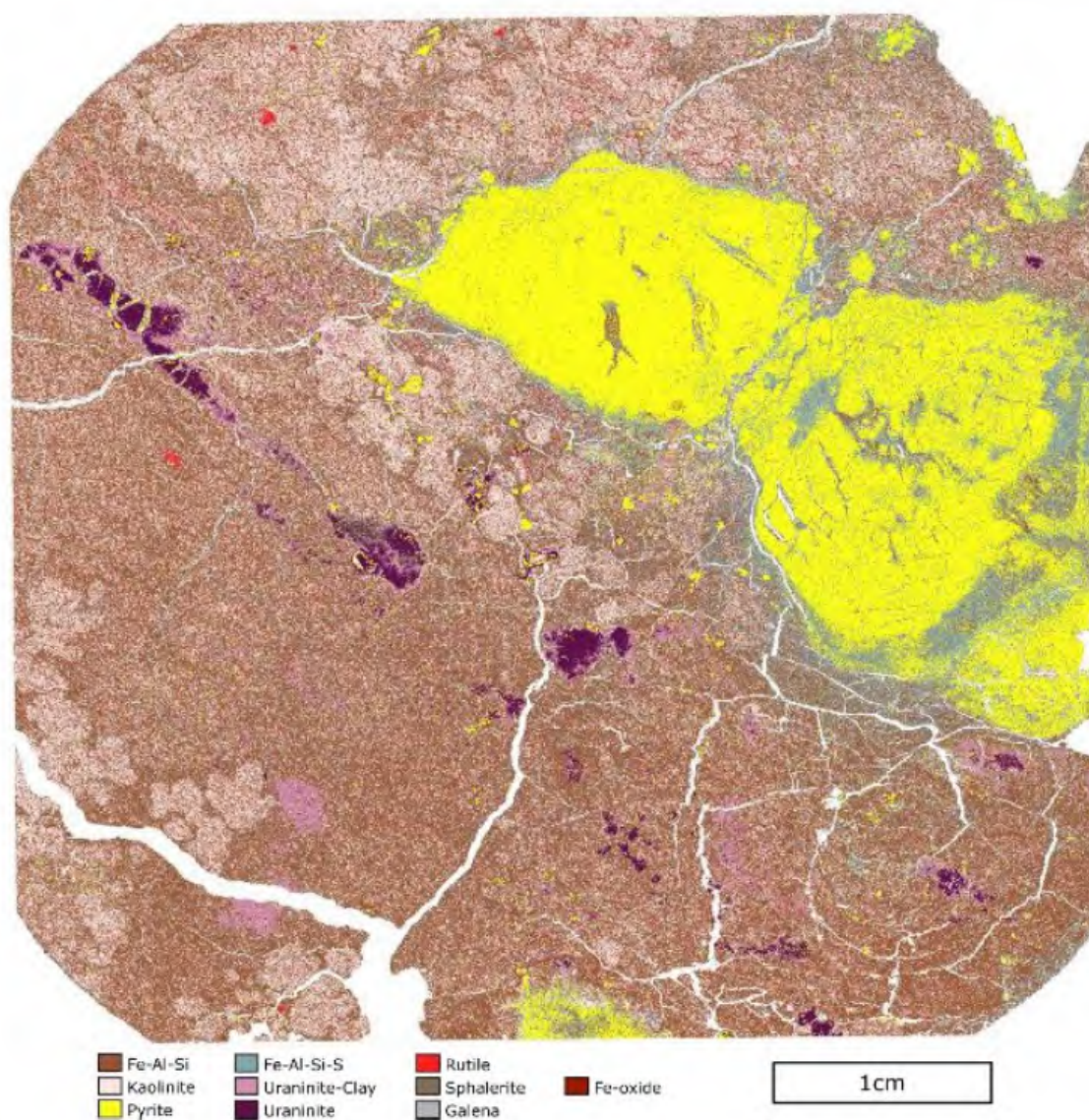


Figure 2: Coreflood 2, QEMSCAN

Coreflood 4

The Coreflood 4 sample was taken from a high-grade segment of HGU 2C from hole GWR-040, which is the middle CSW in the planned field feasibility test (FFT) well pattern. Thus, it was an excellent candidate to correlate with subsequent FFT results.

Coreflood 4 feed sample side view is shown in Figure 3. Near-horizontal mineral banding is evident.



Figure 3: Coreflood 4 Feed Sample Side View, Prior to Placement in Coreflood Machine

Coreflood 4 ran for a total of 113 PVs over 391 days, with life-of-test average UBS grade of 18.7 g/L U and reagent consumptions of 2.78 kg H_2SO_4 and 0.35 kg H_2O_2 per kg U. Part of the difficulty of production ramp-up of Coreflood 4 was due to the flow constraint of low micro scale permeability through the intact core, particularly with generally lower permeability in the vertical flow direction of coreflood samples. As uranium mass gradually leached away, there was a mild trend of increasing flow rate at the same pressure, indicating permeability increase.

In total, 51.8% of the initial dry mass of the sample was removed by leaching. Just over half of the mass loss is accounted for by uranium leaching, and the remainder is accounted for by gangue mineralization leaching. The feed grade was back calculated from measurements of the total uranium in UBS collected throughout the test plus leach residue sections. Feed grade was 26.66% U_3O_8 , and final recovery was 97.1%. Coreflood 4 is the most comprehensive simulation of ISR for the Phoenix FS, with the highest recovery demonstrated from an intact core to date.

Coreflood 4 provides the most information about the mineralogical and hydrogeochemical changes that are occurring in the ore zone during mining. Post-leaching, the core leached in Coreflood 4 was cut into segments, as shown in Figure 4, assayed and visually examined (photographed) for changes to the core due to leaching. The mineralogy of each section was determined.

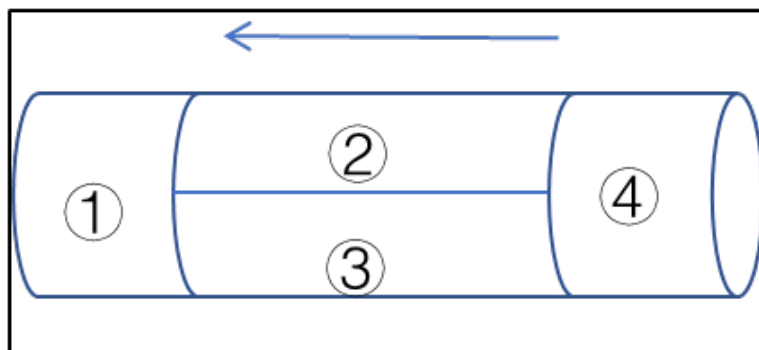


Figure 4: Coreflood 4 Cut Sections and Direction of Flow

Coreflood 4 feed side puck (Section 4), inlet face view is shown in Figure 5. The feed end was deeply eroded, nearly through to the discharge side of the section.



Figure 5: Coreflood 4 Feed Side Puck (Section 4), Inlet Face View

Coreflood 4 middle (Section 2), centre longitudinal cut face view is shown in Figure 6. It was strongly bleached throughout, with cracks that appeared after drying.



Figure 6: Coreflood 4 Middle (Section 2), Centre Longitudinal Cut Face View

Coreflood 4 discharge end puck (Section 1), inlet face view, dried, is shown in Figure 7. It was strongly bleached across the entire cross-section.



Figure 7: Coreflood 4 Discharge End Puck (Section 1), Inlet Face View, Dried

XRD for each of the sections is given in Table 8. Mineral phases that reflect basement-derived materials in the ore zone residuals include anorthite.

Table 8: XRD Results for Coreflood 4 Core Sections

| Mineralogical Composition Post-Extraction | D-CF4A-1 | D-CF4A-2 | D-CF4A-3 | D-CF4A-4 |
|--|---------------|------------|------------|----------|
| Location/section in the coreflood column | Discharge End | Midsection | Midsection | Feed End |
| Kaolinite (Al ₂ Si ₂ O ₉ H ₄) | 74.7 | 22.1 | 38.3 | 43.8 |
| Pyrite (FeS ₂) | 17.9 | 20 | 12.4 | 16 |
| Chamosite (Mg _{2.518} Fe _{2.482})Al _{1.25} Si _{3.80} H ₁₀) (Chlorite Group) | 7.3 | 5.8 | 1.4 | -- |
| Gypsum (CaSO ₄ H ₂ O) | -- | 7.5 | 4.5 | 4.8 |
| Barite (BaSO ₄) | -- | 1.6 | 0.7 | -- |
| Anorthite (CaSi ₂ Al ₂ O ₈) | -- | 30.7 | 31.8 | -- |
| Goethite (FeO ₂ H) | -- | 12.4 | 10.9 | 4.3 |
| Anglesite (PbSO ₄) | -- | -- | -- | 31.1 |

1.3 Composition of the UBS remaining in the Ore Zone at the end of Mining (IR-20)

The analytical results for the UBS composition in Coreflood 2B and 3C are shown in Table 2 along with a range of UBS composition that was developed from the relevant analytical results for a total of 13 samples from across the column and coreflood tests. The ranges of values for constituents of potential concern (COPCs), as defined in Appendix 7-C of the draft EIS, are provided in Table 2. Uranium and other COPC concentrations generally vary by 2-3 orders of magnitude. There is expected variability in the UBS composition because of the nature of the deposit, which has been captured in the conditions of the metallurgical testing, and the nature of the testing (e.g., core vs. crushed rock, test duration, lixiviant composition, etc.). The analytical results were given explicitly for Coreflood 2B and 3C because of the use of results from these coreflood tests to develop the restored solutions, which is discussed further in Section 2.0.

The range of UBS composition at the end of mining has been included in Table 3-5 of Appendix 7-C as was requested as part of IR-20, such that UBS quality at the end of mining and remediated conditions (represented by the Restored Solutions) can be compared. The updated Table 3-5 has been added to this response as Appendix B.

1.4 Mineralogical and Hydrogeochemical Changes to the Ore Zone with Mining (IR-69)

Understanding of changes in the mineralogy of the ore zone with mining are informed by the XRD results from Coreflood 4, as this test was terminated at the completion of the ISR process, and QEMSCAN results for the 2022 columns, because these tests provide quantitative information on the mineral assemblage following mining and with remediation. The following conclusions are made with respect to changes in the mineralogy in the ore zone with mining:

- The mining process is effective as leaching uraninite from the ore zone and also results in partial dissolution of sulphide minerals (pyrite, sphalerite, galena, etc.);
- Secondary sulphate minerals are formed as a result of the mining process. The associated equations are shown in Appendix A. Jarosite minerals were suggested surrounding pyrite particles in the QEMSCAN of Coreflood 2, but were not detected in any of the other post-mining residuals. Gypsum and barite were detected in XRD but not present at quantifiable levels in association with the 2022 column residuals. Formation of anglesite is shown by XRD and QEMSCAN in post-mining residuals.

- The elevated concentration of aluminum in solution evidences clay mineral dissolution, but overall the relative abundance of clays in the ore zone increases with ISR mining, as would be expected with ore dissolution.

The hydrochemistry of the ore zone post-mining is presented in Table 2. Consistent with the dissolution of parent minerals and the pH of the UBS, most COPCs concentrations in the UBS at the end of mining are elevated with respect to baseline groundwater conditions in the ore zone.

2.0. Composition of the Restored Solutions (Addresses Question #2 of IR-67)

The restored solutions were developed using the metallurgical data that were available when conditions in Post-Decommissioning were being conceptualized in 2020-2021 for numerical modelling and effects assessment (Appendix 7-C of the draft EIS). This included the early results on acid leaching of the core (2018) and Coreflood 2B and 3C results. At that time, the coreflood tests provided the most detailed information from which to develop the chemistry of the Restored Solutions #1 and #2, using the remediation portion of the tests. From the results of that testing, “Restored Solution #1” and “Restored Solution #2” (Table 3-5) were developed to represent the bounding scenarios for groundwater quality considered in the reactive transport model to evaluate the potential for environmental effects following remediation of the mining area. As is discussed further below, these solution compositions were developed to reflect remediation of the ore zone through flushing and neutralization, without over-neutralization – meaning, base addition past circumneutral conditions to alkaline conditions.

Since that time, more information from the column and coreflood tests has become available that supports the composition of the Restored Solutions put forward in the draft EIS as being representative of porewater within the mining zone with remediation.

When developing the restored solutions for the draft EIS, the approach was generally to select concentrations for any given element/parameter that represented a low to mid-range value for the COPC from the metallurgical testing solutions, to be conservative with respect to evaluating potential effect, but also to reflect the goal of the remediation (to align with ALARA, as is discussed below). For dissolved uranium, the concentration in Restored Solutions #1 and #2 were set to upper bounds of 100 mg/L and 30 mg/L, respectively. In some cases, like Co and Ni, the values selected for modelling were identified to be on the high end upon subsequent metallurgical testing. Thus, the concentrations for these elements modelled are conservative with respect to anticipated pore water concentrations of these elements post-remediation.

The basis of the selected concentrations for Restored Solution #1, which was the solution modelled in Appendix 7-C of the draft EIS, is provided below in Table 9. As Restoration Solution #1 contains the higher remaining concentrations, and lower pH (i.e., differs more from baseline conditions in the ore zone), this solution was carried forward for geochemical reactive transport modelling to evaluate environmental effects.

Annex 1 – FIRT IR Table – Technical Review of the **Wheeler River Project** draft EIS
Denison Response - August 18, 2023

Table 9: Groundwater Chemistry basis for Restored Solution #1

| Metallurgical Test | | 2018 Pre-Feasibility: Restoration Phase Data | Coreflood 2B | Coreflood 2B | Coreflood 2B | Coreflood 3C | 2021 Column, 2 | 2021 Column, 3 | 2021 Column, 4 | 2022 Column, 2a | 2022 Column, 2c | 2022 Column, 2d | 2022 Column, 2e | 2022 Column, 2e | | |
|-------------------------------|----------|--|----------------------------|----------------------------|--|----------------------------|----------------|----------------|---------------------|---------------------|-----------------|-----------------|-----------------|---------------------|----------------------|--|
| Sample Name | | RPV30-23 | D-CF2B-121-143 | D-CF2B-134-144,146 | D-CF2B-COMBINED-1 (D-CF2B-134-144,146) | D-CF3C-225-237 | D-CL2-FW-2 | D-CL3-FW-2 | D-CL4-FW-2 | D-CL2A-68 | D-CL2C-114 | D-CL2D-111 | D-CL2E-63 | D-CL2E-68 | Restored Solution #1 | Notes on Value Carried Forward in Restored Solution for Model |
| Statistic | | - | Average Value ^a | Average Value ^a | - | Average Value ^a | | | | - | - | - | - | - | | |
| Remediation Method | | GW Flush | NaOH Neutralization | NaOH Neutralization | NaOH Neutralization | Bicarbonate Neutralization | Groundwater | Groundwater | NaOH Neutralization | NaOH Neutralization | GW Flush | GW Flush | GW Flush | NaOH Neutralization | | |
| pH | pH units | 3.87 | 4.4 | 4.42 | | 2.97 | 2.6 | 2.44 | 2.66 | 3.80 | 2.58 | 2.46 | 2.48 | 4.05 | 4.3 | High end of observed |
| Eh | mV | | 520 | 525 | Same as adjacent (D-CF3C-238-256) | 598 | | | | | 570 | 542 | 426 | 648 | - | Set in model to reflect oxidized conditions |
| Pore Volumes of remediation | - | 30-32 | 59-74 | 69-76 | | 109-130 | | | | 19.4 | 15.1 | 11.6 | 14.9 | 18.6 | - | |
| Aluminum, dissolved | mg/L | 5.6 | 9.7 | 10.3 | 7.0 | <5 | 5.4 | 26 | 9.1 | 9.0 | 9.9 | 12 | 32.8 | 15.6 | 7 | Low end of observed |
| Arsenic, dissolved | mg/L | <0.010 | 0.17 | 0.22 | 0.03 | 0.48 | 0.15 | 0.31 | 0.1 | 0.02 | 0.14 | 0.06 | 0.4 | 0.012 | 0.06 | Low end of observed |
| Barium, dissolved | mg/L | <0.05 | 0.10 | <0.1 | <0.05 | <0.1 | <0.005 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.006 | 0.018 | 0.05 | Mid range of observed |
| Total Inorganic Carbon (C(4)) | mg/L | | - | - | - | | | | | | | | | | 58 | Assumed to be approximately equivalent to GW values and considers some bicarbonate |
| Calcium | mg/L | 109 | 228 | 210 | - | 81.7 | 11 | 43 | 23 | 21 | 22 | 380 | 20 | 35 | 110 | Mid range of observed |
| Cadmium, dissolved | mg/L | <0.001 | <0.1 | <0.1 | 0.015 | <0.1 | 0.061 | 0.033 | 0.020 | 0.051 | 0.001 | 0.004 | 0.0004 | 0.0003 | 0.015 | Mid range of observed |
| Chloride | mg/L | 37 | | | - | | 1 | <1 | 1 | 33 | <1 | 6 | 3 | 9 | 200 | Very limited information available. Set to a higher value to consider potential for values closer to baseline ore zone water quality |
| Cobalt, dissolved | mg/L | | 2.8 | 2.1 | 2.0 | <0.1 | | | | 0.15 | 0.03 | 0.16 | 0.53 | 0.42 | 2 | High end of observed |
| Chromium, dissolved | mg/L | 0.04 | 0.22 | 0.14 | <0.05 | <0.1 | 0.18 | 0.76 | 0.16 | <0.05 | <0.05 | 0.17 | 0.013 | 0.05 | 0.05 | Mid range of observed |
| Copper, dissolved | mg/L | 2.23 | 0.21 | 0.24 | 0.17 | <0.1 | 6.2 | 5.8 | 9.2 | 25 | 3.1 | 3.2 | 20.1 | 4.7 | 0.17 | Low end of observed |
| Fluoride | mg/L | NA | - | - | - | | 2.4 | 0.32 | 1.6 | 3 | 6.0 | 4.2 | 2 | 3 | | No data available at time of developing Restored Solution |
| Iron, dissolved | mg/L | 54.1 | 378 | 334 | 324 | 13.0 | 23.2 | 92 | 40 | 124 | 33 | 75 | 74 | 57 | 100 | Mid range of observed |
| Potassium | mg/L | <1 | 10.1 | 9.5 | - | <8 | 3.5 | 4.7 | 1.5 | 3.7 | 1.5 | 5.6 | 1.9 | 1.4 | 9 | High end of observed |
| Magnesium | mg/L | 3.7 | - | - | - | <6 | 0.6 | 11 | 0.2 | 3.0 | 0.4 | 4.4 | 38 | 43 | 6 | Mid range of observed |
| Manganese, dissolved | mg/L | 0.68 | 9.3 | - | 3.4 | <8 | 0.57 | 0.63 | 0.85 | 2.0 | 0.98 | 4.1 | 0.31 | 0.30 | 3.4 | Mid range of observed |
| Molybdenum, dissolved | mg/L | 0.05 | 0.22 | 0.22 | 0.10 | <0.1 | 0.16 | 2.1 | 0.10 | 0.05 | 0.05 | 0.03 | 0.58 | 0.019 | 0.1 | Mid range of observed |
| Sodium | mg/L | 221 | 283.2 | 351.0 | - | 120 | 3.1 | 4.1 | 2.8 | 760 | 3.0 | 4.3 | 3.7 | 378 | 190 | Mid range of observed |
| Nickel, dissolved | mg/L | 0.20 | 12.8 | 10.0 | 9.7 | <0.1 | 0.56 | 3.2 | 0.75 | 0.55 | 0.06 | 0.35 | 1.04 | 0.92 | 9.7 | High end of observed |
| Lead, dissolved | mg/L | 3.08 | 2.9 | 3.41 | 3.1 | 1.8 | 4.97 | 0.68 | 0.96 | 1.3 | 0.22 | 0.10 | 2.64 | 0.50 | 3.1 | Mid-high range of observed |
| Sulfate | mg/L | 860 | 2700 | 2724 | - | 679 | 300 | 750 | 480 | 2180 | 470 | 1460 | 690 | 1220 | 620 | Mid range of observed |
| Selenium, dissolved | mg/L | <0.025 | 0.31 | 0.23 | 0.08 | <0.1 | 0.39 | 0.10 | 0.13 | 0.01 | 0.02 | 0.05 | 0.042 | 0.098 | 0.08 | Mid range of observed |
| Si | mg/L | 71.9 | - | - | - | | | | | | | | | | 40 | limited information available; value similar to available data assumed |
| Strontium, dissolved | mg/L | | 4.5 | 4.4 | 4.4 | 3.2 | 0.32 | 0.70 | 0.22 | 0.62 | 0.43 | 0.58 | 0.67 | 0.76 | 4.4 | Upper range of observed |
| Zinc, dissolved | mg/L | 1.48 | 1.6 | 1.4 | 1.4 | 0.14 | 1.7 | 3.6 | 3.0 | 10 | 0.14 | | 0.20 | 0.13 | 1.4 | Mid-range of observed |
| P | mg/L | | - | - | - | <4 | | | | | | | | | 4 | applied limited information |
| Uranium | mg/L | 105 | 586 | 334 | 338 | 45.2 | 92 | 217 | 579 | 145 | 288 | 328 | 38.1 | 30.8 | 100 | Mid-low end of observed; value set as upper bound in the EIS |
| Vanadium, dissolved | mg/L | 0.09 | 2.9 | 0.8 | 0.51 | 0.32 | 0.35 | 2.8 | 1.1 | 0.13 | 0.70 | 0.51 | 1.8 | 0.006 | 0.51 | Low end of observed |
| Polonium-210 | Bq/L | 6.3+/-0.5 | - | - | 1600 | - | - | - | - | - | - | - | - | - | | Not modelled (lack of thermodynamic constants) |
| Radium-228 | Bq/L | - | - | - | <10 | - | - | - | - | - | - | - | - | - | | Not modelled |
| Thorium-228 | Bq/L | - | - | - | <3 | - | - | - | - | - | - | - | - | - | | Not modelled |
| Thorium-230 | Bq/L | 105+/-9.6 | - | - | <500 | - | - | - | - | - | - | - | - | - | | See Below for values in mg/L |
| Radium-226 | Bq/L | 65.8+/-0.3 | - | - | <200 | - | - | - | - | - | - | - | - | - | | See Below for values in mg/L |
| Lead-210 | Bq/L | 530+/-1.3 | - | - | 2400 | - | - | - | - | - | - | - | - | - | | Not modelled (transport behaviour taken into account with Pb) |
| Thorium-232 | Bq/L | 0.2+/-0.04 | - | - | 0.05 | - | - | - | - | - | - | - | - | - | | Not modelled |
| Radium-226 | mg/L | 1.80E-06 | - | - | <5.47E-06 | - | - | - | - | - | - | - | - | - | 5.47E-06 | Limited data, high end value ^b |
| Thorium-230 | mg/L | 1.38E-04 | - | - | <6.55E-04 | - | - | - | - | - | - | - | - | - | 3.93E-06 | Limited data set ^c |

Notes

^a Data Available when developing the Restored Solutions for the modelling in Appendix 7-C of the EIS

^b Arithmetic average values, calculated using detected measurements or where all values were non-detect, assumed the detection limit. pH value is the median, not the arithmetic average.

^c Limited data set meant that PFS groundwater flushing data at pH 5.8 was also considered in setting this value, with a Th-230 concentration of 2.62E-07 mg/L and a Ra-226 value of 1E-05 mg/L (see Table IR-67-10)

Annex 1 – FIRT IR Table – Technical Review of the **Wheeler River Project** draft EIS
Denison Response - August 18, 2023

Table 10: Groundwater Chemistry basis for Restored Solution #2

| Metallurgical Test | | 2018 Pre-Feasibility; Restoration Phase Data | | | Coreflood 3C | Coreflood 3C | 2021 Column, 4 | 2022 Column, 2b | Restored Solution #2 | Notes on Value Carried Forward in Restored Solution for Model |
|-------------------------------|----------|--|--------------------------------------|-----------|----------------------------|------------------------------------|--|---------------------|----------------------|---|
| Sample Name | | RPV 38-42 | RPV 42-53 | RPV 54-57 | D-CF3C-238-256 | D-CF3C-COMBINED-1 (D-CF3C-238-256) | D-CL4-FW-3 | D-CL2b-116 | | |
| Statistic | | - | - | - | Average ^a | - | - | - | | |
| Remediation Method | | GW Flush | Neutralization (NaHCO ₃) | GW Flush | Bicarbonate Neutralization | Bicarbonate Neutralization | Distilled Water Flush Post NaOH Neutralization | NaOH Neutralization | | |
| pH | pH units | 5.8 | 8.5 | 8.3 | 6.51 | Same as adjacent (D-CF3C-238-256) | 7.48 | 6.51 | 6.1 | Low end of Observed |
| Eh | mV | | | | 402 | | - | 387 | - | Set in model to reflect oxidized conditions |
| Pore Volumes of remediation | | - | 76-84 | 82-108 | - | 131-162 | - | 18.70 | - | |
| Aluminum, dissolved | mg/L | 0.27 | 1.32 | 4.4 | <5 | 0.56 | 0.70 | 10 | 0.56 | Low end of observed |
| Arsenic, dissolved | mg/L | 0.10 | 0.04 | 0.06 | 0.25 | 0.1 | <0.01 | 0.000259 | 0.1 | Upper end of observed |
| Barium, dissolved | mg/L | <0.05 | 0.05 | 0.04 | <0.1 | 0.05 | <0.05 | 0.2 | 0.05 | Mid range of observed |
| Total Inorganic Carbon (C(4)) | | mg/L | - | - | - | - | - | - | 105 | Assumed to be approximately equivalent to GW values and considers some bicarbonate neutralization |
| Calcium | mg/L | 28 | 13 | 5 | 48.1 | | 16 | 127 | 10 | Low end of observed |
| Cadmium, dissolved | mg/L | 0.002 | <0.001 | <0.001 | <0.1 | 0.004 | 0.004 | <0.1 | 0.004 | Mid range of observed |
| Chloride | mg/L | 15 | 2 | 12 | | | 6 | - | 50 | Set to a higher value to consider potential for values closer to baseline ore zone water quality |
| Cobalt, dissolved | mg/L | | | | 0.11 | <0.01 | | <0.1 | 0.01 | Low end of observed |
| Chromium, dissolved | mg/L | <0.01 | <0.01 | <0.01 | <0.1 | <0.05 | 0.05 | <0.1 | 0.05 | Mid range of observed |
| Copper, dissolved | mg/L | 0.04 | <0.01 | <0.01 | 0.12 | <0.02 | 0.33 | 0.2 | 0.02 | Low end of observed |
| Fluoride | mg/L | 0.5 | 1.2 | 0.8 | | | 1.4 | - | 0.8 | Mid range of observed |
| Iron, dissolved | mg/L | 6.13 | 0.44 | 1.23 | 9.1 | 4.7 | | 10 | 4.7 | Mid range of observed |
| Potassium | mg/L | <1 | <1 | 2 | <8 | | 1.2 | <8 | 3.5 | Mid range of observed |
| Magnesium | mg/L | <1 | <1 | <1 | 6.7 | | 1.2 | <6 | 3 | Mid range of observed |
| Manganese, dissolved | mg/L | 0.07 | 0.02 | 0.05 | <8 | 0.48 | 0.28 | <8 | 0.48 | Mid range of observed |
| Molybdenum, dissolved | mg/L | 0.03 | 0.05 | <0.005 | 0.47 | 0.13 | <0.01 | 0.4 | 0.13 | Mid range of observed |
| Sodium | mg/L | 36 | 235 | 87 | 251 | | 351 | 887 | 90 | Low range of observed |
| Nickel, dissolved | mg/L | 0.03 | <0.01 | <0.01 | 0.10 | <0.01 | 0.21 | 0.1 | 0.01 | Low end of observed |
| Lead, dissolved | mg/L | 2.13 | 0.36 | 0.39 | 0.20 | 0.32 | 0.25 | 10.0 | 0.32 | Mid range of observed |
| Sulfate | mg/L | 174 | 117 | 100 | 718.7 | | 440 | 2480 | 136 | Low end of observed |
| Selenium, dissolved | mg/L | <0.025 | <0.025 | 0.026 | 0.86 | <0.01 | 0.09 | <0.1 | 0.01 | Low end of observed |
| Si | mg/L | 43.7 | 43.8 | 44.4 | | | | 132.6 | 40 | Mid range of observed |
| Strontium, dissolved | mg/L | | | | 2.0 | 2.4 | 0.20 | 0.7 | 2.4 | Upper end of observed |
| Zinc, dissolved | mg/L | 0.08 | <0.01 | <0.01 | 0.10 | <0.05 | 0.46 | 0.1 | 0.05 | Mid-range of observed |
| P | mg/L | | | | <4 | | | <5 | 4 | applied limited information available |
| Uranium (mg/L) | mg/L | 3.5 | 4.1 | 0.5 | 19.3 | 26.4 | 187 | 38.7 | 30 | Upper End of Observed |
| Vanadium, dissolved | mg/L | <0.01 | 0.007 | 0.03 | 0.13 | 0.16 | 0.03 | 0.2 | 0.16 | Upper end of observed |
| Polonium-210 | Bq/L | 14.9+/-0.3 | 1.9+/-0.1 | 2.7+/-0.1 | - | 280 | - | - | - | Not modelled (lack of thermodynamic constants) |
| Radium-228 | Bq/L | - | - | - | - | <2 | - | - | - | Not modelled |
| Thorium-228 | Bq/L | - | - | - | - | <1 | - | - | - | Not modelled |
| Thorium-230 | Bq/L | 0.2+/-0.03 | 1.36+/-0.14 | 3.2+/-0.4 | - | <100 | - | - | - | See Below for values in mg/L |
| Radium-226 | Bq/L | 389+/-0.7 | 262+/-0.5 | 129+/-0.4 | - | 370 | - | - | - | See Below for values in mg/L |
| Lead-210 | Bq/L | 301+/-0.7 | 40+/-0.3 | 22+/-0.2 | - | 660 | - | - | - | Not modelled (transport behaviour taken into account with Pb modelled) |
| Thorium-232 | Bq/L | <0.01 | <0.01 | <0.01 | - | 0.007 | - | - | - | Not modelled |
| Radium-226 | mg/L | 1.06E-05 | 7.17E-06 | 3.53E-06 | - | 1.01E-05 | - | - | 1.01E-05 | Limited data, high end value |
| Thorium-230 | mg/L | 2.62E-07 | 1.78E-06 | 4.19E-06 | - | <1.31E-04 | - | - | 1.31E-06 | Limited data set ; Low end of observed |

Notes

Data Available when developing the Restored Solutions for the modelling in Appendix 7-C of the EIS

Data Available when developing the Restored Solutions for the modelling in Appendix 7-C of the EIS, but not considered in the development of Restored Solution #2 as pH was alkaline

^a Arithmetic average values, calculated using detected measurements or where all values were non-detect, assumed the detection limit. pH value is the median, not the arithmetic average.

3.0. Remediation of Mining Area within the context of ALARA (Addresses Question #3 of IR-67)

Section 2.2.3 of the draft EIS presents the conceptual decommissioning plan (CDP). As part of the CDP, and as highlighted in Section 2.3.3.1.1 of the draft EIS, remediation of the mining area will continue until recovered water reaches and is demonstrated to be stabilized (maintained) at acceptable mining area decommissioning objectives. Such decommissioning objectives consider protection of plausible downgradient water uses. For the purpose of the assessment "plausible use" has been determined to be the protection of aquatic life in Whitefish Lake, since numeric 3D groundwater modelling has indicated that Whitefish Lake is where groundwater associated with the remediated mining area will discharge to. It is within this frame of reference therefore that the ALARA concept should be considered. That is, ALARA can be defined for the purpose of the remediation of the mining area to the extent that subsequent discharge of groundwater to Whitefish Lake does not adversely affect aquatic biota in the lake.

The metallurgical testing done to date evidences an amelioration of UBS quality post-mining with flushing using groundwater and base (hydroxide or bicarbonate) to a restored solution of pH in the range of 4.5-5.5. The intent of the remediation approach is to raise the pH consistently but incrementally, so as to avoid over-neutralizing and yielding an alkaline solution. Alkaline pH conditions favour the formation of precipitates that are not desired from a physical (clogging) or chemical standpoint (secondary solids formed in place of removal of COPCs in the dissolved-phase from the subsurface). Potential environmental effects were thus evaluated based on plausible use, as defined above, at a pH and groundwater conditions that were shown to be achievable through groundwater flushing and addition of base without the risk of over-neutralization. Restoration Solution #1 contains the higher remaining concentrations, and lower pH (i.e., differs more from baseline conditions in the ore zone) and was carried forward for geochemical reactive transport modelling to evaluate environmental effects.

It is noted that the freeze wall will remain in place during mining area remediation (see draft EIS Section 2.3.3.1.1), until decommissioning objectives are achieved to ensure there is no loss of tertiary control of the mining fluid (even in a diluted state). Refinement of the mining area decommissioning objectives and associated modelling will be done as the Project progresses through updates to the Decommissioning Plan; nevertheless, the objectives as they may evolve will be bound by the objectives evaluated in the EIS, which as shown are protective of aquatic biota in Whitefish Lake. The final acceptable mining area decommissioning objectives will be developed prior to initiation of groundwater remediation, as part of the Detailed Decommissioning Plan (DDP).

References

Denison (Denison Mines Corp), 2018. Prefeasibility Study Report for the Wheeler River Uranium Project, Saskatchewan, Canada. Report dated: September 24, 2018.

Denison (Denison Mines), 2023. Feasibility Study.

IR-20, IR-67, IR-69 Appendix A

2018 Column Leach Testing

Table A1: Sample Inventory for 2018 ISR Column Leach Test

| Original Sample Purpose | Sample I.D. | WR Hole No. | Lithology | Est. U% | Mass (g) | Mass U (g) |
|--------------------------------------|-----------------|----------------------------------|----------------|-------------|-------------|------------|
| Porosity/Perm. | S066906 | 419D1 | BSMT | 0.22 | 320 | 0.61 |
| Porosity/Perm. | S066907 | 525D2 | SDST | 0.06 | 323 | 0.17 |
| Porosity/Perm. | S066908 | 405D1 | SDST | 0.06 | 270 | 0.14 |
| Porosity/Perm. | S066909 | 405D1 | BSMT | 0.08 | 299 | 0.21 |
| Porosity/Perm. | S066910 | 525D1 | BSMT | 51.72 | 843 | 375 |
| Leach Testing | S066911 | 525D1 | SDST | 0.06 | 282 | 0.17 |
| Leach Testing Composite Sample | S066912-S066916 | 525D1 525D2 | SDST & BSMT | 29.4 | 1,090 | 276 |
| Leach Testing Total Composite Sample | S066906-S066916 | 405D1 419D1 525D1 525D2 | SDST & BSMT | 19.03 (wet) | 3,427 (wet) | 652.3 |

Table A2: Mineralogy of the Ore Zone*

| Unit | Mineral | Ideal Formula | Major (≥2% w/w) | Minor (< 2% w/w, or, shown to be present in Petrography or core logging) |
|----------|---------------------|--|-----------------|--|
| Ore Zone | Pyrite | FeS ₂ | X | |
| | Galena | PbS | X | |
| | Chalcopyrite | CuFeS ₂ | X | |
| | Quartz | SiO ₂ | X | |
| | Chlorite | (Fe,Mg) ₂ (Al,Fe ³⁺) ₃ Si ₃ AlO ₁₀ (OH) ₈ | X | |
| | Muscovite/Illite | KAl ₂ (Si ₃ Al)O ₁₀ (OH,F) ₂ | X | |
| | Kaolinite | Al ₂ Si ₂ O ₅ (OH) ₄ | X | |
| | Fe-oxy-hydroxides | FeO(OH)·nH ₂ O | X | |
| | Uraninite | UO ₂ | X | |
| | UO ₂ .33 | U ₃ O ₇ | X | |
| | UO ₂ .25 | U ₄ O ₉ | X | |
| | Schoepite | UO ₃ ·2H ₂ O | X | |
| | Siderite | FeCO ₃ | X | |
| | Fluorite | CaF ₂ | X | |
| | Gersdorffite | NiAsS | | X |
| | Nickeline | NiAs | | X |
| | Dravite | NaMg ₃ Al ₆ (Si ₆ O ₁₈)(BO ₃) ₃ (OH) ₃ (OH) | | X |
| | Pyrrhotite | Fe _{1-x} S (x=0-0.17) | | X |
| | Sphalerite | (Zn,Fe)S | | X |
| | Feldspar | KAlSi ₃ O ₈ | | X |
| | Calcite | CaCO ₃ | | X |
| | Apatite | Ca ₅ (PO ₄) ₃ (F,Cl,OH) | | X |
| | Corundum | Cr ₂ O ₃ | | X |
| | APS Minerals | CaAl ₃ (PO ₄)(PO ₃ OH)(OH) ₆ | | X |

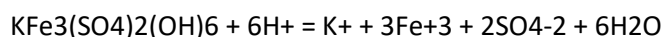
Notes

*The table above is excerpted from Table 3-1 of Appendix 7-C of the draft EIS (mineralogy for other “Units” provided therein are not shown here)

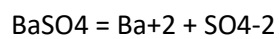
Uraninite **Blue bolded text** indicates dominant minerals; can be present at values exceeding 40% w/w

Reactions forming secondary sulphate minerals

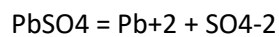
K-Jarosite



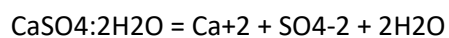
Barite



Anglesite



Gypsum



IR-20, IR-67, IR-69 Appendix B

Table 3-5: Restored Solutions, UBS Composition representative of End of Mining conditions, and Representative Groundwater Composition by Hydrostratigraphic Unit

| Parameter/ Groundwater or Restored Solution | Unit | Ore Zone (GWR-032) | PWZ (GWR-031 and Cigar Lake) | Lower Sandstone Aquifer and Decalcified Zone (GWR-011) | Intermediate Sandstone Aquifer (GWR-046) | Overburden and Upper Sandstone Aquifer (GWR-036, Primarily) | Range of Values of UBS constituent concentrations across Metallurgical tests from 2018-2021 representative of End of mining conditions | | Restored Solution #1 | 50% Restored Solution #1 | Restored Solution #2 | 50% Restored Solution #2 |
|--|----------|-----------------------|---------------------------------------|--|---|--|---|----------|-------------------------|--------------------------------|-------------------------|-----------------------------|
| | | | | | | | Minimum | Maximum | | | | |
| pH | unit | 6.83 | 6.7 | 6.46 | 7.053 | 6.45 | 0.63 | 2.1 | 4.3 | 5.1 | 6.1 | 6.3 |
| pe | unitless | -1.3 | 1.9 | 2.3 | 4.5 | 1.2 | 9.80 | 14.7 | 10 | (set) 7 | 7.8 | (set) 4 |
| temp | °C | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| Al | mg/L | 6.00E-04 | 3.40E-02 | 5.20E-02 | 8.00E-01 | 3.70E-02 | 6.90E+01 | 4.61E+03 | 7.00E+00 | 3.53E+00 | 5.60E-01 | 3.06E-01 |
| As | mg/L | 2.00E-04 | 5.00E-02 | 1.30E-03 | 4.75E-06 | 3.00E-04 | <0.1 | 2.12E+01 | 6.00E-02 | 3.07E-02 | 1.00E-01 | 5.07E-02 |
| Ba | mg/L | 6.30E-02 | 3.60E-02 | 5.40E-02 | 2.41E-01 | 5.70E-03 | <0.05 | <0.5 | 5.00E-02 | 5.20E-02 | 5.00E-02 | 5.20E-02 |
| C(4) | mg/L | 1.76E+02 | 1.54E+02 | 8.66E+01 | 1.01E+02 | 3.39E+01 | - | - | 5.80E+01 | 7.23E+01 | 1.05E+02 | 9.58E+01 |
| Ca | mg/L | 5.50E+01 | 6.76E+00 | 9.78E+00 | 1.07E+01 | 2.70E+00 | 5.80E+01 | 7.23E+02 | 1.10E+02 | 6.00E+01 | 1.00E+01 | 9.89E+00 |
| Cd | mg/L | 1.00E-05 | 1.00E-05 | 1.00E-05 | 3.36E-05 | 1.00E-05 | 1.80E-02 | 1.81E+00 | 1.50E-02 | 7.52E-03 | 4.00E-03 | 2.01E-03 |
| Cl | mg/L | 1.90E+02 | 8.65E+01 | 7.20E+00 | 8.63E+00 | 6.86E+00 | <10 | 1.22E+03 | 2.00E+02 | 1.04E+02 | 5.00E+01 | 2.86E+01 |
| Co | mg/L | 1.00E-04 | 1.00E-02 | 1.00E-04 | 5.84E-03 | 4.00E-04 | 5.00E-01 | 1.49E+01 | 2.00E+00 | 1.00E+00 | 1.00E-02 | 5.05E-03 |
| Cr | mg/L | 5.00E-04 | 4.50E-03 | 5.00E-04 | 1.69E-03 | 5.00E-04 | <0.1 | 9.14E+00 | 5.00E-02 | 2.53E-02 | 5.00E-02 | 2.53E-02 |
| Cu | mg/L | 2.00E-04 | 5.00E-03 | 1.80E-03 | 6.29E-03 | 6.00E-04 | 5.16E+00 | 9.64E+02 | 1.70E-01 | 8.60E-02 | 2.00E-02 | 1.09E-02 |
| F | mg/L | 2.30E-01 | 5.30E-01 | 1.80E-01 | 5.90E-02 | 6.00E-02 | 1.00E+00 | 3.40E+01 | | 9.00E-02 | 8.00E-01 | 4.90E-01 |
| Fe | mg/L | 4.20E+00 | 4.90E-01 | 8.60E-01 | 6.03E+00 | 4.05E-01 | 8.20E+02 | 4.09E+03 | 1.00E+02 | 5.05E+01 | 4.70E+00 | 2.78E+00 |
| K | mg/L | 4.60E+00 | 5.60E+00 | 2.00E+00 | 6.77E+00 | 2.80E+00 | 6.20E+00 | 1.49E+02 | 9.00E+00 | 5.51E+00 | 3.50E+00 | 2.75E+00 |
| Mg | mg/L | 1.10E+01 | 3.09E+00 | 1.60E+00 | 3.91E+00 | 1.80E+00 | <10 | 2.40E+02 | 6.00E+00 | 3.80E+00 | 3.00E+00 | 2.30E+00 |
| Mn | mg/L | 2.20E-01 | 7.00E-01 | 3.60E-01 | 3.91E+00 | 1.40E-01 | 2.70E+00 | 4.10E+01 | 3.40E+00 | 1.88E+00 | 4.80E-01 | 4.20E-01 |
| Mo | mg/L | 3.80E-03 | 1.28E-02 | 4.20E-03 | 3.89E-03 | 7.00E-04 | 1.65E+00 | 5.96E+01 | 1.00E-01 | 5.22E-02 | 1.30E-01 | 6.71E-02 |
| Na | mg/L | 8.10E+01 | 7.61E+01 | 6.10E+00 | 8.96E+00 | 2.90E+00 | 6.00E+00 | 1.23E+04 | 1.90E+02 | 9.82E+01 | 9.00E+01 | 4.81E+01 |
| Ni | mg/L | 1.00E-03 | 1.50E-02 | 1.00E-04 | 4.87E-02 | 1.80E-03 | <1 | 2.68E+01 | 9.70E+00 | 4.86E+00 | 1.00E-02 | 5.05E-03 |
| Pb | mg/L | 1.00E-04 | 1.00E-04 | 1.00E-04 | 1.57E-03 | 1.00E-04 | 2.00E-01 | 1.95E+01 | 3.10E+00 | 1.55E+00 | 3.20E-01 | 1.60E-01 |
| S(6) | mg/L | 1.30E+01 | 4.55E+00 | 4.70E+00 | 1.01E+01 | 1.90E+00 | 5.21E+03 | 2.09E+05 | 7.03E+02 | 3.54E+02 | 1.36E+02 | 7.04E+01 |
| S(-2) | mg/L | 1.00E-08 | 1.00E-09 | 1.00E-09 | 1.00E-09 | 1.00E-09 | - | - | 1.00E-09 | 1.00E-09 | 1.00E-09 | 1.00E-09 |
| Se | mg/L | 1.00E-04 | 1.00E-04 | 1.00E-04 | 3.59E-04 | 8.00E-04 | <0.025 | 2.64E+01 | 8.00E-02 | 4.01E-02 | 1.00E-02 | 5.05E-03 |
| Si | mg/L | 1.33E+01 | 9.18E+00 | 2.41E+01 | 1.31E+01 | 2.62E+01 | 3.07E+01 | 1.92E+02 | 4.00E+01 | 3.21E+01 | 4.00E+01 | 3.21E+01 |
| Sr | mg/L | 1.66E+00 | 1.17E+00 | 1.20E-01 | 1.15E-01 | 1.20E-02 | 6.00E-01 | 5.19E+00 | 4.40E+00 | 2.26E+00 | 2.40E+00 | 1.26E+00 |
| Zn | mg/L | 2.62E+00 | 4.25E-03 | 1.20E-02 | 1.25E-02 | 4.40E-03 | 2.30E+00 | 3.31E+02 | 1.40E+00 | 7.07E-01 | 5.00E-02 | 3.10E-02 |
| P | mg/L | 1.00E-02 | 1.00E-02 | 1.00E-01 | 5.00E-02 | 4.00E-02 | 2.20E+00 | 7.54E+01 | 4.00E+00 | 2.05E+00 | 4.00E+00 | 2.05E+00 |
| U | mg/L | 1.10E-02 | 1.24E-02 | 7.00E-04 | 2.26E-02 | 5.00E-04 | 7.70E+02 | 3.88E+04 | 1.00E+02 | 5.01E+01 | 3.00E+01 | 1.50E+01 |
| V | mg/L | 1.00E-04 | 1.00E-04 | 1.00E-04 | 1.20E-03 | 1.00E-04 | 6.16E+00 | 1.61E+02 | 5.10E-01 | 2.55E-01 | 1.60E-01 | 8.01E-02 |
| ²²⁶ Ra | mg/L | 4.92E-06 | 5.47E-09 | 1.37E-08 | 2.54E-08 | 1.64E-09 | 6.29E-06 | 8.21E-05 | 5.47E-06 | 2.75E-06 | 1.01E-05 | 5.06E-06 |
| ²³⁰ Th | mg/L | 9.17E-06 | 1.00E-06 | 1.31E-07 | 2.62E-07 | 2.62E-08 | 2.75E-02 | 2.88E-01 | 3.93E-06 | 2.02E-06 | 1.31E-06 | 7.14E-07 |

Attachment: IR-21

| | |
|---|--|
| Number | IR-21 |
| Dept. | ECCC |
| Project effects link | Change to an environmental component due to hazardous contaminants |
| Reference to EIS, appendices, or supporting documentation | Section 2.3.3.1.3, Project Description |
| Context and Rationale | <p>Context: The decommissioning process for the wellfield and associated infrastructure is discussed, however there is no information provided on the potential risk for subsidence of the ground above the depleted uranium deposit. After the uranium has been dissolved and pumped to the surface, a cavity will be formed in the area where the uranium used to exist. This could destabilize the overlying substrates, causing the ground at the surface to sink in the future. There is currently no information regarding this risk, and how it may alter the overlying environment, surface water features, runoff, or existing nearby waterbodies.</p> <p>Rationale: From a surface water and sediment quality perspective, it is important to understand how potential subsidence in the future post-decommissioning may affect the existing environment. It is currently unclear if there is any risk to the aquatic environment if subsidence were to occur and alter existing waterbodies, create new surface water features, or if there will be any risk to the decommissioned onsite industrial landfill and industrial wastewater treatment plant precipitate pond.</p> |
| Information Requirement | Provide further information on the potential risks from subsidence including the probability of occurrence, how it may affect surface water features, and if there exists any risk to the planned decommissioning of waste management infrastructure. |

Response:

RESPEC (2023) memo is attached here to support the IR response provided in the table.



EXTERNAL MEMORANDUM

To: Xavier Lu Dac
Dana Harris
Denison Mines Corporation
230-22nd Street East
Suite 200
Saskatoon, SK S7K 0E9

cc: Project Central File 02924

From: Neel Gupta
Cody Vining
Brett Dueck
RESPEC
3824 Jet Drive
Rapid City, SD 57703

Date: July 14, 2023

Subject: Results of a Geomechanical Study Investigating the Stability of the Rock Mass in Response to In Situ Recovery of Uranium-Enriched Rock for the Wheeler River Uranium Project

Denison Mines Corporation (Denison), a uranium exploration and development company, has a flagship Wheeler River Uranium project. This project is the largest undeveloped in situ recovery (ISR) uranium project in Northern Saskatchewan's eastern Athabasca Basin. The project site is located approximately 35 kilometers (km) north-northeast of the Cameco Corporation (Cameco) Key Lake operation and 35 km southwest of the Cameco McArthur River operation in the eastern Athabasca Basin. Denison proposes developing the Phoenix deposit in this region.

At the Phoenix deposit, Denison plans to drill the set of injection/recovery wells for ISR of uranium-enriched rock through leaching with a freeze wall isolating the operations from the surrounding rock mass. In response to the leaching process, the remnant ore zone may displace or fail and may no longer be able to support the overburden load while causing instability in the surrounding rock mass because of the stress redistribution. Denison, therefore, has requested a geomechanical study to analyze the geomechanical stability of the rock mass around the excavation and freeze wall from the leaching process. This memorandum documents the geomechanical study and briefly discusses the study objectives and approach, significant results, and conclusions.

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STUDY OBJECTIVES AND APPROACH

In a recent geomechanical study [Vining et al., 2023], RESPEC Company, LLC (RESPEC) developed a three-dimensional (3D) strip model of a specific geological section where maximum ore extraction is planned to investigate the stability of the mined cavity and estimate the surface disturbance. The boundary conditions of the strip numerical model assumed an infinite array of the modeled cross-section, where ore extraction is maximum, along the length of the Phoenix deposit. Considering the boundary conditions of the strip model and presuming the average material properties of key stratigraphic layers, the numerical model predicted surface displacement of approximately 7.5 centimeters (cm) and marginal stability of the rock mass limited to the extent of 16 meters (m) from the top extent of mined excavation.

The primary objectives of the current study are evaluating the geomechanical stability of the rock mass around the excavation and proposed freeze wall in response to the in situ leaching operations in Zone A of the Phoenix deposit. To achieve the desired objectives, RESPEC modified the previously developed 3D strip model [Vining et al., 2023] to create a full-scale 3D model using the structural finite difference program *FLAC3D* [Itasca Consulting Group, Inc., 2021] while presuming the similar, average material properties of key stratigraphic layers. Considering the computational time and analysis effort, creating a numerical model that extends across the entire extent of Zone A is impractical. Because the *FLAC3D* program imposes a plane of symmetry along its boundaries, RESPEC, in consultation with Denison, simulated the half-length of Zone A, and the modeling domain encompasses the Phoenix deposit's northeast extent, as shown in Figure 1. The vertical extent of the 3D model is assumed to be 1,000 m below ground surface (bgs), and the lateral boundary is approximately 135 m away from the extent of the low-grade ore zone. The model boundaries located far away from the excavation boundaries isolated the influence of model boundaries on the excavation response. The kinematic boundary conditions of the numerical model prevent normal (horizontal) displacements along the four vertical boundaries of the model and vertical displacements of the bottom boundary. These constraints allow the interior portion of the model to move freely. In situ stress data were not available for the Phoenix deposit. The vertical stress was assumed to be lithostatic (i.e., equal to the weight of the overburden) and determined as a function of depth from the weight of the overburden. In rock mass, the horizontal stress is considered isotropic (i.e., maximum and minimum horizontal stress equal to the vertical stress). For instance, at the depth of 400 m bgs, the average in situ vertical stress is approximately 10 megapascals (MPa).

Denison provided the AutoCAD drawings of key stratigraphic layers in the Phoenix deposit, which were used to develop the 3D structural model. Table 1 summarizes these stratigraphic layers. Figure 2 presents the elevation view of the 3D model, which illustrates the continually changing elevations and thicknesses of the rock layers, for example, upper and lower clay, sandstone with sulfide, and altered basement. Except for the desilicified sandstone and sandstone with sulfide, the modeled stratigraphic units and their material properties are consistent with the 3D strip model in the previous geomechanical study [Vining et al., 2023]. In consultation with Denison, RESPEC assumed the Mohr-Coulomb property of sandstone with sulfide was similar to altered sandstone and the desilicified sandstone was similar to sand [Terzaghi and Peck, 1967].

Random rock removal was adopted to represent the in situ leaching process in the numerical model. Rock removal included the instantaneous excavation of 30 percent of rock by volume from the high-grade ore zone and 3 percent from the low-grade ore zone. According to Denison, high- and low-grade ore zones are based on the uranium grade and encompass different stratigraphic layers (e.g., upper clay, lower clay, ore zone) within the Phoenix deposit. Denison plans to adopt the freeze wall design for ISR of uranium-enriched rock; therefore, RESPEC explicitly modeled the freeze wall, which

was 20 m thick and located at a distance of 15 m from the extent of the low-grade ore zone. Figure 3 presents the vertical extent of the high- and low-grade ore zones on the vertical plane and surrounding freeze wall.

In the numerical simulation, the pressure at the excavation surface was maintained at a pressure equivalent to a wellhead pressure of 0 MPa with a freshwater gradient of 0.01 MPa/m. Considering that the overlying sandstone is fractured and permeable, and the elevation of the potentiometric surface is near the ground level, RESPEC also simulated the influence of porewater pressure on the predicted stresses and displacement, which is consistent with the previous study [Vining et al., 2023].

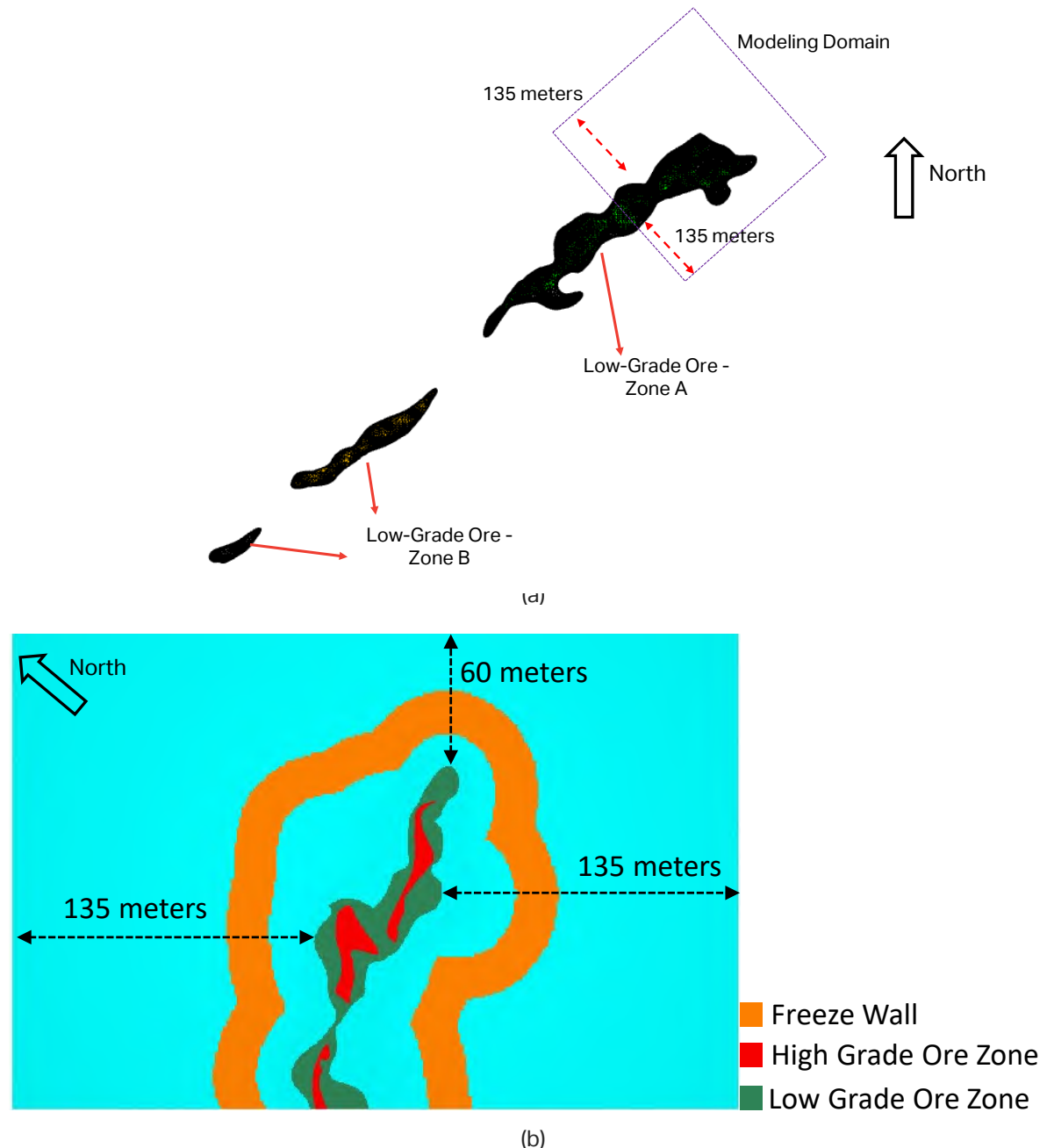


Figure 1. Plan View of the (a) Low-Grade Ore in Zone A and Zone B of the Phoenix Deposit and (b) Extent of Modeling Domain.

Table 1. Average Material Properties

| Stratigraphy | Cohesion (MPa) | Friction Angle (degree) | Rock-Mass Compressive Strength (MPa) | Tensile Strength (MPa) | Rock-Mass Modulus (MPa) | Poisson's Ratio (—) | Density (g/cc) |
|------------------------|----------------|-------------------------|--------------------------------------|------------------------|-------------------------|---------------------|----------------|
| Overburden | 1.44 | 26.93 | 4.84 | 4.7 | 2,241.65 | 0.20 | 2.6 |
| Stiff Sandstone | 1.44 | 26.93 | 4.84 | 4.7 | 2,241.65 | 0.20 | 2.6 |
| Altered Sandstone | 1.07 | 22.54 | 3.39 | 1.0 | 1,363.76 | 0.25 | 2.1 |
| Sandstone with Sulfide | 1.07 | 22.54 | 3.39 | 1.0 | 1,363.76 | 0.25 | 2.1 |
| Desilicified Sandstone | 0.0 | 30.0 | 0.0 | 0.0 | 1,363.76 | 0.25 | 2.1 |
| Upper Clay | 0.03 | 16.6 | 0.12 | 0.20 | 55.17 | 0.28 | 1.7 |
| Ore Zone | 0.22 | 20.11 | 0.54 | 0.51 | 188.75 | 0.28 | 4.2 |
| Lower Clay | 0.15 | 18 | 0.48 | 0.20 | 206.43 | 0.28 | 1.7 |
| Altered Basement | 2.72 | 25.88 | 9.17 | 1.2 | 4,254.55 | 0.15 | 2.1 |
| Stiff Basement | 5.57 | 31.46 | 20.34 | 10.7 | 11,564.83 | 0.11 | 2.7 |

g/cc = grams per cubic centimeter

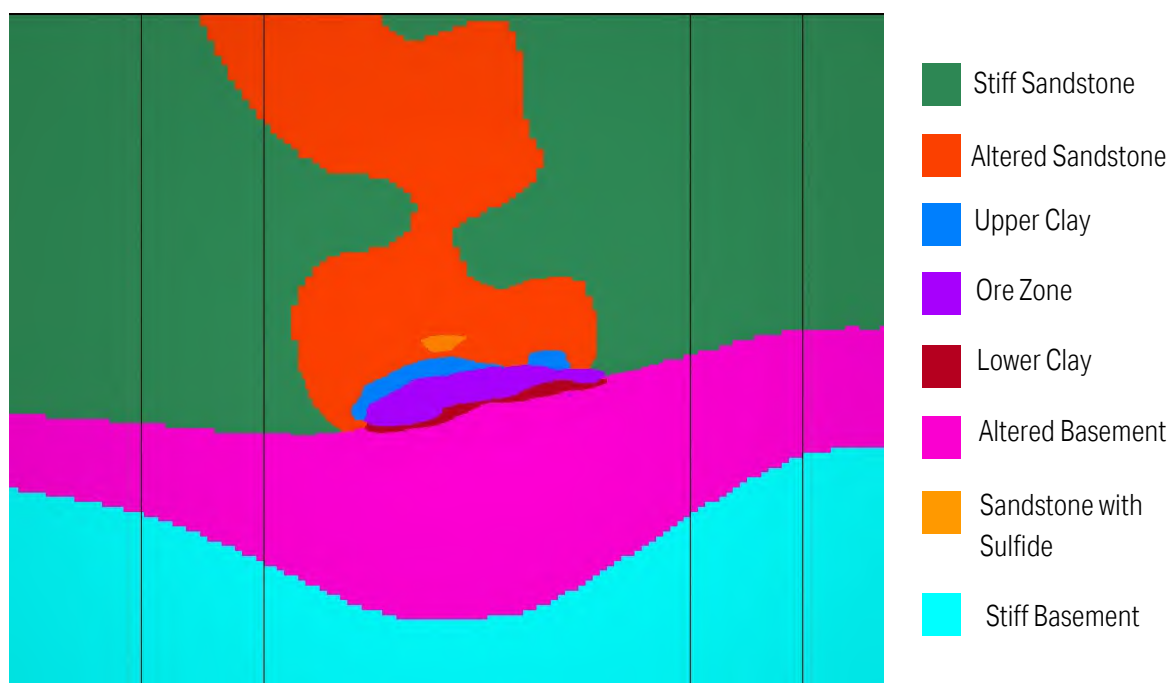


Figure 2. Elevation View of the Numerical Model Illustrating Changing Elevation of Different Stratigraphic Units Represented in the Structural Model.

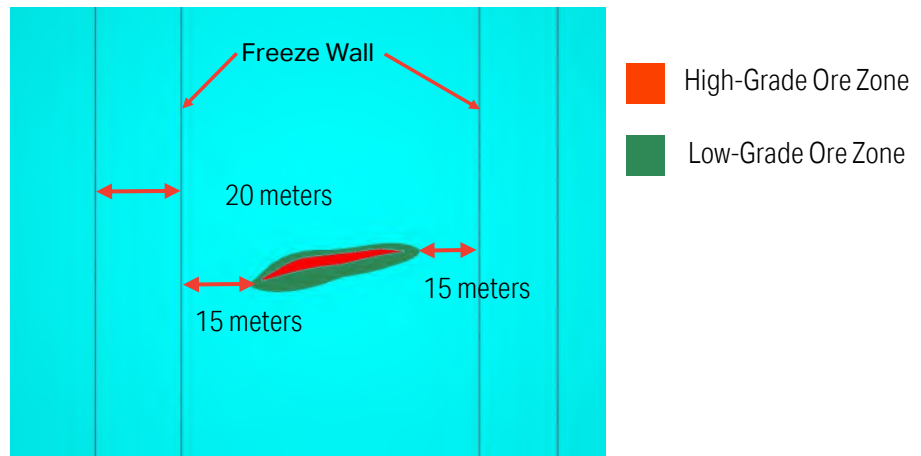


Figure 3. Elevation View of the Numerical Model Illustrating the Relative Location of the Freeze Wall to the High- and Low-Grade Ore Zones in Zone A of the Phoenix Deposit.

RESULTS

The numerical model-predicted stresses and displacements were scrutinized to assess the surface subsidence and the stability of the remaining ore zone, surrounding rock mass, and freeze wall. The outcomes of the numerical simulation are discussed in the following subsections.

ROCK STABILITY

RESPEC simulated the rheological behavior of rock presuming the Mohr-Coulomb constitutive model for each stratigraphic unit to analyze the stress redistribution in case of failure of the remnant rock around the excavation. In the post-simulation analysis, the Mohr-Coulomb Factor of Safety (MCFS) was determined to quantify the competency of the rock mass based on the predicted stress fields. The MCFS value greater than, equal to, or less than 1.0 quantifies the material as not failing, at failure, or failed, respectively. The potential for tensile fracturing in the rock mass was also analyzed using the least compressive principal stress (LCPS). The magnitude of LCPS will be positive at locations where a tensile stress component exists in any direction. Site-specific strength properties of the rock after freezing were unavailable at the time of the study; therefore, RESPEC took a conservative approach and assumed that the properties of the freeze wall were similar to the host rock.

Figures 4 and 5 present the MCFS contour and LCPS contour, respectively, on a horizontal plane passing through the depth of 390, 399, 406, and 413 m bgs. Figures 6 and 7 present the MCFS and LCPS contour on multiple vertical planes. MCFS contour (Figures 4 and 6) presents that the failure conditions (i.e., red contour) are limited within the close proximity (i.e., 5 to 8 m) of the low-grade ore zone, and its lateral extent varies with the depth of the ore zone below the ground surface. However, the MCFS is always greater than 2.50 within the modeled extent of the freeze wall. LCPS contour (Figures 5 and 7) presents that the marginally compressive stress conditions (i.e., yellow and red contours) are predicted within the extent of the low-grade ore zone, and compressive stresses greater than 5 MPa are predicted within the proposed extent of the freeze wall. Figure 8 quantifies the failure volume predicted within the different stratigraphic units. Within the modeled domain of Zone A, the predicted failure volume was approximately 8, 22, 41, and 26 percent of the modeled volume of sandstone with sulfide, upper clay, ore zone, and lower clay, respectively. However, the failure volume is less than 0.02 percent of the modeled volume of stiff or altered sandstone, desilicified sandstone, and altered and stiff basement rock. Additionally, 0 percent failure volume is predicted within the freeze wall.

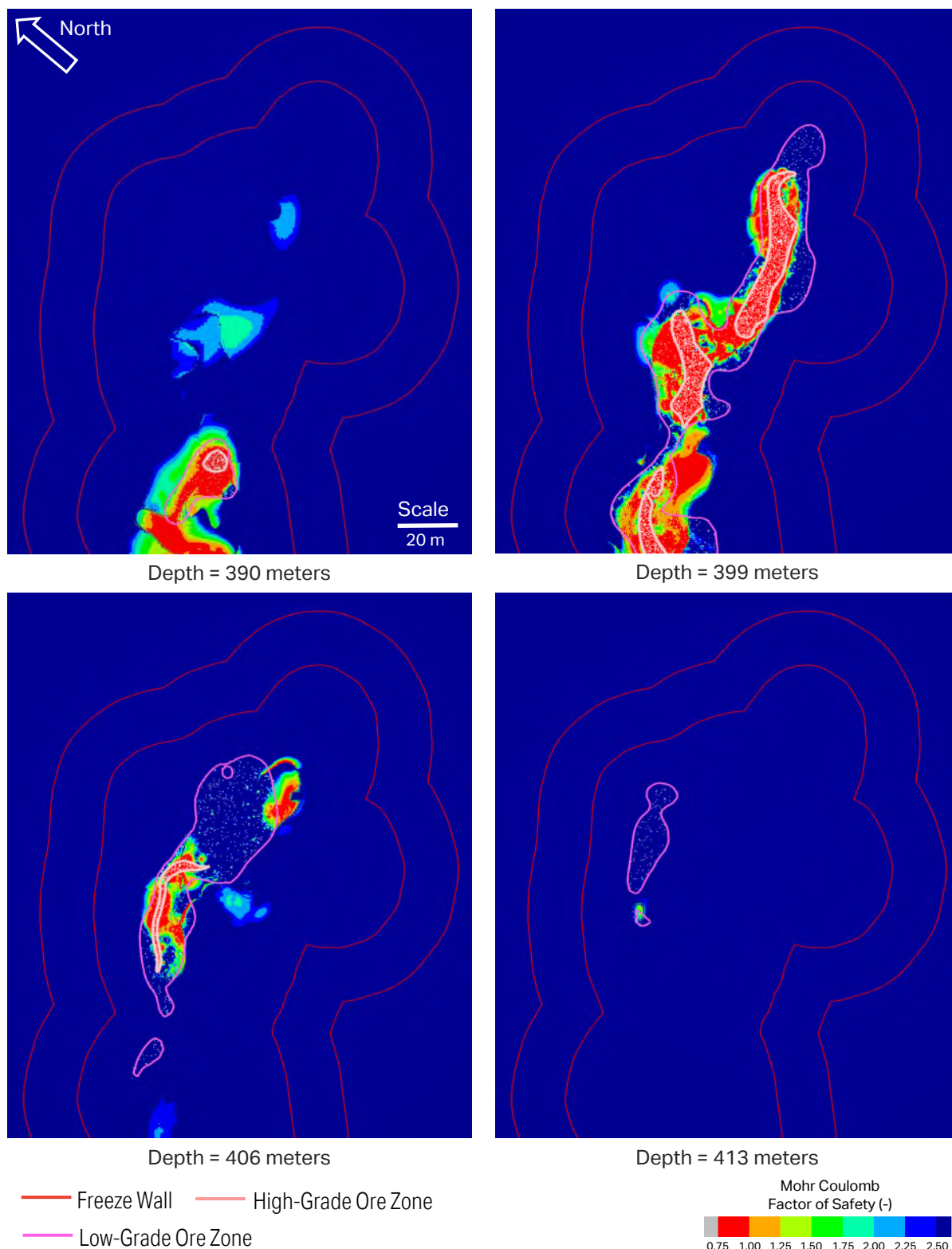


Figure 4. Plot of Mohr-Coulomb Factor of Safety Values on a Horizontal Plane Passing at a depth of 390, 399, 406, and 413 Meters Below Ground Surface.

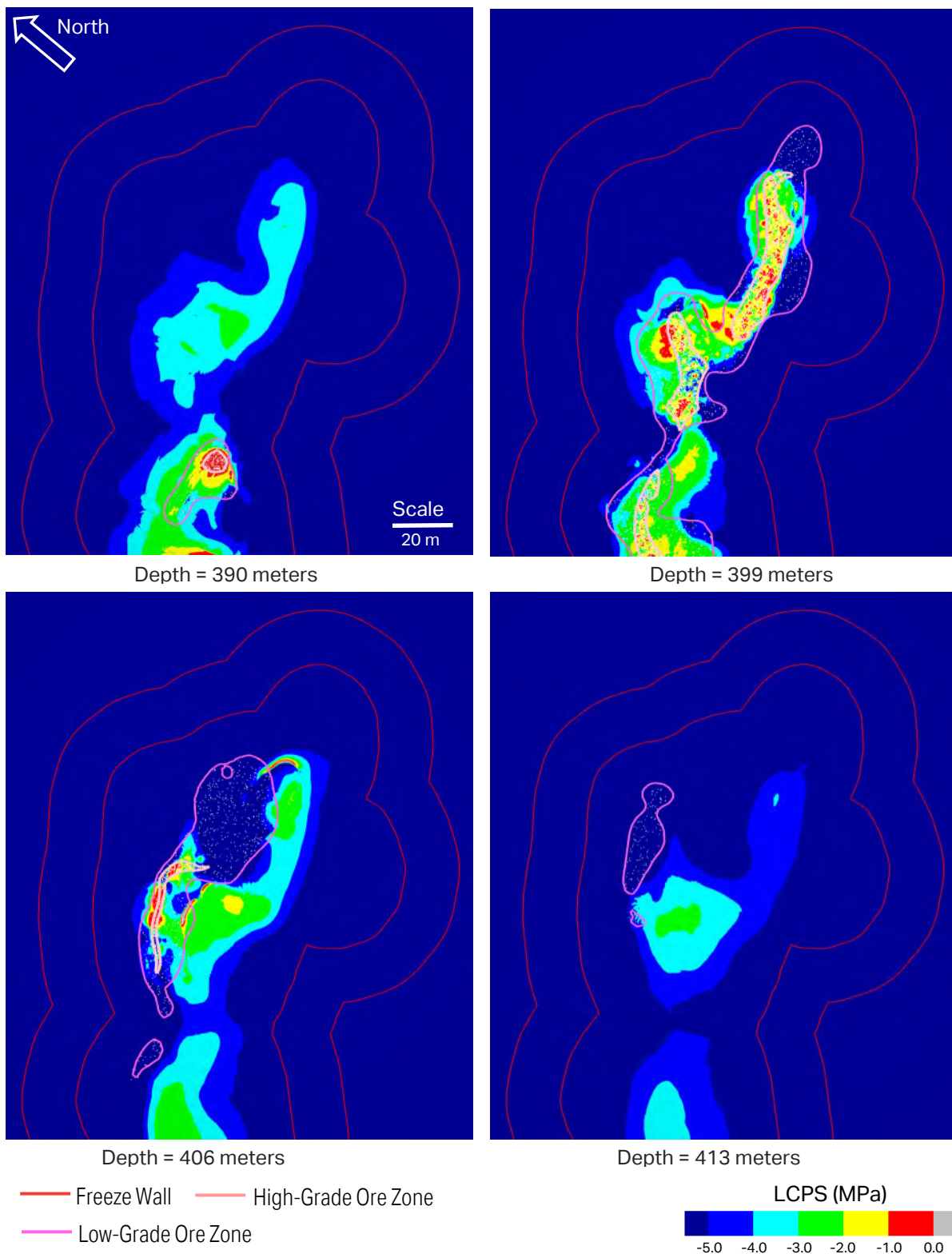


Figure 5. Plot of Least Compressive Principal Stress Values on a Horizontal Plane Passing at a Depth of 390, 399, 406, and 413 Meters Below Ground Surface.

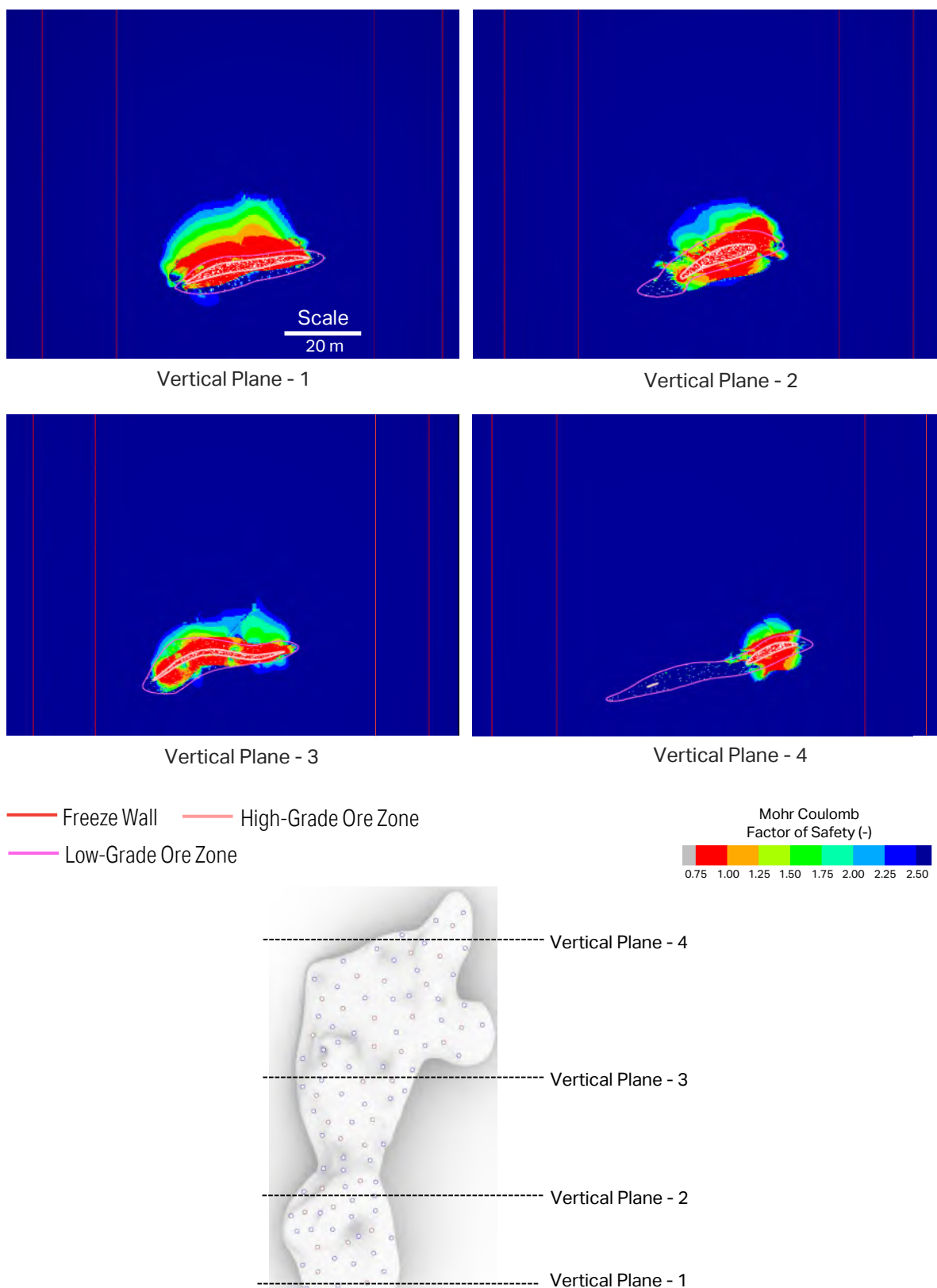


Figure 6. Plot of Mohr-Coulomb Factor of Safety Values on Multiple Vertical Planes.

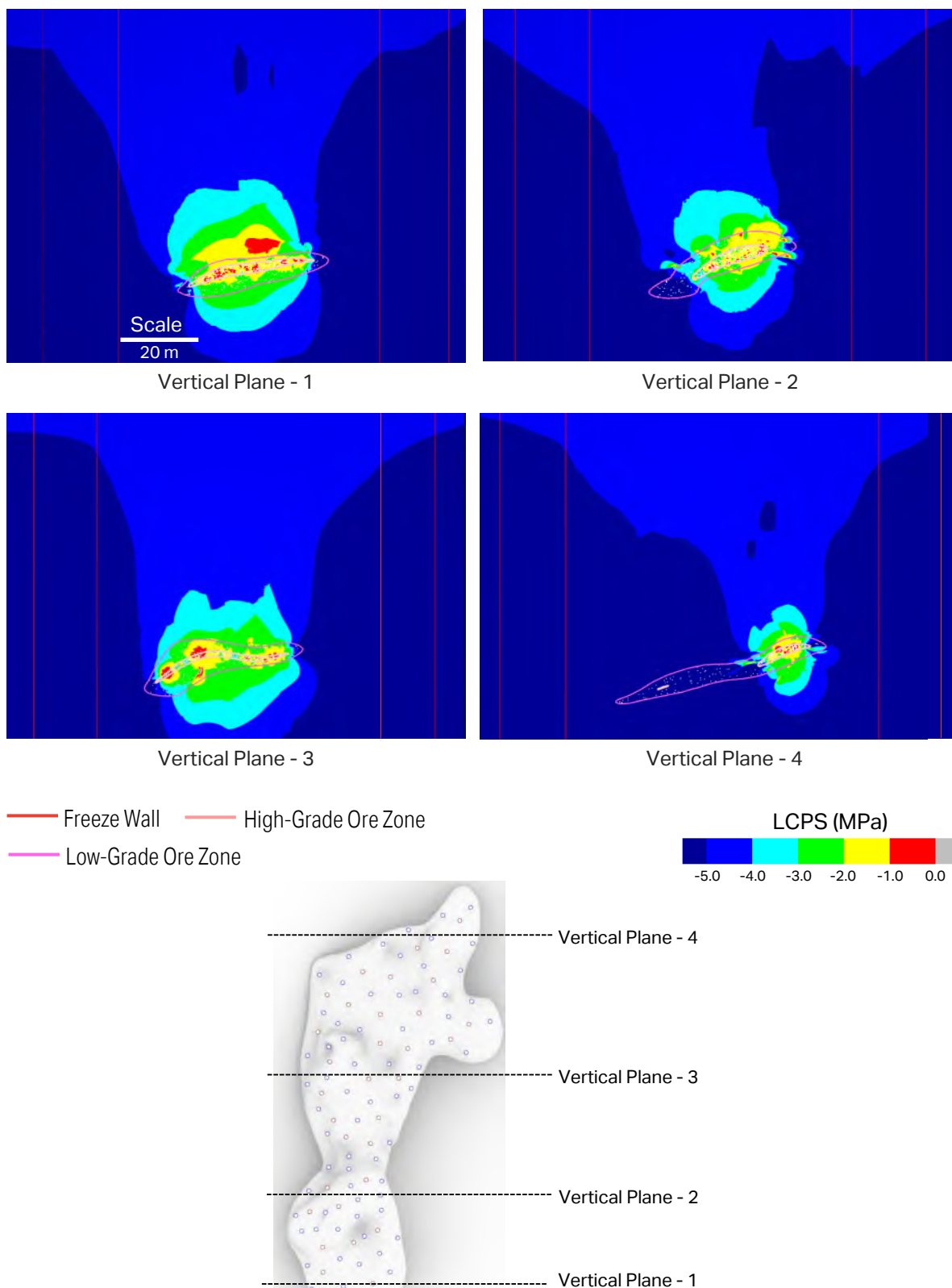


Figure 7. Plot of Least Compressive Principal Stress Values on Multiple Vertical Planes.

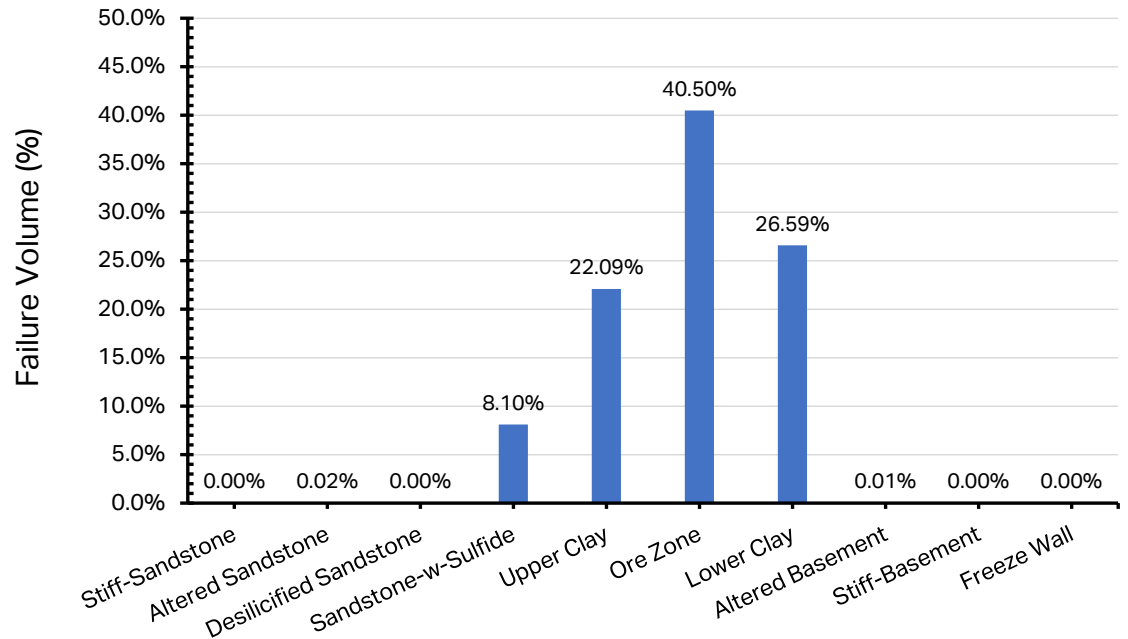


Figure 8. Failure Volume in Different Stratigraphic Units.

SURFACE SUBSIDENCE

In response to the proposed leaching process, the surrounding host rock will displace into the mined cavity, which manifests as subsidence at the ground surface. The numerical model predicted the negligible vertical displacement of approximately 2.5 millimeters (mm) on the ground surface. Figure 9 presents the contours of vertical displacement predicted on a vertical plane passing through the modeling domain's southern boundary. The contour on the vertical plane presents that the vertical displacement of the rock mass immediately above the low-grade ore zone ranges between 42 and 49 cm and quickly reduces to the range between 0 and 7 cm at a distance of 4 to 5 m from the low-grade ore zone. The current study's numerical model-predicted surface subsidence is significantly smaller than the surface subsidence of 7.5 cm predicted in the previous geomechanical study [Vining et al., 2023], which is likely attributed to the difference in the modeling domain and boundary conditions between the two models. In the previous study, the 3D strip model presumed an infinite array of modeled cross sections and corresponding excavation of uranium-enriched rock; in the current study, the full-scale model included the representative extent of Zone A at the Phoenix deposit.

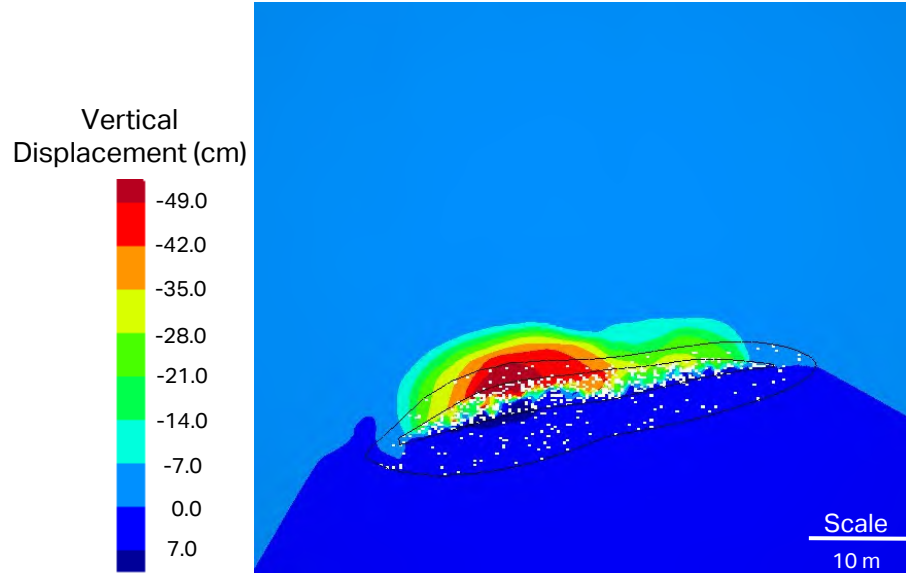


Figure 9. Contour of Vertical Displacement After the Proposed Volumetric Extraction on a Vertical Plane Passing Through the Modeling Domain's Southern Boundary.

CONCLUSIONS

The study objective was to better understand the anticipated response of the surrounding rock mass, particularly the freeze wall, after proposed volumetric rock extraction from the high- and low-grade ore zone. The significant outcomes from this study are as follows:

- / **The geomechanical numerical model predicted stability against shear or tensile failure within the proposed extent of the freeze wall.** Considering the average estimate of the material properties of modeled stratigraphic layers, the predicted failure conditions in the rock mass are limited to 5 to 8 m of the extent of the low-grade ore zone. Within the proposed extent of the freeze wall, the MCFS values are greater than 2.50, and the magnitude of LCPS is greater than 5 MPa in compression, indicating the limited potential of instability in the freeze wall.
- / **The numerical model predicted vertical displacement at the surface in response to the proposed volumetric extraction is negligible.** The vertical displacement of the rock mass near the modeling domain's southern extent is at a maximum immediately above the low-grade ore zone, ranging between 42 and 49 cm, which reduces to the range between 0 and 7 cm at a distance of 4 to 5 m from the low-grade ore zone. At the ground surface, the average vertical displacement is approximately 2.5 mm.

REFERENCES

Itasca Consulting Group, Inc., 2021. *FLAC3D: Fast Lagrangian Analysis of Continua in 3 Dimensions*, 7th Edition (Version 7.00.154), Minneapolis, MN.

Terzaghi, K., and R. B. Peck, 1967. *Soil Mechanics in Engineering Practice*, 2nd Ed., John Wiley & Sons, New York, NY.

Vining, C. A., N. Gupta, and J. Nopola, 2023. *Results of a Geomechanical Study Investigating the Influence of Uranium Extraction on Mining-Cavity Stability for the Wheeler River Uranium Project (Revision 2)*, RSI(RCO)-2924/5-21/14, prepared by RESPEC, Rapid City, SD, for X. Lu Dac and D. Harris, Denison Mines Corporation, Saskatoon, SK, February 9.

Attachment: IR-24

| | |
|---|--|
| Number | IR-24 |
| Dept. | CNSC |
| Project effects link | Alternative Means |
| Reference to EIS, appendices, or supporting documentation | Section 2.10.2 Alternative Means |
| Context and Rationale | <p>Context: While Appendix 2-C (Alternative Means Assessment) is detailed and includes all aspects of the Alternative means assessment that are required, the summary of the analysis and conclusions in Section 2.10.2 of the EIS lacks the level of detail required to understand the methodology used, and how Denison arrived at these conclusions.</p> <p>Rationale: As noted in the Agency’s Operational Policy Statement on Addressing “Purpose of” and “Alternative Means” under the CEAA 2012: “If a preferred means is selected, the analysis and the rationale for the choice should be explained from the perspective of the proponent, and be documented in the EIS in sufficient detail to provide context for public and technical comment periods during the project EA, and ultimately to allow the decision maker to understand the choice.”</p> |
| Information Requirement | <p>Please summarize the analysis of the alternative means assessment within the body of the EIS, in sufficient detail that a reader of the EIS has adequate information to understand the methodology used, and how Denison arrived at these conclusions.</p> <p>Note: In addition to the adding text to summarize, Table 6 in Appendix 2-C could be useful to understanding table 2.10.1 in the EIS.</p> |

Response:

Revised text for final EIS, Section 2.10.2.

2.10.2 Alternatives Means Assessment

Denison first evaluated production potential from the Project in 2010. Since that time, the Project has undergone significant design and review stages and has naturally evolved into the Project described and assessed in this EIS. Appendix 2-C provides details related to the alternative means assessment framework employed and the results of the alternatives assessment for key Project components and activities; this section of the EIS provides a summary of Appendix 2-C.

Alternative means are the various ways Denison considered to implement Project components and activities. During the planning process, it is common to consider various means by which to fulfill a specific aspect of the Project.

A systematic assessment of these alternatives was used to select preferred alternatives that are carried forward as Project design elements in a manner consistent with Canadian Environmental Assessment Agency's operational policy statement (Canadian Environmental Assessment Agency 2015). These preferred alternatives ultimately become the basis upon which potential Project-related effects are evaluated in the EIS. The preferred alternatives have been presented in the preceding section of this Project Description. The documentation of this systematic alternative assessment provides transparency and traceability with respect to decision making on Project design. It also documents how input received by Indigenous groups and other Interested Parties has been considered in the design/planning process.

The alternative means assessment has been carried out in a stepwise fashion as follows (Figure 2.10-1):

1. Identification of Alternative Means: Project components for which alternate means were considered are identified;
2. Consideration of Technical Feasibility, Economic Feasibility, and Land Use Factors: the technical and economic feasibility of these alternate means is considered along with a specific screening for land use intensity and importance. Only alternate means that are deemed technically feasible, economically feasible, and passed the land use screening are carried forward in the evaluation.
3. Potential Residual Effects Associated the Alternative Means: the potential residual effects of each alternative, in consideration of mitigation, are described; and,
4. Evaluation of Alternative Means: a comparative evaluation of alternative means that considers the potential residual effects for each alternative relative to various assessment criteria and indicators.

A description of the above four steps along with an example from Appendix 2-C (for Mining - Method) is provided in the following sections.

2.10.2.1 Identification of Alternative Means

Several Project components and activities had alternate means or options considered:

- Mining
 - Method
 - Freeze design for tertiary containment of mining solution
 - Permeability enhancement

- Mining solution
- Processing
 - Location of processing
 - On-site processing method
- Water management
 - Freshwater supply
 - Drinking water
 - Treated effluent discharge location
 - Treated effluent discharge location to surface water
- Waste management
 - Organic waste disposal
 - Process precipitate management
 - Domestic waste disposal
- Access and transportation
 - Access road alignment
 - Stream crossing structures
 - Worker transportation
- Power
 - Primary power supply
- Support facilities
 - Camp location optimization

For each Project component or activities listed above, a variety of options were considered. For example, the options considered under Mining – Method included:

- Option 1: Open pit
- Option 2: Jet boring
- Option 3: Surface boring
- Option 4: Micro tunnel boring
- Option 5: ISR

2.10.2.2 Consideration of Technical Feasibility, Economic Feasibility, and Land Use Factors

Alternative means considered in an EIS must be technically and economically feasible (CEAA 2015).

Denison integrated an additional category at this early stage in the alternative means assessment framework: land use screening. Although technical feasibility can include land use considerations, Denison opted to include land use separately to provide greater transparency on the approach taken and also in recognition of the importance of local land use that has been communicated by interested parties. In conjunction with screening for technical and economic feasibility, an initial evaluation was conducted to review Indigenous and other land use in the area to identify alternative means that may interact with areas of high land use intensity or areas of cultural importance (e.g., known gravesites). Consideration was given to information made available to Denison in the early stages of project planning. Note that subsequent, additional consideration of engagement information, including Indigenous and other land and resource use is completed at later stages in the alternatives means assessment framework (Section 2.10.2.4). The purpose of considering land use information at this stage was to identify land use that could compromise the feasibility of the Project and screen an alternative means out from additional evaluation.

For each Project component or activity, a consideration of the technical, economic, and land use characteristics of each alternative was considered. The purpose of this step in the alternative means assessment framework is to identify feasible alternatives for further assessment and to eliminate those alternative means that are not considered to be feasible from a technical, economic, or land use lens. Only those alternatives that are deemed technically and/or economically feasible and avoided interaction with areas of high intensity or high importance land use, are carried forward for further assessment.

For example, at this step in the alternative means assessment framework Option 1 Open pit mining (under Mining – Method) was screened out due to economic factors. For Mining – Methods, the remaining four options were carried forward for further assessment.

2.10.2.3 Potential Residual Effects Associated the Alternative Means

For all alternative means carried forward from the previous step, the expected residual effects following application of mitigation measures were considered. This step in the alternative means assessment framework identifies the potential residual effects which are then brought forward to the evaluation of alternative means. Again, as an example, the information related to Mining - Method (from Appendix 2-C, Table 4) is summarized here in **Table 2.10-1**.

2.10.2.4 Evaluation of Alternative Means

Detailed comparative evaluations of alternative means is presented in Appendix 2-C, Table 6 to Table 22. These evaluations considered the relative residual effects of each of the technical and economically feasible alternatives for each of the evaluation criteria identified in **Table 2.10-2** (same as Table 5 from Appendix 2-C), following the application of mitigation measures (described in Appendix 2-C Table 4).

By way of example (refer to Appendix 2-C for details), a detailed evaluation of Mining – Method from Appendix 2-C has been provided here as **Table 2.10-3**.

Based on the above alternative means assessment process, a preferred alternative means for each respective Project component or activity evaluated was selected. Rationale for the selection based on the comparative evaluation of alternatives is provided in Appendix 2-C including input received by Indigenous groups and other Interested Parties.

For reference, the alternative means assessment is conducted at a screening level, appropriate for the stage of the Project when the alternatives were considered. The assessment considered both quantitative (where possible) and qualitative information as available. The comparative evaluation identified more preferred versus less preferred alternatives. The preferred alternative(s) was selected and evaluated in much greater detail in the EA. A summary of the alternative means carried forward into the EA is provided in **Table 2.10-4**.

2.10.3 Summary of Influence of Indigenous Knowledge, Local Knowledge, and Engagement on the Alternative Means Assessment

As described above, Indigenous Knowledge, local knowledge, and engagement has influenced the alternative means assessment, specifically in step 2 (Consideration of Technical Feasibility, Economic Feasibility, and Land Use Factors) and step 4 (Evaluation of Alternative Means) of the alternative means assessment framework.

Alternative means considered in an EIS must be technically and economically feasible (CEAA 2015). Denison opted to integrate an additional category at this early stage in the alternative means assessment framework: land use screening. Denison included land use separately to provide greater transparency on the approach taken and also in recognition of the importance of local land use that has been communicated by Interested Parties. At this step in the alternative means assessment framework, an option for treated effluent discharge location was eliminated due to land use screening in conjunction with technical considerations.

Denison's specific engagement initiatives on Project alternatives are outlined in Appendix 2-C for the 1) mining method, 2) freeze design for tertiary containment of mining solution, 3) treated effluent discharge location to surface water, and 4) access road alignment. In addition to these targeted engagement sessions, information gathered more broadly during engagement was also considered in Project alternatives through the consideration of general concerns or statements. The comparative evaluation of alternative means includes specific input received from

Indigenous groups and other Interested Parties that contributed to the selection of the preferred option, when applicable. Refer to the row titled *Input received from Interested Parties* in **Table 2.10-3** below for an example of how engagement influenced the selection of mining method.

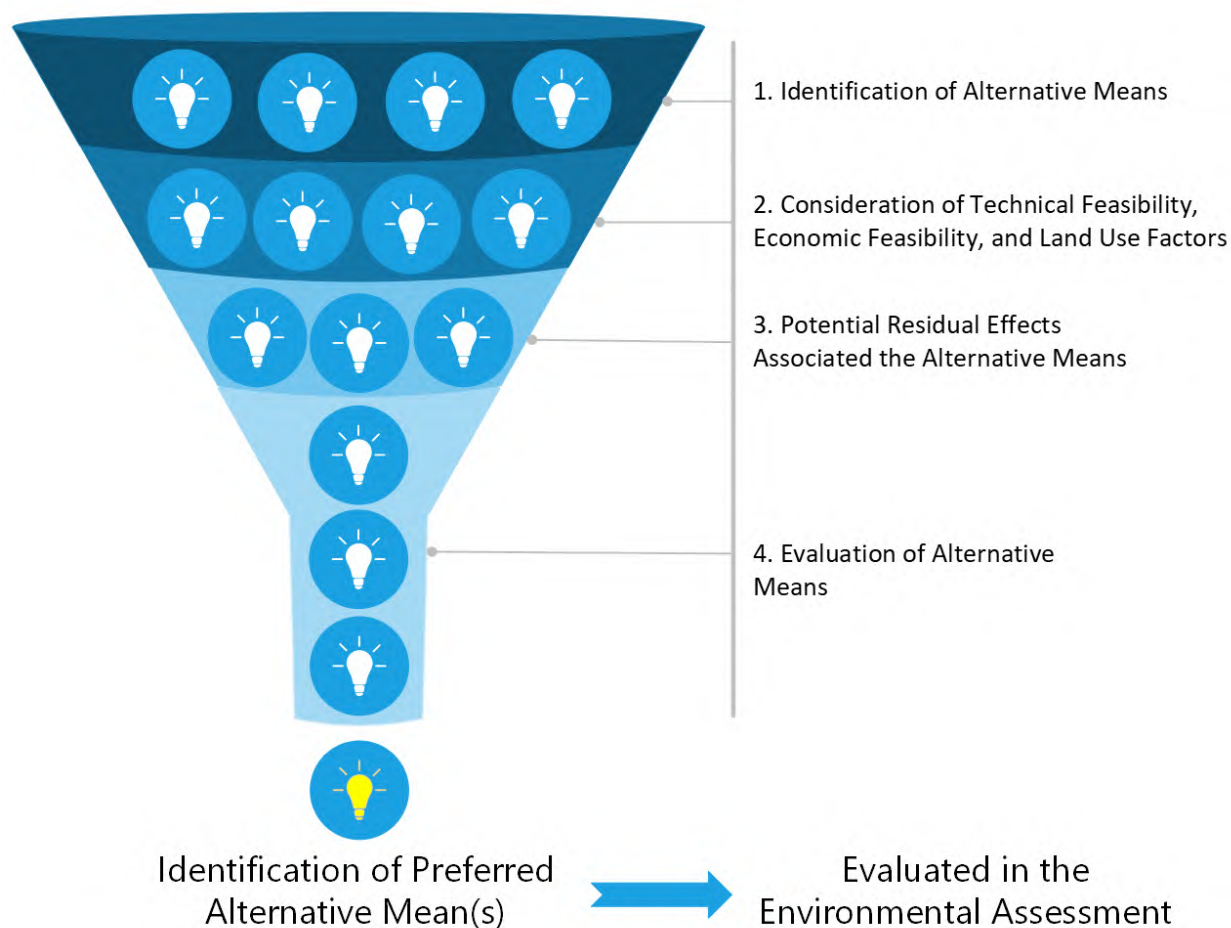


Figure 2.10-1: Alternative Means Assessment Framework for the Project

Table 2.10-1: Mitigation Measures and Residual Effects for Mining - Method (Excerpt from Appendix 2-C Table 4)

| Project Component | | Alternative Means Carried Through after Screening for Technical, Economic, and Land Use Factors | Mitigation Measures | Residual Effects |
|-------------------|--------|---|--|--|
| Mining | Method | Option 2: Jet Boring | <p>Through design and monitoring, make sure emissions from ventilation meet applicable air quality emissions criteria</p> <p>Any water associated with workings and mining activities meets applicable discharge quality criteria prior to release</p> <p>Limit any surface development to extent practical and avoid areas of significance</p> <p>Follow best management practices and standards for waste characterization and management, containment of hazardous material, liner designs, fuel management</p> | <p>Effects to local geology by development of underground workings</p> <p>Effects on local vegetation, soil, bird, and wildlife habitat as a result of clearing required to develop surface infrastructure to support mining</p> <p>Effects on air quality via emissions from ventilation of underground workings</p> <p>Effects on groundwater quantity and flow paths based on need to dewatering underground mine workings</p> <p>Effects to surface water quality and surface water related receptors whereby mine water is released to local surface water features</p> |
| | | Option 3: Surface Boring | <p>Through design and monitoring, make sure emissions from ventilation meet applicable air quality emissions criteria</p> <p>Any water associated with workings and mining activities meets applicable discharge quality criteria prior to release</p> <p>Limit any surface development to extent practical and avoid areas of significance</p> <p>Follow best management practices and standards for waste characterization and management, containment of hazardous material, liner designs, fuel management</p> | <p>Effects to local geology by development of underground workings</p> <p>Effects on local vegetation, soil, bird, and wildlife habitat as a result of clearing required to develop surface infrastructure to support mining</p> <p>Effects on air quality via emissions from ventilation of underground workings</p> <p>Effects on groundwater quantity and flow paths based on need to dewatering underground mine workings</p> <p>Effects to surface water quality and surface water related receptors whereby mine water is released to local surface water features</p> |
| | | Option 4: Micro Tunnel Boring | <p>Through design and monitoring, make sure emissions from ventilation meet applicable air quality emissions criteria</p> <p>Any water associated with workings and mining activities meets applicable discharge quality criteria prior to release</p> <p>Limit any surface development to extent practical and avoid areas of significance</p> | <p>Effects to local geology by development of underground workings</p> <p>Effects on local vegetation, soil, bird, and wildlife habitat as a result of clearing required to develop surface infrastructure to support mining</p> <p>Effects on air quality via emissions from ventilation of underground workings</p> <p>Effects on groundwater quantity and flow paths based on need to dewatering underground mine workings</p> |

| Project Component | | Alternative Means Carried Through after Screening for Technical, Economic, and Land Use Factors | Mitigation Measures | Residual Effects |
|-------------------|--|---|---|--|
| | | | Follow best management practices and standards for waste characterization and management, containment of hazardous material, liner designs, fuel management | Effects to surface water quality and surface water-related receptors whereby mine water is released to local surface water features |
| | | Option 5: ISR | Through design and monitoring, make sure emissions from ventilation meet applicable air quality emissions criteria Any water associated with workings and mining activities meets applicable discharge quality criteria prior to release Limit any surface development to extent practical and avoid areas of significance Follow best management practices and standards for waste characterization and management, containment of hazardous material, liner designs, fuel management | Effects to local geology by development of ISR mining area Effects on local vegetation, soil, bird, and wildlife habitat as a result of clearing required to develop surface infrastructure to support ISR mining Effects on groundwater quantity and flow paths based on development of ISR wellfield (injection and recovery well systems) Effects on groundwater quality by introduction of ISR mining solutions to the mining area Effects to surface water quality and surface water related receptors whereby mine water is released to local surface water features |

Table 2.10-2: Detailed Alternatives Means Assessment Evaluation Criteria and Metrics (same as Table 5 in Appendix 2-C)

| Criteria | Section | Valued Component | Indicator | Metric |
|-------------------------|--------------------------------------|------------------------|--|---|
| Biophysical Environment | Atmospheric and Acoustic Environment | Air quality | Changes in air quality, including concentrations of dust, combustion products, uranium, metals and/or radionuclides | Alternatives that minimize changes in air quality and effects on ecological and human receptors are preferred. |
| | | Noise | Changes in sound levels | Alternatives that minimize the increase in sound levels, and subsequent effects on wildlife and human receptors, are preferred. |
| | Geology and Groundwater | Geology | Changes in geology | Alternatives that avoid or minimize effects on geology are preferred |
| | | Groundwater quantity | Changes in groundwater levels, groundwater flow patterns, and discharge rates to local surface water bodies | Alternatives that minimize interaction with groundwater quantity are preferred. |
| | | Groundwater quality | Changes in concentrations of physical and chemical parameters in groundwater with consideration of discharge to local surface water bodies | Alternatives that minimize changes in groundwater quality, in the context of groundwater discharge to surface water bodies, are preferred. |
| | Aquatic Environment | Surface Water Quantity | Changes in surface water quantity through water taking, surface water discharge, and project overprinting of drainage areas (footprints) | Alternatives that minimize Project footprint, as well as surface water intake and release to surface water bodies, are preferred. |
| | | Surface Water Quality | Changes in physical and chemical parameters of surface water quality can result from discharge of treated effluent to surface water bodies and land disturbance and clearing can mobilize solids into the aquatic environment | Alternatives that minimize Project footprint and changes in surface water quality and effects on fish, and other ecological receptors, are preferred. |
| | | Fish and Fish Habitat | Changes in fish and fish habitat may develop from Project overprinting of fish habitat (habitat alteration or loss), changes in surface water quantity, surface water quality (physical and chemical parameters), sediment quality, or benthic invertebrates | Alternatives that minimize interaction with fish and fish habitat are preferred. |
| | | Sediment Quality | Changes in sediment quality mainly from discharge of treated effluent to surface water bodies | Alternatives that minimize effects on sediment quality are preferred. |
| | | Benthic Invertebrates | Changes in benthic invertebrate communities and quality from uptake of chemical parameters | Alternatives that minimize effects on benthic invertebrates are preferred. |

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| Criteria | Section | Valued Component | Indicator | Metric |
|----------|-------------------------|---------------------------|---|---|
| | | Fish Health | Changes in fish health mainly from discharge of treated effluent to surface water bodies | Alternatives that minimize effects on fish health are preferred. |
| | Terrestrial Environment | Terrain | Changes to terrain | Alternatives that minimize interaction with terrain are preferred. |
| | | Soil | Changes in soil quantity or quality | Alternatives that minimize loss or alteration of soil quantity, and minimize changes in soil quality, are preferred. |
| | | Organic matter/peat | Loss of organic matter/peat | Alternatives that minimize loss or alteration of organic matter/peat are preferred. |
| | | Vegetation and Ecosystems | Change in areal extent of vegetation habitat types and ecosystems | Alternatives that minimize loss vegetation and ecosystems are preferred. |
| | | Listed Plant Species | Change in number of listed plant species | Alternatives that minimize direct and indirect effects on listed plant species are preferred. |
| | | Wetlands | Change in areal extent of wetlands | Alternatives that minimize loss or alteration of wetlands are preferred. |
| | | Ungulates | Changes in ungulate habitat (loss and/or alteration) and indirect or direct mortality of individuals | Alternatives that minimize ungulate habitat loss or alteration and minimize ungulate mortality are preferred. |
| | | Furbearers | Changes in furbearer habitat (loss and/or alteration) and indirect or direct mortality of individuals | Alternatives that minimize furbearer habitat loss or alteration and minimize furbearer mortality are preferred. |
| | | Woodland caribou | Changes in woodland caribou habitat (loss and/or alteration) and indirect or direct mortality of individuals | Alternatives that minimize woodland caribou habitat loss or alteration and minimize woodland caribou mortality are preferred. |
| | | Raptors | Changes in raptor habitat (loss and/or alteration) and indirect or direct mortality of individuals | Alternatives that minimize raptor habitat loss or alteration and minimize raptor mortality are preferred. |
| | | Migratory breeding birds | Changes in migratory breeding bird habitat (loss and/or alteration) and indirect or direct mortality of individuals | Alternatives that minimize migratory breeding bird habitat loss or alteration and minimize migratory breeding bird mortality are preferred. |
| | | Bird species at risk | Changes in bird species at risk habitat (loss and/or alteration) and indirect or direct mortality of individuals | Alternatives that minimize bird species at risk habitat loss or alteration and minimize bird species at risk mortality are preferred. |

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| Criteria | Section | Valued Component | Indicator | Metric |
|--------------------------|--|----------------------------------|---|---|
| Human Environment | Human Health | Human Health | Changes in human health from exposure to non-radiological and radiological constituents in air, water, and food | Alternatives that minimize negative changes in human health are preferred. |
| | | Worker Health | Worker conventional health and safety and radiation exposure | Alternatives that reduce conventional health and safety risks and radiation exposure are preferred. |
| | Land and Resource Use | Indigenous Land and Resource Use | Changes in the area of land available for Indigenous land and resource use, as well as resource availability, and perceived suitability of land and resources for safe use | Alternatives that minimize negative changes in Indigenous land and resource use are preferred. |
| | | Other Land and Resource Use | Changes in the area of land available for non-Indigenous land and resource use, as well as resource availability, and perceived suitability of land and resources for safe use | Alternatives that minimize negative changes in other land and resource use are preferred. |
| | | Heritage Resources | Change in the number of known archaeological resources | Alternatives that minimize direct or indirect alteration or loss of archaeological resources are preferred |
| | Quality of Life | Cultural Expression | Changes to knowledge transmission and traditional diet, including perceived changes in the suitability and safety of resources that support a traditional diet | Alternatives that minimize direct or indirect adverse effects on cultural expression are preferred. |
| | | Community Well-being | Change in income of local workers and community cohesion | Alternatives that minimize direct or indirect adverse effects on community well-being are preferred. |
| | | Infrastructure and Services | Changes in traffic, community infrastructure and services | Alternatives that minimize direct or indirect adverse effects on infrastructure and services are preferred. |
| | Economics | Economy | Changes in participation in the traditional economy | Alternatives that minimize direct or indirect adverse effects on economy are preferred. |
| Other Evaluation Factors | | | | |
| Criteria | | | Metric | |
| Technical Factors | Complexity of design, construction, operation, and decommissioning | | Simple or straightforward designs, construction techniques, and operational procedures based on tested and proven technologies are preferred. Alternatives that are more amenable to decommissioning and/or reclamation are preferred. | |
| Cost Factors | Capital, operating, and decommissioning costs | | Lower capital costs are preferred to reduce the pre-production costs and influence the project economic viability. Lower operational costs are preferred to maintain project economics. Lower decommissioning costs are preferred to reduce long term liabilities | |

Table 2.10-3: Mining – Methods - Alternative Means Assessment (same as Table 6 in Appendix 2-C)

| Table Criteria | Section | Valued Component | Option 2: Jet Boring | Option 3: Surface Boring | Option 4: Micro Tunnel Boring | Option 5: ISR |
|----------------|--------------------------------------|----------------------|---|--|--|--|
| Biophysical | Atmospheric and Acoustic Environment | Air quality | Less preferred option. Air quality on surface would be influenced by slurry handling, radon gas, radioactive dust in vent exhaust, dust from surface stockpiles including clean waste rock. Air quality in the mine workings would be managed with ventilation. | More preferred option. Size of mine rock stockpiles and their influence on air quality would be similar to Option 5. Changes in concentrations of radon in air from well development would be similar to option 5. | Less preferred option. Air quality in the mine workings would be managed with ventilation. Air quality on surface would be influenced by hoisted cuttings or slurry, radon gas, radioactive dust in vent exhaust, dust from surface stockpiles including clean waste rock. | More preferred option. Size of mine rock stockpiles and their influence on air quality would be similar to Option 3. Changes in concentrations of radon in air from well development would be similar to option 3. |
| | | Noise | No appreciable difference was identified among the alternatives for changes in noise. Continual noise from surface ventilation fans and noise from mobile equipment. Similar to Option 4. | No appreciable difference was identified among the alternatives for changes in noise. No fans, noise from production drilling from surface includes compressors and mobile equipment would be continual. | No appreciable difference was identified among the alternatives for changes in noise. Continual noise from surface ventilation fans and noise from mobile equipment. Similar to Option 2. | No appreciable difference was identified among the alternatives for changes in noise. No fans, noise from surface drilling equipment includes compressors and mobile equipment would be intermittent as drilling is done only as required. |
| | Geology and Groundwater | Geology | Less preferred option for changes to geology, compared to options 3 and 5. | More preferred option for geology compared to options 2 and 4 since this is a surface method requiring less excavation. | Less preferred option for changes to geology, compared to options 3 and 5. | More preferred option for geology compared to options 2 and 4 since this is a surface method requiring less excavation. |
| | | Groundwater quantity | Less preferred compared to option 3. Volume of groundwater management during mining would be similar to Option 4. | Preferred option with smallest interaction on groundwater quantity compared to options 2, 4 and 5. | Less preferred compared to option 3. Volume of groundwater management during mining would be similar to Option 4. | Less preferred compared to option 3. Use of ground freezing temporarily interacts with groundwater flow during operations. |
| | | Groundwater quality | No appreciable difference was identified among the alternatives for changes to groundwater quality. Groundwater quality would interact with mine workings in a limited way due to groundwater management during mining. | No appreciable difference was identified among the alternatives for changes to groundwater quality. | No appreciable difference was identified among the alternatives for changes to groundwater quality. Groundwater quality would interact with mine workings in a limited way due to groundwater management during mining. | No appreciable difference was identified among the alternatives for changes to groundwater quality. Mining area remediation during decommissioning would mitigate effects on groundwater quality. |

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| Table Criteria | Section | Valued Component | Option 2: Jet Boring | Option 3: Surface Boring | Option 4: Micro Tunnel Boring | Option 5: ISR |
|-------------------|-------------------------|---------------------------|---|--|---|--|
| | Aquatic Environment | Surface Water Quantity | Less preferred than options 3 and 5. The volume of water requiring treatment and release would be high, because of the groundwater management required for mine development. This could result in a larger effect on the aquatic environment. Quality of treated effluent expected to be similar among all four options. | More preferred option compared to options 2 and 4. The volume of water needed treatment and release to a surface waterbody would be minimal, and as such, this option would have a smaller effect on the aquatic environment. Quality of treated effluent expected to be similar among all four options. | Less preferred than options 3 and 5. The volume of water requiring treatment and release would be high, because of the groundwater management required for mine development. This could result in a larger effect on the aquatic environment. Quality of treated effluent expected to be similar among all four options. | More preferred option compared to options 2 and 4. The volume of water needed treatment and release to a surface waterbody would be minimal, and as such, this option would have a smaller effect on the aquatic environment. Quality of treated effluent expected to be similar among all four options. |
| | | Surface Water Quality | | | | |
| | | Fish and Fish Habitat | | | | |
| | | Sediment Quality | | | | |
| | | Benthic Invertebrates | | | | |
| | | Fish Health | | | | |
| | Terrestrial Environment | Terrain | This option is less preferred as it may result in a greater potential effect (loss) of terrain, soil, organic matter/peat, vegetation, listed plant species, wetlands and related loss and alteration of wildlife habitat. Largest amount of disturbance due to underground waste rock creating stockpiles of acid generating, contaminated and clean waste rock. Footprint estimated to be similar to Option 4 and double the total disturbance of Option 5. | Direct surface footprint/mining disturbance expected to be the second lowest of the four options. This option is more preferred than option 2 and 4, similar to option 5 with regard to potential effects on the terrestrial environment. | This option is less preferred as it may result in a greater potential effect (loss) of terrain, soil, organic matter/peat, vegetation, listed plant species, wetlands and related loss and alteration of wildlife habitat. Largest amount of disturbance due to underground waste rock creating stockpiles of acid generating, contaminated and clean waste rock. Footprint estimated to be similar to Option 2 and double the total disturbance of Option 5. | Direct surface footprint/mining disturbance expected to be the lowest of the four options. This option is more preferred than option 2 and 4, similar to option 3 with regard to potential effects on the terrestrial environment. |
| | | Soil | | | | |
| | | Organic matter/peat | | | | |
| | | Vegetation and Ecosystems | | | | |
| | | Listed Plant Species | | | | |
| | | Wetlands | | | | |
| | | Ungulates | | | | |
| | | Furbearers | | | | |
| | | Woodland caribou | | | | |
| | | Raptors | | | | |
| | | Migratory breeding birds | | | | |
| | | Bird species at risk | | | | |
| | | | | | | |
| Human Environment | Human Health | Human Health | Less preferred. Potential exposure to non-radiological and radiological constituents in air, water, and food may be higher with this option compared to options 3 and 5 due to 1. changes in air quality from mine | More preferred compared to option 2 and 4 due to smaller changes in air quality and smaller volume of treated effluent release | Less preferred. Potential exposure to non-radiological and radiological constituents in air, water, and food may be higher with this option compared to options 3 and 5 due to 1. changes in air quality from mine rock, | More preferred compared to option 2 and 4 due to smaller changes in air quality and smaller volume of treated effluent release |

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| Table Criteria | Section | Valued Component | Option 2: Jet Boring | Option 3: Surface Boring | Option 4: Micro Tunnel Boring | Option 5: ISR |
|----------------|-----------------------|----------------------------------|--|--|---|--|
| | | | rock, slurry handling, and mine ventilation and 2. larger volume of treated effluent release to the aquatic environment. | | slurry handling, and mine ventilation and 2. larger volume of treated effluent release to the aquatic environment. | |
| | | Worker Health | No appreciable difference was identified between alternatives because with application of mitigation measures and monitoring, all options would protect worker health and maintain radiation exposure within limits for nuclear workers. Within this context, underground work is higher risk than surface due to confined working area with heavy equipment underground and higher contaminates in underground atmosphere compared to open air conditions on surface. | No appreciable difference was identified between alternatives because with application of mitigation measures and monitoring, all options would protect worker health and maintain radiation exposure within limits for nuclear workers. Surface operation with specialized surface equipment to drill horizontal cavities at ore depth. Physical ore cuttings will need to be rehandled on surface to either slurry for wet transport or dewater for dry transport increasing dose relative to Option 5 (which has a fraction of the drill cuttings to handle). Good conventional H&S as there is minimal mobile surface equipment. | No appreciable difference was identified between alternatives because with application of mitigation measures and monitoring, all options would protect worker health and maintain radiation exposure within limits for nuclear workers. Within this context, this option has potentially the highest dose as workers will have greater potential exposure to radiation while servicing equipment that is working within the ore zone. Underground work is higher risk than surface due to confined working area with heavy equipment underground and higher contaminates in underground atmosphere compared to open air conditions on surface. | No appreciable difference was identified between alternatives because with application of mitigation measures and monitoring, all options would protect worker health and maintain radiation exposure within limits for nuclear workers. Lowest dose of the four mining options evaluated in terms of dose associated with drill cuttings. The main contributor to worker dose would be radon associated with drilling the ISR wells. Surface piping of UBS, pumphouses, and well maintenance will also be a source of dose during pipeline repairs and inspection of equipment. |
| | Land and Resource Use | Indigenous Land and Resource Use | Less preferred compared to options 3 and 5 because of larger potential changes in resource availability linked to: 1. Larger footprint (changes to terrestrial environment) and 2. Higher volume of treated effluent (changes to aquatic environment). For all options, the area immediately around the mining activity would not be available for Indigenous land and resource use activities during operations for safety reasons. Perceived suitability of land and | More preferred compared to options 2 and 4 because of smaller potential changes in resource availability linked to: 1. smaller footprint (and changes to terrestrial environment) and 2. lower volume of treated effluent (and changes to aquatic environment). For all options, the area immediately around the mining activity would not be available for Indigenous land and resource use activities during operations for safety reasons. Perceived suitability of land | Less preferred compared to options 3 and 5 because of larger potential changes in resource availability linked to: 1. Larger footprint (changes to terrestrial environment) and 2. Higher volume of treated effluent (changes to aquatic environment). For all options, the area immediately around the mining activity would not be available for Indigenous land and resource use activities during operations for safety reasons. Perceived suitability of land | More preferred compared to options 2 and 4 because of smaller potential changes in resource availability linked to: 1. smaller footprint (changes to terrestrial environment) and 2. lower volume of treated effluent (changes to aquatic environment). For all options, the area immediately around the mining activity would not be available for Indigenous land and resource use activities during operations for |

| Table Criteria | Section | Valued Component | Option 2: Jet Boring | Option 3: Surface Boring | Option 4: Micro Tunnel Boring | Option 5: ISR |
|----------------|-----------------|-----------------------------|---|--|---|--|
| | | | resources for safe use expected to be similar for all options. | and resources for safe use expected to be similar for all options. | and resources for safe use expected to be similar for all options. | safety reasons. Perceived suitability of land and resources for safe use expected to be similar for all options. |
| | | Other Land and Resource Use | Less preferred compared to options 3 and 5 because of larger potential changes in resource availability linked to: 1. Larger footprint (changes to terrestrial environment) and 2. Higher volume of treated effluent (changes to aquatic environment). For all options, the area immediately around the mining activity would not be available for Indigenous land and resource use activities during operations for safety reasons. Perceived suitability of land and resources for safe use expected to be similar for all options. | More preferred compared to options 2 and 4 because of smaller potential changes in resource availability linked to: 1. smaller footprint (and changes to terrestrial environment) and 2. lower volume of treated effluent (and changes to aquatic environment). For all options, the area immediately around the mining activity would not be available for Indigenous land and resource use activities during operations for safety reasons. Perceived suitability of land and resources for safe use expected to be similar for all options. | Less preferred compared to options 3 and 5 because of larger potential changes in resource availability linked to: 1. Larger footprint (changes to terrestrial environment) and 2. Higher volume of treated effluent (changes to aquatic environment). For all options, the area immediately around the mining activity would not be available for Indigenous land and resource use activities during operations for safety reasons. Perceived suitability of land and resources for safe use expected to be similar for all options. | More preferred compared to options 2 and 4 because of smaller potential changes in resource availability linked to: 1. smaller footprint (changes to terrestrial environment) and 2. lower volume of treated effluent (changes to aquatic environment). For all options, the area immediately around the mining activity would not be available for Indigenous land and resource use activities during operations for safety reasons. Perceived suitability of land and resources for safe use expected to be similar for all options. |
| | | Heritage Resources | Less preferred compared to options 3 and 5. Larger area of surface disturbance increases potential interaction with archaeological resources. | More preferred compared to options 2 and 4. Smaller area of surface disturbance reduces potential interaction with archaeological resources. | Less preferred compared to options 3 and 5. Larger area of surface disturbance increases potential interaction with archaeological resources. | More preferred compared to options 2 and 4. Smaller area of surface disturbance reduces potential interaction with archaeological resources. |
| | Quality of Life | Cultural Expression | No appreciable difference was identified between alternatives for changes to knowledge transmission and traditional diet, including perceived changes in the suitability and safety of resources that support a traditional diet. | | | |
| | | Community Well-being | No appreciable difference was identified between alternatives for change in income of local workers and community cohesion. | | | |
| | | Infrastructure and Services | No appreciable difference was identified between alternatives for changes in traffic, community infrastructure and services. | | | |
| | Economics | Economy | No appreciable difference was identified between alternatives for changes in participation in the traditional economy. | | | |

| Other Evaluation Factors | | | | | |
|--------------------------|--|---|---|---|---|
| Criteria | | Option 2: Jet Boring | Option 3: Surface Boring | Option 4: Micro Tunnel Boring | Option 5: ISR |
| Technical Factors | Complexity of design, construction, operation, and decommissioning | <p>Potential advantages: technology currently in use in Canadian uranium industry; mine layouts do not require development at or above the unconformity; remote system – safe for radiological risks.</p> <p>Potential technical weaknesses: Long duration development timeline; low production rate with limited ability to increase; currently used at only one mine with limited experience outside of that operation; may require extensive research and development; high technical risk including underground operating risks, inflow risk, design and operating risk; may require bulk freezing approach versus perimeter freeze design as assumed in the PEA. This would increase freeze cost and time significantly.</p> | <p>Potential advantages: technology in widespread use in oil and gas industry; reduced safety and environmental risks with elimination of underground excavations; completely remote system – safe for radiological risks; reduced number of employees on site; short timeframe to production (weeks); good production rate with scalability; similar technique under evaluation in Canadian uranium industry (Orano’s SABRE mining method).</p> <p>Potential technical weaknesses: Drilling accuracy is paramount and needs additional testing; not currently in use in Canadian uranium industry.</p> | <p>Potential advantages: technology in widespread use in civil / municipal applications; remote system – safe for radiological risks under normal operating conditions; self-supported tunnels, thus risk of ground failure or inflow in tunnels reduced; simple concept and operation, variety of knowledgeable contractors/personnel; moderate production rate (approximately 4M lbs/yr per machine); ability to apply multiple units (scalability).</p> <p>Potential technical weaknesses: Recovery of ore may be limited to 90% at best due to configuration of the tunnels; congested working space in the launch stations; not currently in use in Canadian uranium industry.</p> | <p>Potential advantages: technology in widespread use in international uranium operations (USA, Kazakhstan, Australia); reduced safety and environmental risks with elimination of underground excavations; completely remote system – safe for radiological risks; reduced number of employees on site; short timeframe to production (months); reduced technical risk with majority of remaining risks tested during feasibility stage; toll milling not required.</p> <p>Potential technical weaknesses: Not currently in use in Canadian uranium industry; mining solution permeability requires additional testing to increase confidence; low production rate – based on production rate at US operations (future testing may allow for higher production rates).</p> |

| Other Evaluation Factors | | | | | |
|--|---|--|--|---|--|
| Criteria | | Option 2: Jet Boring | Option 3: Surface Boring | Option 4: Micro Tunnel Boring | Option 5: ISR |
| Cost Factors | Capital, operating, and decommissioning costs | Option 2 has high operating cost relative to the grade of the ore body, high capital costs and long duration development timeline, although the technology is in use at an existing uranium operation in Canada. | Option 3 has low capital and operating costs compared to jet boring. | Option 4 has the lowest ore recovery and high capital costs and long duration development timeline. Technology is commonly used in civil engineering. | Option 5 has low capital and operating costs. The technology is in widespread use at international uranium operations. ISR mining operations often have comparatively low capital and operating costs, as well as shorter timelines to first production and greater flexibility to allow production to be scaled to meet market demands. |
| <p>Input received from Interested Parties:</p> <p>Denison discussed potential mining methods early in the engagement process. As part of the engagement program for the Project, Denison organized a series of in-person workshops with Indigenous and non-Indigenous communities of interest (COI) and other Interested Parties in 2018. The workshops gathered community and student input in relation to potential mining methods for the Phoenix deposit. Given the history of uranium mining in the Athabasca Basin, there is a wealth of knowledge on various mining methods, and Denison sought input for which method would be best suited to efficiently and safety mining the Phoenix deposit.</p> <p>The following mining methods were evaluated for effectiveness in mining the Phoenix deposit at the Project: Jet Boring, Surface Boring, Micro Tunnel Boring and In Situ Recovery. There was no specific engagement data collected related to surface boring or micro tunnel boring. Workshop participants noted that while jet boring was a relatively well-known method of mining, the high economic costs may make it undesirable for the Phoenix deposit (18-EN-VPL-2.38) (18-EN-ERFN-5.44). ISR mining is new to northern Saskatchewan and Canada. Some workshop participants were unsure how to evaluate the potential benefits and/or drawbacks of this mining method (18-EN-VILX-3.69), however other participants were confident in the method, saying they know it works in other locations, there are minimal waste streams, and method is more economically feasible than other methods (18-EN-VILX-3.68). A participant in the Village of Beauval workshop preferred the small footprint and lesser environmental impacts of ISR and viewed this method as a new opportunity for northern Saskatchewan (18-EN-VB-4.51). New opportunities are welcomed in the area, as they can support local businesses, provide training and learning opportunities, and keep money within the local economy (16-EN-MLA-109.26).</p> | | | | | |
| <p>Selected alternative for mining method = Option 5: ISR</p> <p>Rationale: Mining methods were evaluated through an increasingly rigorous process and considered factors such as: safety, environment, production rates, capital costs, operating costs, schedule, operational flexibility, and risk. The top four mining methods considered for the Phoenix deposit were: jet boring, surface boring, micro tunnel boring, and ISR. Independent preliminary economic assessment or class 5 level assessments were completed on each of these four options in 2017. The parameters evaluated included safety, environmental impacts, radiological safety, capital cost, operating cost, development timeframe, production rate, economic results (net present value, internal rate of return), regulatory risk, technology risk, equipment and contractor availability, and operating flexibility; this information has been summarized above in the alternatives means assessment cells. In addition, workshops were held in local Indigenous and non-Indigenous communities to capture community input into the selection of a preferred mining method once the options were narrowed down. Ultimately, based on the alternatives evaluated and feedback from Communities of Interest, Denison included the ISR method in the prefeasibility study (PFS; Denison 2018) and this mining method was selected as the basis for the EA.</p> | | | | | |

Less Preferred

Neutral

More preferred

Table 2.10-4: Summary of Alternative Means Carried Forward into the Environmental Assessment

| Project Component | | Reference to Detailed Alternative Means Assessment Table in Appendix 2-C | Alternative Means | | | | | | |
|-------------------|---|--|---|--|----------------------|---------------------|----------|----------|----------|
| | | | Option 1 | Option 2 | Option 3 | Option 4 | Option 5 | Option 6 | Option 7 |
| Mining | Method | Table 6 | Open-pit | Jet Boring | Surface Boring | Micro Tunnel Boring | ISR | | |
| | Freeze design for tertiary containment of mining solution | Table 7 | Freeze dome | Freeze wall | | | | | |
| | Permeability enhancement | Table 8 | Hydraulics | Propellant | Mechanical | | | | |
| | Mining solution | Not applicable. Option 1 basic solution was deemed not technically feasible, economically feasible, and passed the land use screening are carried forward in the evaluation. | Basic solution | Acidic solution | | | | | |
| Processing | Location of processing | Table 9 | Off-site processing at an existing mill | On-site processing in purpose built processing plant | | | | | |
| | On-site processing method | Table 10 | Ion exchange | Solvent extraction | Direct precipitation | | | | |
| Water management | Freshwater supply | Table 11 | Groundwater | Surface water | | | | | |
| | Drinking water | Table 12 | Truck drinking water to site | Generate drinking water on site with a potable water treatment plant | | | | | |

Annex 1 – FIRT IR Table – Technical Review of the **Wheeler River Project** draft EIS
Denison Response – August 18th, 2023

| Project Component | | Reference to Detailed Alternative Means Assessment Table in Appendix 2-C | Alternative Means | | | | | | |
|---------------------------|--|--|--|---|--|------------------------------|--------------|-------------------------------|-------------------------------|
| | | | Option 1 | Option 2 | Option 3 | Option 4 | Option 5 | Option 6 | Option 7 |
| | Treated effluent discharge location | Table 13 | To groundwater | To surface water | | | | | |
| | Treated effluent discharge locations for surface water | Table 14 | Kratchkowsky Lake (LA-7) | Whitefish Lake north (LA-6) | Whitefish Lake south (LA-5) | McGowan Lake (LA-1) | Russell Lake | Mardoc Lake (LA-4) | Williams Lake-LB-3 |
| Waste management | Organic waste disposal | Table 15 | On-site disposal using an incinerator | On-site disposal in domestic landfill | On-site composting | | | | |
| | Process precipitate disposal | Table 16 | On-site permanent disposal | Off-site reprocessing and final disposal | | | | | |
| | Domestic waste disposal | Table 17 | Collection and disposal off site by a third-party contractor | Collection and disposal in an on-site domestic landfill | | | | | |
| Access and transportation | Access road alignment | Table 18 | Direct route | Direct route to reduce cut volumes | Follows part of the existing exploration access road | | | | |
| | Stream crossing structures | Table 19 | Culverts | Clear span bridges | | | | | |
| | Worker transportation | Table 20 | Ground transport | Air transport to existing airstrip at nearby Cameco operations | Air transport to new airstrip constructed and operated by Denison | | | | |
| Power | Primary power supply | Table 21 | Liquefied natural gas power plant | Solar photovoltaic power plant | Diesel generators | Provincial power grid | | | |

| Project Component | | Reference to Detailed Alternative Means Assessment Table in Appendix 2-C | Alternative Means | | | | | | |
|--------------------|----------------------------|--|---------------------------------|---------------------------------------|---|----------|----------|----------|----------|
| | | | Option 1 | Option 2 | Option 3 | Option 4 | Option 5 | Option 6 | Option 7 |
| Support facilities | Camp location optimization | Table 22 | First location - Prefeasibility | Second location – Reduce fill volumes | Third location - Southwest from second location | | | | |

Selected alternative

~~Strike through~~ option was eliminated at an earlier step due to technical, economic, or land use factors (see Appendix 2-C)

Attachment: IR-28

| | |
|---|---|
| Number | IR-28 |
| Dept. | CNSC |
| Project effects link | Current use of lands and resources for traditional purposes |
| Reference to EIS, appendices, or supporting documentation | <p>Section 4, IER and engagement appendices, including:</p> <ul style="list-style-type: none"> • Appendix 2-A • Appendix 6-B • Appendix 7-B • Appendix 8-A • Appendix 9-A • Appendix 10-B • Appendix 11-A • Appendix 12-A • Appendix 13-A • Appendix 14-B |
| Context and Rationale | <p>Context: The summary of issues tables do not appear to include all of the key issues identified by the Indigenous Nations and communities.</p> <p>For example, some Indigenous Nations and communities have shared concerns with respect to accident prevention and overall safety on the Key Lake road (Highway 914) due to increased traffic, impacts on treaty rights and section 35 rights due to cumulative impacts, and decommissioning, that were not captured in the issues and concerns and summary tables in Section 4.3.2 and in the IER.</p> <p>The tables in the engagement appendices include a column titled “Response (From Denison)”. The “Response” column does not include responses, but instead points the reader to where this comment or concern was considered. When navigating to the sections referenced, it is often unclear how this information was considered or influenced the assessment.</p> <p>Rationale: Additional detail is required in order to ensure the key issues are all identified and to understand the status of validation for each issue raised and the response provided.</p> |
| Information Requirement | <p>1) Update the summary of issues and concerns tables to include all relevant issues and concerns raised by each of the Indigenous Nations and communities to date, including concerns raised in the Indigenous Knowledge studies provided, additional engagement, and Draft EIS comments.</p> |

| | |
|--|--|
| | <p>2) Please include a column in the issues and concerns tables to clearly articulate the specific mitigation/monitoring measures that Denison have committed to, or any other measures, in order to address the concerns raised by each Indigenous Nation and community during the engagement process to date.</p> <p>3) Denison must demonstrate that each Indigenous Nation and community has validated that the summary of issues and concerns table reflects their understanding or agreement, and/or a path forward to complete the validation throughout the EIS and the updated IER.</p> <p>Validation must be complete by the time the technical review is complete, prior to submission of a final EIS. Should Denison not be able to fully address issues, concerns or feedback raised by any Indigenous Nation or community, through mitigation and monitoring measures, this should be documented, and a rationale provided.</p> <p>4) Update the response column of the Engagement tables to describe how these were considered in the sections referenced. Consider renaming this column to reflect the nature of the content (i.e., how the information was considered).</p> |
|--|--|

Response:

This response has broken up information into two sections – the information requirement in relation to Section 4 and the associated related sections in the Indigenous Engagement Report (IER), and the engagement appendices that are associated with various sections of the EIS.

Section 4 and the IER: Context

Engagement with Indigenous and non-Indigenous Communities of Interest and Other Communities has been ongoing since 2016 and has evolved over time. Some changes have occurred from the beginning of engagement activities in 2016 to today, such as:

- early engagement occurring with the Northern Village of Pinehouse Lake, to the current state where Kineepik Métis Local #9 (KML) now generally represents the interests of the Métis citizens of the Northern Village of Pinehouse Lake together, along with general non-Indigenous residents;
- the Duty to Consult delegated to the Métis Nation – Saskatchewan from the A La Baie Métis Local #21, the Sipishik Métis Local #37, Patuanak Métis Local #82, and the Sled Lake / Dore Lake Métis Local #67; and
- interest expressed in the Project by Peter Ballantyne Cree Nation, who had not been previously identified by Denison, the CNSC nor the Province of Saskatchewan as having potential interests in the Project.

Section 4 and the IER: Interests, Issues and Concerns

Denison has worked to adapt to the changes as they have arisen. As such, we recognize that some of the *Interests, Issues and Concerns* tables (“Issues Tables”) can be further updated with new information

about potential issues that have arisen in relation to the Project, of which both the issue and Denison's response to the issue will be further subject to validation by the Indigenous Nation or community.

It is important to note that not all issue or concern raised by an Indigenous nation or community will necessarily have a specific mitigation measure and/or monitoring associated with Denison's response—but mitigation and monitoring measures will be included where it makes sense to do so.

In respect of understanding and enhancing the identification of issues by an Indigenous nation or community, we can advise the CNSC that presently we have:

- 1) reviewed each Issues Table to determine any engagement data gaps evident as presented in the draft EIS, which may have occurred due to the changing nature of engagement over time as specified above;
- 2) updated each Issues Table with the key issues raised by the Indigenous Nation and community as a result of comments made on the draft EIS;
- 3) have developed a plan for validation and positive resolution of the Issues Table with each Indigenous Nation and community and are presently seeking confirmation with each group accordingly; and
- 4) (in the near future) seek confirmation on acceptable path forward in relation to validation of issues and/or resolution, where it is mutually agreed upon. Where it is not mutually agreed upon, Denison will identify a proposed rationale for potential next steps.

As an important note on this, Denison received permission to use three Indigenous Knowledge reports in the EIS, to provide additional comprehensive information in relation to the relationship to the land and connection to the environment from the Indigenous nations who shared this information. Information from these reports was used accordingly in the draft EIS to inform the environmental assessment and methodology. At the request of these Indigenous nations, these reports have been provided to the regulators under confidential cover. Denison did not carry forward items into the draft EIS that were outside the scope of the agreed-upon nature of the information exchange between Denison and the Indigenous nation. As such, at the time, Denison did not bring forward concerns raised in these reports through to Section 4 of the draft EIS.

Each of the Indigenous nation for whom these reports were prepared has now provided publicly available comments on the draft EIS where they have summarized their own issues and concerns about the Project, *some* of which arise from the confidential materials they have provided to the regulator. As such, Denison can now confidently update the Issues Table with these comments provided on the public record, which will enable a transparent accounting of issues from the worldview.

Section 4 and the IER: Clear Documentation in Issues Tables

Denison understands the importance of demonstrating to the CNSC how issues and concerns raised by Indigenous nations and communities have been resolved, or where this has not been achieved, how Denison can demonstrate its efforts towards doing so and/or rationale for where agreement has not been reached.

We can advise that the steps identified above have been successfully achieved with KML, and as such, Appendix A to this submission includes the Issues Table that will be inserted into the final EIS for KML (Table 4.3-3: Key Issues and Concerns from Kineepik Métis Local #9 [and corresponding table in the IER])

and serves as an example of the Issues Table that will be generated for all the other Indigenous nations and communities.

In this table Denison has added additional information in relation to *How Comment was Addressed / Considered in the Draft EIS* as requested by the CNSC, including any specific mitigation and/or monitoring measures pertinent if appropriate. Additionally, the *Status* column includes whether the issue is complete or ongoing, and the *Justification of Status* column now includes the evidence to support the status conclusion, and if necessary, additional details are provided in the *Ongoing Resolution of Concerns (if Required)* column. The *Ongoing Resolution of Concerns* column will outline the planned process to be followed with the Indigenous nation or community in respect of validation and/or resolution of the issue.

It is Denison's objective to successfully validate and resolve concerns with Indigenous nations and communities prior to the finalization of the EIS. As per Denison's outlined engagement strategy, a focussed approach will occur, first with respect to Indigenous and non-Indigenous Communities of Interest, and then with other Interested Parties.

Where Denison is unable to demonstrate that positive validation and resolution have been attained, clear information will be provided in the relevant table for the Indigenous nation or community in Section 4 of the final EIS (and if required, the IER) outlining the efforts undertaken to do so, planned next steps, or clear rationale for why a positive resolution has not been found to date.

Section 4 and the IER: Planned Engagement and Next Steps

Denison understands the importance of outlining to the CNSC the planned engagement activities to occur with Indigenous nations and communities. As identified above, part of engagement activities is in relation to positive validation and resolution of key issues. Additionally, Denison will be undertaking additional engagement activities that are outlined as follows as of June 30, 2023.

English River First Nation ("ERFN")

Interests, Issues and Concerns:

- 1) Denison has reviewed ERFN comments provided on the draft EIS.
- 2) Issues Table from Section 4 of draft EIS will be revised according to the example found in Appendix A of this IR and updated with summarized draft EIS comments—for the final EIS.
- 3) Discussions are actively occurring with ERFN regarding a process to resolve issues and concerns raised about the draft EIS, as well as successful validation of Denison's responses to historical issues and concerns raised since engagement commenced 2016. Items of interest raised by regulators will be included as part of this process.
- 4) Status of successful validation by ERFN of Denison responses to Issues Table—in progress.

Engagement activities

- 1) Site tour is planned for summer 2023 with ERFN Leadership, Technical team and Members.
- 2) Community and Leadership engagement—planned for fall 2023 to discuss:
 - a. mitigation, monitoring and residual effects
 - b. forthcoming licensing actions

Future Documentation in updated EIS and updated IER

- 1) All records per the above will be updated in Section 4 of the EIS and the associated section in the IER.

Kineepik Métis Local #9 (“KML”)

Interests, Issues and Concerns:

- 1) Denison has reviewed KML comments provided on the draft EIS.
- 2) Issues, Interests and Concerns table from Section 4 of draft EIS was revised according to Appendix A of this IR to be updated with summarized draft EIS comments—for the final EIS.
- 3) Discussions actively occurring with KML regarding process to resolve issues and concerns raised about the draft EIS, as well as successful validation of Denison's responses to historical issues and concerns raised since engagement commenced 2016. Items of interest raised by regulators were included as part of this process.
- 4) On June 10, 2023, Denison received positive validation that Denison's responses to KML issues, as described in the Issues Table, were acceptable to KML.
- 5) Status of successful validation by KML of Denison responses to KML Issues Table—**complete**.

****It is important to note that KML and the Northern Village of Pinehouse are working on the above matters together as a collective****

Engagement activities

- 1) Site tour is planned for summer 2023 with KML Leadership, Technical team and Citizens.
- 2) Community and Leadership engagement—planned for fall 2023 to discuss:
 - c. mitigation, monitoring and residual effects
 - d. forthcoming licensing actions

Future Documentation in updated EIS and updated IER

- 1) All records per the above will be updated in Section 4 of the final EIS and the IER.

Ya'thi Nene Lands and Resources Office (“YNLR”) (Representing the Athabasca Basin First Nations and the Athabasca Basin Communities)

Interests, Issues and Concerns:

- 1) Denison has reviewed YNLR comments provided on the draft EIS.
- 2) Issues Table from Section 4 of the draft EIS will be revised according to the example found in Appendix A of this IR and updated with summarized draft EIS comments—for the final EIS.
- 3) Discussions are actively occurring with YNLR regarding the process to resolve issues and concerns raised about the draft EIS, as well as successful validation of Denison's responses to historical issues and concerns raised over time.
- 4) Status of successful validation by YNLR of Denison responses to YNLR Issues, Interests and Concerns—**in progress**.

Engagement activities

- 1) Undertook in-person community meetings in January 2023 in coordination with the YNLR in Black Lake, Fond du Lac, Hatchet Lake and Uranium City.
- 2) Coordinating process for additional engagement with YNLR for fall 2023 as they deem appropriate to discuss:
 - a) mitigation, monitoring and residual effects
 - b) forthcoming licensing actions

Future Documentation in updated EIS and updated IER

- 1) All records per the above will be updated in Section 4 of the final EIS and the IER.

Métis Nation – Saskatchewan (“MN-S”)

Interests, Issues and Concerns:

- 1) Denison has reviewed MN-S comments provided on the draft EIS.
- 2) Issues Table from Section 4 of the draft EIS will be revised according to the example found in Appendix A of this IR and updated with summarized draft EIS comments—for the final EIS.

- 3) Denison has offered to meet to discuss the process toward resolution of draft EIS comments with MN-S as well as successful validation of Denison's responses to historical issues and concerns raised over time.
- 4) MN-S and Denison met on June 12, 2023, to provide a status update on completion of deliverables with respect to Capacity Funding Agreement, and in particular, the Métis Knowledge Study. MN-S outlined steps being followed in respect of this work. Denison indicated its willingness to meet regularly to support the efforts of MN-S in this regard. A tentative meeting has been set for the week of June 26-29, 2023.
- 5) Status of successful validation by MN-S of Denison responses to MN-S Issues, Interests and Concerns—in progress.

Engagement activities

- 1) Undertook in-person community NR1 and NR3 meetings in February 2023, as coordinated and led by MN-S.
- 2) Will take direction from MN-S about coordinating additional meetings with MN-S as they deem appropriate to discuss matters of interest.

Future Documentation in updated EIS and updated IER

- 1) All records per the above will be updated in Section 4 of the final EIS and the IER.

Birch Narrows Dene Nation (“BNDN”)

Interests, Issues and Concerns:

- 1) Denison has reviewed BNDN comments provided on the draft EIS.
- 2) Issues Table from Section 4 of the draft EIS will be revised according to the example found in Appendix A of this IR and updated with summarized draft EIS comments—for the final EIS.
- 3) Denison has requested the BNDN traditional territory map along with relevant land and occupancy information in relation to the Wheeler River Project, as indicated by BNDN as existing. To facilitate this, Denison has shared a proposed confidentiality agreement with BNDN to facilitate the sharing of such information.
- 4) Discussions are actively occurring with BNDN regarding the process to resolve issues and concerns raised about the draft EIS, as well as successful validation of Denison's responses to historical issues and concerns raised over time.
- 5) Status of successful validation by BNDN of Denison responses to BNDN Issues, Interests and Concerns—in progress.

Engagement activities

- 1) Denison had a meeting with BNDN on February 14, 2023, to provide an overview of the Wheeler River Project. During the meeting, BNDN indicated they would share a traditional territory map and land and occupancy information in relation to the Wheeler River Project subject to reaching suitable confidentiality provisions.
- 2) On April 25, 2023, Denison shared a draft confidentiality agreement with BNDN.
- 3) On May 10, 2023, Denison met with BNDN, to discuss the process going forward. During the meeting, Denison was advised that BNDN had proposed revisions to the confidentiality agreement, which they would provide to Denison. Also identified in the meeting was that Denison's access to data BNDN has referenced regarding land use activities in and around the Wheeler River Project would be limited and subject to additional funding from Denison to BNDN. Denison continued to request the available site-specific information to better understand the potential for adverse impacts to rights from the Wheeler River Project to BNDN to potentially adjust engagement approaches with BNDN.

- 4) On May 11, 2023, Denison was advised to communicate directly with the Chief of BNDN and was provided additional information from BNDN that BNDN would connect with Denison in the future to determine next steps together.
- 5) On June 16, 2023, BNDN contacted Denison to request a meeting toward the latter part of July 2023. Denison responded positively to this request and will be following up with BNDN accordingly.
- 6) Subject to process set between Denison and BNDN as identified above, engagement process to be determined.

Future Documentation in updated EIS and updated IER

- 1) All records per the above will be updated in Section 4 of the final EIS and the IER.

Peter Ballantyne Cree Nation (“PBCN”)

Interests, Issues and Concerns:

- 1) Denison has reviewed PBCN comments provided on the draft EIS.
- 2) Issues Table from Section 4 of the draft EIS will be revised according to the example found in Appendix A of this IR and updated with summarized draft EIS comments—for the final EIS.
- 3) Denison has requested PBCN traditional territory map along with relevant land and occupancy information in relation to the Wheeler River Project.
- 4) To facilitate this, PBCN has directed Denison to access the traditional territory map in a confidential fashion from the CNSC.
- 5) On May 30, 2023, Denison has made this request of the CNSC.
- 6) Per below, Denison intends to provide materials to PBCN responding to the concerns raised in the EIS.
- 7) Status of successful validation by PBCN of Denison responses to PBCN Issues, Interests and Concerns—in progress.

Engagement activities

- 1) Denison had a meeting with PBCN on May 16, 2023, to provide an overview of the Wheeler River Project. During the meeting, PBCN indicated they would share a traditional territory map and had land and occupancy information in relation to the Wheeler River Project. PBCN indicated they desired another meeting to discuss their interests in the Wheeler River Project further. During this meeting Denison and PBCN acknowledged the challenges of meeting immediately, but committed to doing so.
- 2) As of June 30, 2023, Denison and PBCN have not met, but have intent to do so. Generally, the purpose of the next meeting would be for PBCN to provide more detail on their interests in the Wheeler River Project, and Denison would provide responses to the high-level issues raised by PBCN in their draft EIS comments.

Future Documentation in updated EIS and updated IER

- 1) All records per the above will be updated in Section 4 of the final EIS and the IER.

Lac La Ronge Indian Band (“LLRIB”)

Interests, Issues and Concerns:

- 1) Denison has reviewed comments provided on the draft EIS.
- 2) Issues Table from Section 4 of the draft EIS will be revised according to the example found in Appendix A of this IR and updated with summarized draft EIS comments—for the final EIS:
 - a) Denison has confirmed that the Wheeler River Project is not located within the Lac La Ronge Indian Band Traditionally Occupied Territory as described in <https://pubsaskdev.blob.core.windows.net/pubsask-prod/86730/86730-English.pdf> (page 84) (email to Ty Roberts, LLRIB - date February 14, 2023).

- b) Denison has confirmed that the Trapping furblock in which the Wheeler River Project is located is N-18 (ERFN) (email to Ty Roberts, LLRIB - date February 14, 2023).
- 3) Per below, Denison is providing materials to LLRIB responding to the concerns raised on the Project in relation to the draft EIS.
- 4) Status of successful validation by LLRIB of Denison responses to LLRIB Issues, Interests and Concerns–**in progress**

Engagement activities

- 1) Denison will send correspondence to LLRIB regarding the issues raised in the letter sent to the CNSC on the draft EIS in the coming months. In this correspondence, Denison will reiterate its interest in participating in a meeting of the LLRIB Land and Resources Board at a time that is mutually convenient. Denison has also requested the information from the LLRIB that indicates there is some trapping activity near the Project, to better understand the nature of these activities in relation to the Project.
- 2) As of June 30, 2023, Denison and LLRIB have not met, but have intent to do so at a mutually convenient time.

Future Documentation in updated EIS and updated IER

- 1) All records per the above will be updated in Section 4 of the final EIS and the IER.

Prince Albert Grand Council (“PAGC”)

Interests, Issues and Concerns:

- 1) Denison has reviewed comments provided on the draft EIS.
- 2) Issues Table from Section 4 of the draft EIS will be revised according to the example found in Appendix A of this IR and updated with summarized draft EIS comments–for the final EIS.
- 3) Per below, Denison is providing materials to PAGC responding to the concerns raised on the Project in relation to the draft EIS.
- 4) Status of successful validation by PAGC of Denison responses to PAGC Issues, Interests and Concerns–**in progress**.

Engagement activities

- 1) Denison will be sending correspondence to PAGC regarding the issues raised in the draft EIS with a response to issues raised by PAGC.
- 2) Based on the outcome of the effort above, Denison will undertake next steps accordingly.

Future Documentation in updated EIS and updated IER

- 1) All records per the above will be updated in Section 4 of the final EIS and the IER.

Northern Village of Beauval & Northern Village of Ile a la Crosse (“NVB” & “NVILX”)

Interests, Issues and Concerns:

- 1) No comments were received on the draft EIS by these Interested Parties.
- 2) The format of the Issues Tables for NVB and NVILX will be formatted according to Appendix A of this IR–for the final EIS.
- 3) Denison will develop a process with NVB and NVILX in relation to the Issues Tables for each of these Interested Parties to seek successful validation by NVB and NVILX of Denison responses to NVB and NVILX Issues, Interests and Concerns.
- 4) Status of successful validation by NVB and NVILX of Denison responses to NVB and NVILX Issues, Interests and Concerns–**in progress**.

Engagement activities

- 1) Community and Leadership engagement–planned for fall 2023 to discuss:
- a) mitigation, monitoring and residual effects

b) forthcoming licensing actions

****NVILX subject to discussions with MN-S****

Future Documentation in updated EIS and updated IER

1) All records per the above will be updated in Section 4 of the final EIS and the IER.

Section 4 and the IER: Updates Planned for the Final EIS

The following will be updated for the final EIS:

- Section 4 general updates since submission of the draft EIS, including updates to clarify the purpose of the Key Issues and Concerns tables and the Engagement Database Summary tables in various appendices
- Table 4.3-2: Key Issues and Concerns from English River First Nation (and corresponding table in the IER)
- Table 4.3-3: Key Issues and Concerns from Kineepik Métis Local #9 (and corresponding table in the IER)
- Table 4.3-4: Key Issues and Concerns from Sipishik Métis Local #37 (and corresponding table in the IER)
- Table 4.3-5: Key Issues and Concerns from Patuanak Métis Local #82 (and corresponding table in the IER)
- Table 4.3-6: Key Issues and Concerns from Birch Narrows Dene Nation (and corresponding table in the IER)
- Table 4.3-7: Key Issues and Concerns from Lac La Ronge Indian Band (and corresponding table in the IER)
- Table 4.3-8: Key Issues and Concerns from A La Baie Métis Local #21 (and corresponding table in the IER)
- Table 4.3-9: Key Issues and Concerns from Métis Nation – Saskatchewan (and corresponding table in the IER)
- Table 4.3-10: Key Issues and Concerns from Ya'thi Néné Lands and Resources Office (and corresponding table in the IER)
- Table 4.4-1: Key Issues and Concerns from the Northern Village of Pinehouse
- Table 4.4-2: Key Issues and Concerns from the Northern Village of Beauval
- Table 4.4-3: Key Issues and Concerns from the Northern Village of Île-à-la-Crosse

A new table will also be included for Peter Ballantyne Cree Nation in the final EIS and in the IER.

Engagement Database Summary Tables in Various Appendices: Context

Denison's overall approach to respecting the information shared with Denison, as a result of engagement interactions from 2016 onwards, was to aspire to interweave the data outcomes throughout the entire assessment, rather than providing a single summary chapter in the draft EIS. To do this, Denison's Subject Matter Experts reviewed the over 2,000 lines of engagement data collected from 2016 onwards, and determined what and which information could meaningfully inform their assessment approach. This resulted in engagement data being reflected throughout the entire draft EIS, informing almost all aspects of the assessment. To make sure the reviewer could reasonably understand the context in which the engagement data was collected, Denison created an Engagement Database Summary Table as an Appendix item for each section of the draft EIS where engagement data were used. Each Engagement Database Summary Table identifies the *Unique ID* referenced in the chapter, the *Record of Contact* ("ROC") number that can be used to look up the original source materials in the EIS Appendix 4-A: Supporting Materials, the *Event Type*, the *Date*, the *Event Summary*, the *Interested Parties* with which the engagement occurred, the *Comment* made, and the *Response* from Denison. Denison has now added a final column called *Context*, which provides specifics about how the comment was used in the section.

It is important to note that not all issues or concern raised by an Indigenous nation or community will necessarily have a specific mitigation measure and/or monitoring associated with Denison's response, but mitigation and monitoring measures will be included where it makes sense to do so.

It is also important to note that these engagement data are not intended to be representative of the Indigenous nation or community perspective, as the comment may have been made by an individual from the Indigenous nation or community, and not specifically by the leadership. The Issues Tables (as discussed in this IR) are those Tables that summarize the collective interests, issues and concerns by the leadership, which Denison has identified will be subject to the validation process as outlined above. These appendices are simply intended to provide transparency around the engagement data points that had been used in the draft EIS in some manner, and are, therefore, not part of the validation process designed for Indigenous nations and communities.

Engagement Database Summary Tables in Various Appendices: Updates Planned for the Final EIS

Please see Appendix B to this IR for an example of the new format for the Engagement Appendices. The following in the EIS will be updated:

- Section 2 Project Description – Appendix 2-A: Engagement Database Summary Table for Project Description
- Section 6 Atmospheric and Acoustic Environment – Appendix 6-B: Engagement Database Summary Table for Project Description
- Section 7 Geology and Groundwater – Appendix 7-B: Engagement Database Summary Table for Geology and Groundwater
- Section 8 Aquatic Environment – Appendix 8-A: Engagement Database Summary Table for Aquatic Environment
- Section 9 Terrestrial Environment – Appendix 9-A: Engagement Database Summary Table for Terrestrial Environment
- Section 10 Human Health – Appendix 10-B: Engagement Database Summary Table for Human Health

- Section 11 Land and Resource Use – Appendix 11-A: Engagement Database Summary Table for Land and Resource Use
- Section 12 Quality of Life – Appendix 12- A: Engagement Database Summary Table for Quality of Life
- Section 13 Economics – Appendix 13-A: Engagement Database Summary Table for Economics
- Section 14 Accidents and Malfunctions – Appendix 14-B: Engagement Database Summary Table for Accidents and Malfunctions
- Section 15 Effects of the Environment – Appendix 15-A: Engagement Database Summary Table for Effects of the Environment on the Project

Appendix A

| Topic | Summary of the Issue, Interest, or Concern | Reference | Denison Response & How Comment was Addressed/Considered in the Draft EIS | Status | Justification of Status | Ongoing Resolution of Concerns (if required) |
|-------------------|---|---|--|--|---|--|
| Monitoring | <p>Interest in information and direct participation in monitoring baseline and effects.</p> <p>Concern that project should have independent monitoring for the Project and that information from this be shared with communities.</p> | ROC 2 ROC 105 ROC 444 | <p>An Environmental Protection Program will be established to provide an overarching framework for key environmental monitoring and management plans and to ensure a means to demonstrate compliance with applicable environmental regulatory requirements and other performance targets that Denison may set. The program would be developed in a manner that aligns with the ISO 14001 EMS Standard. Aspects of the Environmental Protection Plan will include:</p> <ul style="list-style-type: none"> -Management and Monitoring of Emissions -Liquid Effluent Monitoring Plan - Air Emissions Monitoring Plan - Groundwater Monitoring Plan - Environmental Monitoring Plan - Woodland Caribou Management Plan <p>As the Indigenous Community of Interest with a residential community most proximal to the Project, Denison has committed to collaborating with Kineepik Métis Local on a community specific monitoring regime, suited to their interests and needs in order to provide transparent information to discourage avoidance of the area and alleviate perceived concerns about potential impacts. As part of this program, Denison and KML will be sharing information in an agreed-upon fashion, about agreed-upon species of interest. Denison expects that important country foods harvested for food and cultural purposes (i.e moose, fish species, etc), surface water quality, and other areas of interest will form part of this monitoring program, including the potential to report on wildlife-vehicle mortality or other such areas of potential concern as they evolve over time.</p> <p>See Section 16 for a summary of monitoring and follow-up programs.</p> | Complete (based on KML acceptance of Response) | <ul style="list-style-type: none"> • Draft table sent by email from Denison on June 7, 2023 • Confirmation of positive validation by KML received by email on June 10, 2023 | N/A General discussions to continue as part of ongoing dialogue |
| Economics | Concern and interest in economic opportunities associated with Project and education and training to facilitate access and participation by community members. | ROC 62 ROC 105 ROC 388 ROC 444 ROC 620 ROC 623 | Denison has estimated a workforce of 300 during the two-year Construction phase and 180 during the Operation phase. Mineral sector positions are typically considered to be higher paying than many other industrial positions. Residents and communities in the LSA (ERFN (including Indian Reserve Wapachewunak 192D and Indian Reserve La Plonge 192) and Patuanak, Northern Hamlet (Patuanak); Pinehouse Lake, Northern Village; and Beauval, Northern Village) will | Complete (based on KML acceptance of Response) | <ul style="list-style-type: none"> • Draft table sent by email from Denison on June 7, 2023 | N/A General discussions to continue as part of ongoing dialogue |

Appendix A

| Topic | Summary of the Issue, Interest, or Concern | Reference | Denison Response & How Comment was Addressed/Considered in the Draft EIS | Status | Justification of Status | Ongoing Resolution of Concerns (if required) |
|------------------|---|--|---|--|--|--|
| | | | <p>be given first priority for employment, training, and business opportunities, followed by residents and communities in the RSA (Northern Saskatchewan Administrative District).</p> <p>Mitigation and enhancement measures will be implemented by Denison to enhance the positive effects of the Project on employment and training, income, traditional economy, and business opportunities and minimize adverse effects including:</p> <ul style="list-style-type: none"> -A Human Resource Development Plan to initially prioritize Indigenous and non-Indigenous communities in the LSA in terms of employment and training opportunities; -Establishment of a procurement approach through all phases of the Project, focusing on businesses based within the LSA communities, followed by Indigenous and / or businesses in the RSA; -Negotiation with the Province of Saskatchewan to develop the Project's Surface Lease Agreement and Human Resource Development Agreement. <p>The Agreement negotiated between Denison and KML outlines specific commitments for KML participation in economic opportunities associated with the Project, including in relation to ongoing education and training as deemed appropriate by KML.</p> <p>See Section 13 for a summary on local, provincial, and federal Project benefits and Denison's approach to employment, training, and business participation opportunities for communities.</p> <p>See Section 13 for information regarding employment, employment opportunities, and career growth for community members.</p> | | <ul style="list-style-type: none"> Confirmation of positive validation by KML received by email on June 10, 2023 | |
| Economics | Interest with potential contracts and business opportunities for northern Indigenous companies. | ROC 105 ROC 114 ROC 118 ROC 444 | The Project will create employment and business opportunities and increase income for workers and businesses in the LSA, RSA, and beyond the RSA during all phases of the Project. Denison has estimated a workforce during the two-year Construction period of 300 people and during the Operation phase 180 people are expected to be employed to operate the ISR wellfield and processing plant, including | Complete (based on KML acceptance of Response) | <ul style="list-style-type: none"> Draft table sent by email from Denison on June 7, 2023 | N/A General discussions to continue as part of ongoing dialogue |

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| Topic | Summary of the Issue, Interest, or Concern | Reference | Denison Response & How Comment was Addressed/Considered in the Draft EIS | Status | Justification of Status | Ongoing Resolution of Concerns (if required) |
|-------------------|---|--|---|--|---|--|
| | | | <p>supporting activities. Mineral sector positions are typically considered to be higher paying than many other industrial positions. Residents and communities in the LSA will be given first priority for employment and training and business opportunities, followed by Indigenous and / or other communities in the RSA.</p> <p>The Agreement negotiated between Denison and KML outlines specific commitments for KML participation in economic opportunities associated with the Project, including business opportunities as deemed appropriate by KML.</p> <p>See Section 13 for a summary of local, provincial, and federal Project benefits and Denison's approach to employment, training, and business participation opportunities for communities.</p> | | <ul style="list-style-type: none"> Confirmation of positive validation by KML received by email on June 10, 2023 | |
| Engagement | <p>Interest in implementation of appropriate engagement process activities.</p> <p>Concern was raised over the approach to consultation with others (other communities) and questions raised on whether a Collaborative Agreement was possible during operations.</p> | ROC 106 ROC 114 ROC 118 ROC 135 ROC 388 ROC 444 | <p>Denison has identified key objectives respecting Indigenous engagement associated with the Project:</p> <ul style="list-style-type: none"> -Build and maintain authentic relationships based on a foundation of trust, good faith, and transparency. -Create a respectful dialogue process that promotes communication and collaboration among Denison and Indigenous communities, in a timely and accurate fashion. -Understand how the proposed development of the Project may affect the interests of Indigenous peoples (including Indigenous and/or Treaty Rights), and work with Indigenous peoples to avoid, mitigate, or otherwise address effects, while also collaborating to maximize potential positive effects. <p>Engagement activities for the Project can and will evolve over time, as information is gathered that is pertinent to Denison's understanding of the Interested Parties and their relationship to, and interest in, the Project. At present, Denison has an Exploration Agreement with KML and continues to engage with KML and NVP with respect to the Wheeler River Project.</p> | Complete (based on KML acceptance of Response) | <ul style="list-style-type: none"> Draft table sent by email from Denison on June 7, 2023 Confirmation of positive validation by KML received by email on June 10, 2023 | N/A General discussions to continue as part of ongoing dialogue |

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| Topic | Summary of the Issue, Interest, or Concern | Reference | Denison Response & How Comment was Addressed/Considered in the Draft EIS | Status | Justification of Status | Ongoing Resolution of Concerns (if required) |
|----------------------------|---|-----------|---|--|---|--|
| | | | <p>The Agreement negotiated between Denison and KML is demonstrative of Denison's responsiveness to the request from KML for such an agreement.</p> <p>See Section 4 for additional information on the consultation process.</p> | | | |
| Cumulative Effects | Concern was expressed over cumulative effects in the region. | ROC 105 | <p>Denison conducted a cumulative effects assessment, which included the Highway 914 extension project, on categories:</p> <ul style="list-style-type: none"> -The Atmospheric and Acoustic Environment. -Geology and Groundwater. -The Aquatic Environment. -The Terrestrial Environment. -Human Health. -Land and Resource Use. -Quality of Life. -Economics. <p>Denison respects and understands KML's concern about the cumulative effects in the region, particularly in relation to access to traditional lands and resources in correlation with industrial and mining developments. The residual effects of the Project are expected to interact with the residual effects of other projects and activities in the ILRU RSA, resulting in potential cumulative effects to Indigenous land use activity in the area. This is largely due to the proposed Highway 914 extension project.</p> <p>See Section 16 for a summary of the cumulative effects assessments for each category above.</p> | Complete (based on KML acceptance of Response) | <ul style="list-style-type: none"> • Draft table sent by email from Denison on June 7, 2023 • Confirmation of positive validation by KML received by email on June 10, 2023 | N/A General discussions to continue as part of ongoing dialogue |
| Project Description | Interest in information about current market conditions and overall viability of the Project. | ROC 105 | Denison has identified that there is current and future market demand for uranium, the primary raw material for nuclear fuel generation. The Project can address gaps in annual global uranium supply and the use of uranium in nuclear power plants can contribute to net-zero goals, and this can be achieved while making a meaningful contribution to the Canadian economy. The Project was considered in relation to technical feasibility, economic feasibility, and land use criteria to determine viability of the Project. | Complete (based on KML acceptance of Response) | <ul style="list-style-type: none"> • Draft table sent by email from Denison on June 7, 2023 • Confirmation of positive | N/A General discussions to continue as part of ongoing dialogue |

Appendix A

| Topic | Summary of the Issue, Interest, or Concern | Reference | Denison Response & How Comment was Addressed/Considered in the Draft EIS | Status | Justification of Status | Ongoing Resolution of Concerns (if required) |
|----------------------------|--|-----------|--|--|---|--|
| | | | See Section 2 for information about Project components and purpose. | | validation by KML received by email on June 10, 2023 | |
| Project Description | <p>Feedback on mining options and technical questions were asked on the different methods of mining.</p> <p>The community provided comments on the different on-site road options.</p> | ROC 2 | <p>Project components include: ISR, Drilling, Freeze Wall, Wellfield, Processing, Water Management, Waste Management, Access and Transportation, Power, Support Facilities, Project Area, Project Activities, Ancillary Projects, GHG Emissions, Project Schedule, Project Benefits, Project Design Features, Management System, and Project Alternatives.</p> <p>Through an alternative means assessment, Denison considered options in relation to access and transportation. The access road alignment will follow part of the existing exploration access road, stream crossing structures will use clear span bridges, and worker transportation will be air transport to a) nearby Cameco operations or, b) a new airstrip constructed and operated by Denison.</p> <p>Denison incorporated the feedback provided on road options select the current road alignment for the Project.</p> <p>See Section 2 for information and technical detail pertaining to Project Components and Project alternatives.</p> | Complete (based on KML acceptance of Response) | <ul style="list-style-type: none"> Draft table sent by email from Denison on June 7, 2023 Confirmation of positive validation by KML received by email on June 10, 2023 | N/A General discussions to continue as part of ongoing dialogue |
| Project Description | Interest for information about type and how chemicals and other hazardous products would be transported, and whether an emergency response team would be ready to respond. | ROC 444 | <p>Denison will establish a Transportation of Dangerous Good Program, intended to provide for the safe transport of goods by conforming to all applicable laws, regulations, company policies, and procedures. The Transportation of Dangerous Goods Program applies to all modes of transport and all locations where Denison assumes care and control of the materials.</p> <p>Denison will establish an Emergency Preparedness and Response Program to identify how the Project will prepare for and addresses emergencies that may affect the health and safety of persons, the environment, and the protection of property. Emergency</p> | Complete (based on KML acceptance of Response) | <ul style="list-style-type: none"> Draft table sent by email from Denison on June 7, 2023 Confirmation of positive validation by KML received by | N/A General discussions to continue as part of ongoing dialogue |

Appendix A

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|------------------------------|--|------------------|--|--|---|--|
| | | | <p>Preparedness and Response Program would be developed consistent with guidance provided by CNSC in REGDOC-2.10.1, Nuclear Emergency Preparedness and Response (CNSC 2016).</p> <p>Increased pressure on emergency services is most likely to stem from an accident or malfunction on Highways 914 or 165. The extent to which these changes could affect any given community would depend on the nature of the accident or malfunction. Accidents and malfunctions for the Project were determined to (generally) have a highly unlikely to unlikely probability of occurrence, with an overall risk rating of low to moderate; however, the severity of accidents and malfunctions was determined to be minor to major. If such an event were to occur, local resources may be called upon to provide support, which may result in a call to fire, RCMP, or ambulance services depending on the nature of the event. Denison will provide any necessary training and/or equipment to local first responders to make sure they are sufficiently prepared to deal with an unlikely accident or malfunction.</p> <p>Denison's objective is to utilize existing emergency response teams from other operations prior to drawing on community-based resources. In the unlikely event that this were to occur, and KML resources were drawn upon, the Agreement negotiated between provides the foundation for discussions in respect of such incidents.</p> <p>See Section 2 for information pertaining to the above programs.</p> | | email on June 10, 2023 | |
| Land and Resource Use | Russell Lake was noted of particular importance for recreational/commercial fishing. | ROC 2 ROC 620 | <p>Denison noted the importance of Russell Lake and considered Russell Lake in the LSA in terms of recreational/commercial fishing.</p> <p>Negligible aquatic habitat loss is predicted in LA-5 (also known as Whitefish Lake) due to the installation of a discharge pipeline and diffuser configuration. The total area of the lake substrate that would be overprinted by the pipeline is expected to be approximately 135 m², which will constitute less than 0.05% of the lake's surface area. No other alteration, disruption, or destruction of aquatic habitat in the aquatic environment LSA is expected. Project-induced changes to the</p> | Complete (based on KML acceptance of Response) | <ul style="list-style-type: none"> Draft table sent by email from Denison on June 7, 2023 Confirmation of positive validation by KML received by | N/A General discussions to continue as part of ongoing dialogue |

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|---------------------------------------|--|---|--|--|---|--|
| | | | <p>abundance and distribution of fish is, therefore, not expected. The effect, if any, is expected to undetectable to fishers.</p> <p>The Agreement negotiated between Denison and KML outlines specific commitments for KML participation in environmental monitoring associated with the Project, including the potential for monitoring fish species harvested by and important to, KML.</p> <p>See Section 11 for information on how the Project will interact with land and resources including how potential effects will be mitigated.</p> | | email on June 10, 2023 | |
| Indigenous and Local Knowledge | The community has pre-existing Indigenous Knowledge and will work with Denison on this. | ROC 106 | <p>In 2018, KML approached Denison to support a land use mapping initiative in the Project area. The 2018 study builds on existing land use maps, completed in 2011. A verification meeting was held in late 2018 to make sure no geographic data gaps existed and that the results speak for the whole community. In 2022, KML prepared a document to voice their perspectives on Project VCs and to provide a record for EIS development. Based on 12 community engagement sessions and review of the land use maps, KML explained their unique social, cultural, and historical context, expressed a general consensus of support for the Project, and described issues and concerns.</p> <p>See Section 3 for information on IK and LK and how this information was integrated throughout the EIS.</p> | Complete (based on KML acceptance of Response) | <ul style="list-style-type: none"> Draft table sent by email from Denison on June 7, 2023 Confirmation of positive validation by KML received by email on June 10, 2023 | N/A General discussions to continue as part of ongoing dialogue |
| Project Description | Questions and clarifications on ISR mining methodology, including freeze wall technology and Project power requirements. | ROC 62 ROC 604 ROC 620 ROC 623 | <p>Project components include: ISR, Drilling, Freeze Wall, Wellfield, Processing, Water Management, Waste Management, Access and Transportation, Power, Support Facilities, Project Area, Project Activities, Ancillary Projects, GHG Emissions, Project Schedule, Project Benefits, Project Design Features, Management System, and Project Alternatives.</p> <p>See Section 2 for information and technical detail pertaining to Project Components and Project alternatives.</p> | Complete (based on KML acceptance of Response) | <ul style="list-style-type: none"> Draft table sent by email from Denison on June 7, 2023 Confirmation of positive validation by KML received by email on | N/A General discussions to continue as part of ongoing dialogue |

Appendix A

| Topic | Summary of the Issue, Interest, or Concern | Reference | Denison Response & How Comment was Addressed/Considered in the Draft EIS | Status | Justification of Status | Ongoing Resolution of Concerns (if required) |
|--|---|--------------------|--|--|---|--|
| | | | <p>Engagement activities for the Project can and will evolve over time, as information is gathered that is pertinent to Denison's understanding of the Interested Parties and their relationship to, and interest in, the Project. At present, Denison has an Exploration Agreement with KML continues to engage with KML and NVP with respect to the Wheeler River Project.</p> <p>See Section 4 for additional information on the consultation process.</p> | | June 10, 2023 | |
| Economics and Local Capacity Building | Expressed a need for building capacity locally in terms of training and education, emergency response, waste management, and additionally expressed a want of local procurement and industry supporting infrastructure. | Draft EIS Comments | <p>As outlined in Denison's Indigenous Peoples Policy, Denison recognizes the critical necessity of advancing reconciliation with Indigenous peoples in Canada and the important role of Canadian business in the reconciliation process. Denison is committed to providing Indigenous people and businesses with sustainable economic opportunities and benefits and sharing the economic benefits of Denison's business activities.</p> <p>The Agreement negotiated between Denison and KML outlines specific commitments for KML participation in economic opportunities associated with the Project, including commitments for ongoing education and training as deemed appropriate by KML, support to the vision of local industry supporting infrastructure.</p> <p>In terms of building capacity locally for emergency response and waste management, Denison supports KML's vision on these items where it makes sense and is possible. The Agreement provides a framework for future possibilities such as these.</p> | Complete (based on KML acceptance of Response) | <ul style="list-style-type: none"> Draft table sent by email from Denison on June 7, 2023 Confirmation of positive validation by KML received by email on June 10, 2023 | N/A General discussions to continue as part of ongoing dialogue |
| Access and Transport | Expressed a need for industrial grade improvements between Highway 2 and the Key Lake Gate to support the increase in heavy traffic. | Draft EIS Comments | <p>Highway improvements are not within Denison's jurisdiction and are not considered in the EIS for the Wheeler River Project. However, Denison notes KML's perspective of increased traffic volumes and subsequent desire for highway improvements.</p> <p>On Highway 914 between Key Lake and Pinehouse, Denison anticipated that road users would see an increase between 16% and</p> | Complete (based on KML acceptance of Response) | <ul style="list-style-type: none"> Draft table sent by email from Denison on June 7, 2023 Confirmation of positive validation by | N/A General discussions to continue as part of ongoing dialogue |

Appendix A

| Topic | Summary of the Issue, Interest, or Concern | Reference | Denison Response & How Comment was Addressed/Considered in the Draft EIS | Status | Justification of Status | Ongoing Resolution of Concerns (if required) |
|-------|--|-----------|--|--------|---|--|
| | | | <p>40% over the life of the mine. Trucks travelling on this section of highway will increase from 35 to 53 at peak operational times.</p> <p>Denison's vision in respect of this concern is that Denison and KML work together as partners in discussions about highways with the Provincial Government.</p> <p>However, in respect of actions Denison can undertake regarding traffic along the road at times important for the undertaking of cultural activities, Denison commits to:</p> <ol style="list-style-type: none"> 1) Assisting KML with the clear identification of the forthcoming culture camp along highway 914 (clear signage) 2) Having Project vehicle slow down to 40km/hr from mid-August to mid-October, during the times when KML members may be using the portion of the road near the culture camp. To be specific, this includes 2.5km before the entry into the culture camp, and 2.5km after the entry into the culture camp. <p>See Section 2, Appendix 2-B for more detail pertaining to traffic volumes.</p> | | KML received by email on June 10, 2023 | |

Appendix B

Section 9: Engagement Database Summary Table – Vegetation and Ecosystems

Examples

| Unique ID | ROC | Event Type | Date | Event Summary | Interested Parties | Comments (from interested party) | Response (from Denison) | Context |
|-----------------------|-----|------------|------------|---|----------------------------------|---|--|---|
| 18-EN-VILX-3.32 | 3 | Workshop | 2018-01-17 | As part of the engagement program for the Wheeler River Project, Denison organized a workshop in Ile a la Crosse for community and A La Baie Métis members to attend. The workshop gathered community and student input in relation to road alignment options, treated effluent discharge locations, and mining methods. | Village of Ile a la Crosse | Need to understand impact on groundwater and lakes. | <p>Denison considered this in section:</p> <p>Assessment of Project Related Effects, Potential Project Related Effects, Change in Areal Extent of Habitat Types, Number of Listed Plants, and Areal Extent of Wetlands</p> <p>And in section:</p> <p>Assessment of Project Related Effects, Potential Project Related Effects, Change in the Concentrations of Constituents of Potential Concern in Vegetation</p> | <p>How comment was used in this section:</p> <p>The context in which this comment was used within the terrestrial section of the EIS serves as a local perspective, documented as coming from an individual who attended workshop in Ile a la Crosse in the year 2018, which reiterates the importance of groundwater and lakes, thereby providing further validity to the inclusion of water quality and water quantity as a potential pathway of influence in terms of areal extent of habitat types, number of listed plants, the areal extent of wetlands, and changes in the concentrations of constituents of potential concern in vegetation.</p> <p>How comment would be answered through EIS information:</p> <p>Groundwater impacts were assessed in Section 7 titled Geology and Groundwater. Impacts to lakes were assessed in Section 9 titled Aquatic Environment. Section 7 and 9 provide details to support the conclusion that there is no significant impact in terms of groundwater or lakes.</p> |
| 20-LK-LEASESUR-267.67 | 267 | Survey | 2020-02-01 | Denison sent all known local cabin and lodge leaseholders a survey in the mail to be completed regarding their interests in Wheeler River. Denison received 6 responses from the survey, which has informed it's understanding of leaseholder uses in the area and interests regarding elements to be assessed as part of the environmental assessment. | Leaseholder, Wheeler River Lodge | Concerns over fishing and hunting pressure [from the mine and people accessing the area]. | <p>Denison considered this in section:</p> <p>Cumulative Effects, Potential Cumulative Effects</p> | <p>How comment was used in this section:</p> <p>The context in which this comment was used within the terrestrial section of the EIS serves as a local perspective, documented as coming from a leaseholder who completed a survey in in the year 2020, which reiterates the importance of land use activities, thereby providing further validity to the inclusion of increased access to the terrestrial RSA as a potential pathway for cumulative effects in terms of invasive plant introduction and increased dust deposition.</p> <p>How comment would be answered through EIS information:</p> <p>Both fishing and hunting were assessed in Section 11 titled Land and Resource Use. The assessment considers both terrestrial and aquatic resource availability, as well as the health and abundance of resource, in terms of both Indigenous Land and Resource Use and Other Land and Resource Use. The assessment in Section 11 additionally incorporates increased access owing to the extension of highway 914 as part of the cumulative effects assessment while existing projects were captured and assessed within baseline conditions. Section 11 provides details to support the conclusion that there is no significant impact in terms of fishing and hunting.</p> |

Appendix B

Section 11: Engagement Database Summary Table – Indigenous Land and Resource Use

Examples

| Unique ID | ROC | Event Type | Date | Event Summary | Interested Parties | Comments (from interested party) | Response (from Denison) | Context |
|----------------|-----|------------|------------|--|----------------------------|--|---|---|
| 18-EN-ERFN-5.1 | 5 | Workshop | 2018-05-03 | <p>As part of the engagement program for the Wheeler River Project, Denison organized a workshop for ERFN at their Patuanak Reserve location for ERFN and Patuanak members to attend. The workshop aimed to gather community input in relation to road alignment options, treated effluent</p> <p>discharge locations, and mining methods. The meeting had been delayed many times, and was held in the Health Clinic because there was a regional power outage.</p> | English River First Nation | <p>I always come from the elders' perspective. Since 1906, the area where you're working has been Treaty 10 land. Those lands were the primary area of ERFN and contain burial sites and birth sites of ERFN members. The Dené name of the Wheeler River, Russell Lake and Cree Lake all come from the Denésuliné of English River. The elders have always expressed that it's a primary area of ERFN. One of our late elders was born north of there in 1922. Our traditional gathering place is there.</p> | <p>Denison considered this in section:</p> <p>Existing Environment, Contemporary Indigenous Land and Resource Use in the Region, English River / Patuanak</p> | <p>How comment was used in this section:</p> <p>The context in which this comment was used within the land and resource use section of the EIS serves as a local perspective, documented as coming from a member of English River First Nation who attended a workshop in the year 2018. Existing conditions are based on available information and are accompanied by supporting information including available IK, LK, and results of engagement activities of specific relevance to the particular VC/KI. As such, the direct quote was incorporated into the characterization of the existing environment as it relates to occupancy, cultural sites, and navigation pertinent to English River First Nation.</p> <p>How comment would be answered through EIS information:</p> <p>English River First Nation is categorized as an Indigenous Community of Interest. Detail on Indigenous COI criteria is provided in detail in EIS Section 4 titled Engagement. Consideration of ERFN territory, as well as ERFN perspectives, has been interwoven throughout the EIS wherever pertinent.</p> <p>Potential impacts to heritage resources were assessed in Section 11 in the subsection titled Heritage Resources. Section 11 provides details to support the conclusion that there is no significant impact in terms of heritage resources. This section also provides detail on the Heritage Resource Management Plan.</p> |

Appendix B

Section 13: Engagement Database Summary Table – Economics

Examples

| Unique ID | ROC | Event Type | Date | Event Summary | Interested Parties | Comments (from interested party) | Response (from Denison) | Context |
|------------------|-----|-----------------|------------|---|---------------------------|---|---|---|
| 21-EN-VPL-444.16 | 444 | Virtual Meeting | 2021-02-11 | Denison hosted a virtual meeting for the municipality of Pinehouse Lake. The public meetings were focused on the Project generally, and did not seek input or comments on the distinct interests of the Métis in respect of the Project or Métis land use. This was expressly stated at the outset of each of the public meetings. Included in the discussion was an overview on the Valued Components for the Wheeler River Project, with a request to provide feedback to Denison via an online survey with specific questions pertaining to Valued Components. | Village of Pinehouse Lake | Will there be opportunities for people from Pinehouse to be employed? | <p>Denison considered this in section:</p> <p>Existing Environment, Key Indicator: Employment and Training, Employment Rate</p> | <p>How comment was used in this section:</p> <p>The context in which this comment was used within the economics section of the EIS serves as a local perspective, documented as coming from a resident of Pinehouse Lake who attended a virtual meeting in the year 2021, which reiterates the importance of employment, thereby providing further validity to the inclusion of employment and training as a key indicator and additionally providing substance to the characterization of local perspectives on the existing environment as it relates to an emphasis on employment.</p> <p>How comment would be answered through EIS information:</p> <p>Denison has estimated a workforce of 300 during the two-year Construction phase and 180 during the Operation phase. Mineral sector positions are typically considered to be higher paying than many other industrial positions. Residents and communities in the LSA (ERFN (including Indian Reserve Wapachewunak 192D and Indian Reserve La Plonge 192) and Patuanak, Northern Hamlet (Patuanak); Pinehouse Lake, Northern Village; and Beauval, Northern Village) will be given first priority for employment, training, and business opportunities, followed by residents and communities in the RSA (Northern Saskatchewan Administrative District).</p> <p>Employment was assessed in Section 13 which provides detail related to all facets of the Economic assessments including detail on how the Project will create employment opportunities and increase income for workers and businesses in the LSA, RSA and beyond the RSA during all phases of the Project.</p> |

Attachment: IR-35

| | |
|---|--|
| Number | IR-35 |
| Dept. | CNSC |
| Project effects link | Change to an environmental component due to hazardous contaminants |
| Reference to EIS, appendices, or supporting documentation | Section 6, Chemicals of Potential Concern |
| Context and Rationale | <p>Context: The use of petroleum products (e.g., propane, gasoline, and diesel) at the Denison Mines Wheeler River site is associated with vehicles and periodic operational testing of emergency generators as well as stationary pumps for emergency power or fire water systems. Thus, the air emissions will contain acrolein.</p> <p>Rationale: This chemical of potential concern (COPC) poses potential risks to human health via inhalation, but acrolein appears to have been missed or deemed insignificant. However, its consideration in the assessment will provide information on the significance of the associated risk.</p> |
| Information Requirement | Please consider acrolein in the assessment or provide a rationale for its exclusion. |

Response:

The air quality assessment in the draft EIS considered combustion emissions (i.e., NO_x, SO₂, CO, and fine particulate matter) from diesel-powered equipment/vehicles and the standby diesel generators. While acrolein is a component of diesel exhaust, it was not identified as a contaminant of potential concern (COPC) given that the use of diesel equipment/vehicles and generators at the Wheeler River Project will be limited. To demonstrate this, a quantitative screening level assessment of acrolein emissions from diesel combustion was carried out here to address this IR. Because there is no acrolein criterion or standard in Saskatchewan, Ambient Air Quality Criteria (AAQC) from Ontario were used. These criteria have also been adopted in Alberta. The screening level assessment is described in the following text.

Using the nitrogen oxide (NO_x) results from the air quality modelling assessment in Appendix 6-A, 1-hour and 24-hour dispersion factors (i.e., µg/m³ per g/s emitted) were calculated for each assessment scenario. A dispersion factor was calculated for both the worker camp receptor, and the off-property receptor with the highest predicted NO_x concentration. These dispersion factors were then applied to estimates of acrolein emissions to predict 1-hour and 24-hour concentrations of acrolein at both locations. The acrolein emission rate from the standby diesel generators were estimated using fuel flow

rates from manufacturer’s specifications and emission factors from Chapters 3.3 and 3.4 of the U.S. EPA AP-42 Compilation of Emission Factors, depending on the generator size. For mobile equipment and vehicles, a ratio of acrolein to non-methane hydrocarbons (NMHC) was applied to the total HC emission factors (see Section A.9 and A.10 of Appendix 6-A), conservatively assuming total HC equals NMHC. The ratio of acrolein to NMHC was obtained from the U.S. EPA document “*Speciation Profiles and Toxic Emission Factors for Non-road Engines in MOVES3*” (2022) and assumed Tier II engines. The site-wide emission rates for acrolein were estimated to be 1.89E-03 g/s for Construction, 1.04E-03 g/s for Operation, and 1.53E-03 g/s for Decommissioning. In all scenarios, the generators were assumed to operate 24-hours per day and increased equipment usage during Construction and Decommissioning resulted in higher acrolein emissions compared to the Operation scenario.

The results of the screening level assessment are outlined in the table below. Calculated acrolein concentrations are compared against Ontario AAQC, which are based on health as the limiting effect. As can be seen in the table, acrolein concentrations are expected to be well below the applicable criteria for all scenarios. The highest estimated concentrations will occur for the Decommissioning scenario and are 6.7% of the 24-hour AAQC, and 1.8% of the 1-hour AAQC at the worker camp. At the maximum off-property receptor, the estimated acrolein concentrations for Decommissioning are predicted to be 0.9% and 2.0% of the 1-hour and 24-hour AAQC, respectively.

Based on the results of the screening level assessment, acrolein is not considered a COPC.

Calculated Dispersion Factors and Resulting Acrolein Concentrations

| Scenario | Averaging Period | Ontario AAQC (µg/m³) | Emission Rate (g/s) | Dispersion Factor ^[1] (µg/m³ per g/s) | | Concentration ^[2] (µg/m³) | | % of Ontario AAQC | |
|--------------|------------------|----------------------|---------------------|--|---------------------------|--------------------------------------|---------------------------|-------------------|---------------------------|
| | | | | Camp Receptor | Max Off-Property Receptor | Camp Receptor | Max Off-Property Receptor | Camp Receptor | Max Off-Property Receptor |
| Construction | 1-hour | 4.5 | 1.89E-03 | 25.5 | 24.9 | 4.84E-02 | 4.71E-02 | 1.1% | 1.0% |
| | 24-hour | 0.4 | | 9.2 | 5.0 | 1.75E-02 | 9.56E-03 | 4.4% | 2.4% |
| Operations | 1-hour | 4.5 | 1.04E-03 | 37.5 | 23.6 | 3.91E-02 | 2.47E-02 | 0.9% | 0.5% |
| | 24-hour | 0.4 | | 12.9 | 5.3 | 1.35E-02 | 5.55E-03 | 3.4% | 1.4% |
| Decomm. | 1-hour | 4.5 | 1.53E-03 | 54.1 | 26.2 | 8.29E-02 | 4.01E-02 | 1.8% | 0.9% |
| | 24-hour | 0.4 | | 17.4 | 5.2 | 2.66E-02 | 8.02E-03 | 6.7% | 2.0% |

Notes:

[1] Based on the incremental NOx predictions at the worker camp receptor and the off-property receptor where maximum NOx concentrations were predicted.

[2] Concentrations are incremental and do not include the addition of a background. Background is expected to be negligible.

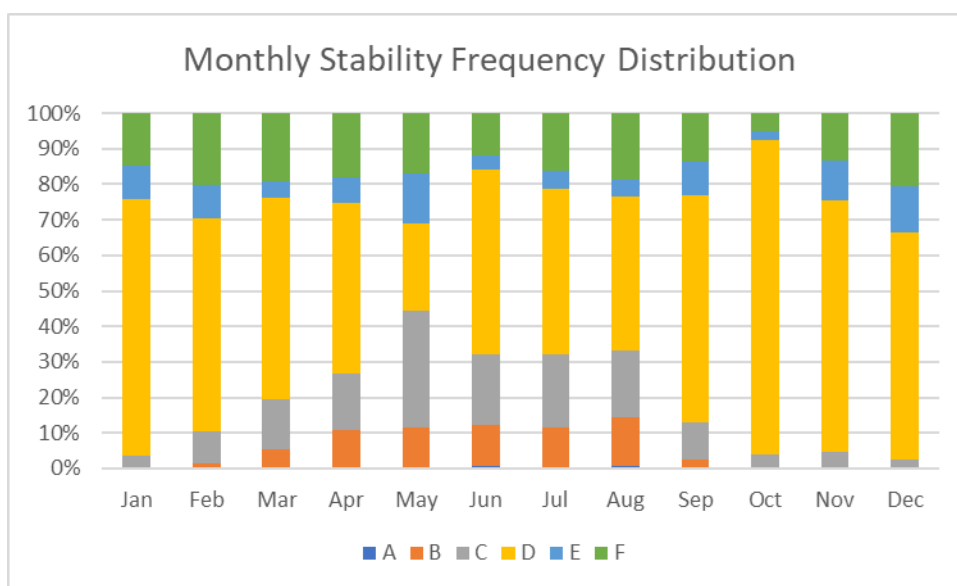
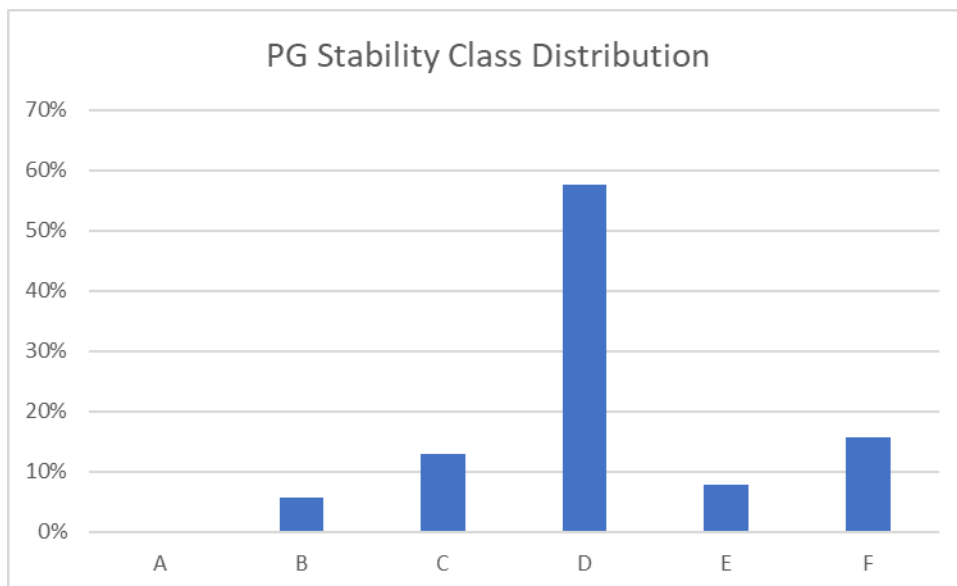
Attachment: IR-39

| | |
|---|--|
| Number | IR-39 |
| Dept. | ECCC |
| Project effects link | Change to an environmental component due to hazardous contaminants |
| Reference to EIS, appendices, or supporting documentation | Section 6.1.4.2, Potential Project- Related Effects |
| Context and Rationale | <p>Context: In this section, the Proponent discusses the approach taken for air dispersion numerical modelling. Using their CALMET data set, the Proponent’s CALPUFF model runs indicated exceedances for 24- hour total suspended particulates, 24-hour particulate matter (PM10), 1-hour nitrogen dioxide, and 24-hour uranium concentrations. However, there is no mention of possible diurnal and seasonal occurrences of the exceedances.</p> <p>Rationale: Adequate assessment of the modelling results requires knowledge of the temporal characteristics for the exceedances. For example, wintertime exceedances may be due to strong temperature inversions, especially during the overnight to morning hours. These strong inversions are challenging for numerical models to capture. Exceedances during warmer months may be due to specific wind directions, which transport emissions directly to downwind receptors.</p> |
| Information Requirement | Provide additional information on any diurnal and seasonal influences of the modelled exceedances. |

Response:

The draft EIS aggregated the total number of exceedances predicted over the one-year CALMET data set to determine the maximum frequency of exceedances. While information on diurnal and seasonal patterns of exceedances is useful for developing air emissions management and monitoring plans, the total number of exceedances was required to identify and evaluate potential residual effects in the EIS.

Information regarding the presence of inversions in the CALMET data set was presented during the Meteorology Technical Meeting held on January 27, 2023. As shown in the figures below, stable conditions (PG stability class categories E and F) occur about 24% of the time and are most prominent during December (33% of the time).

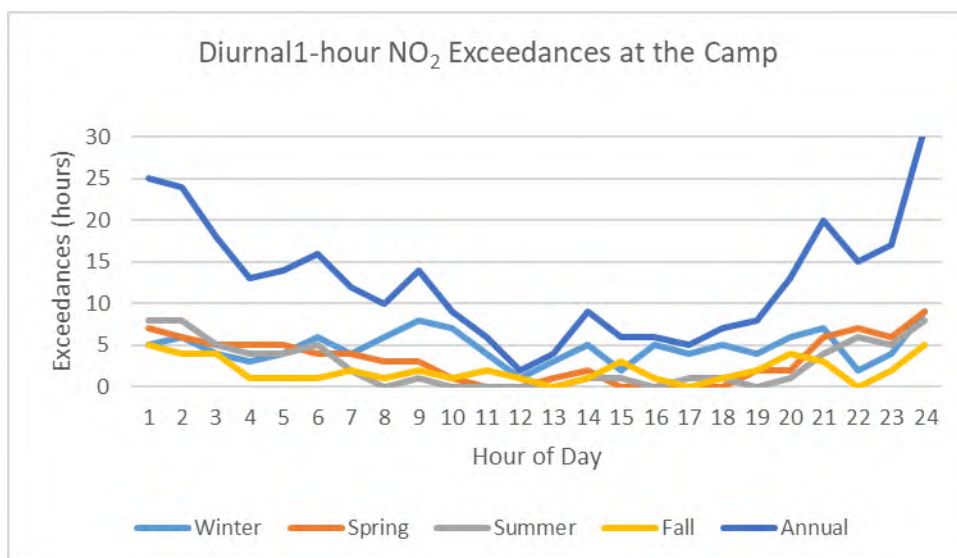
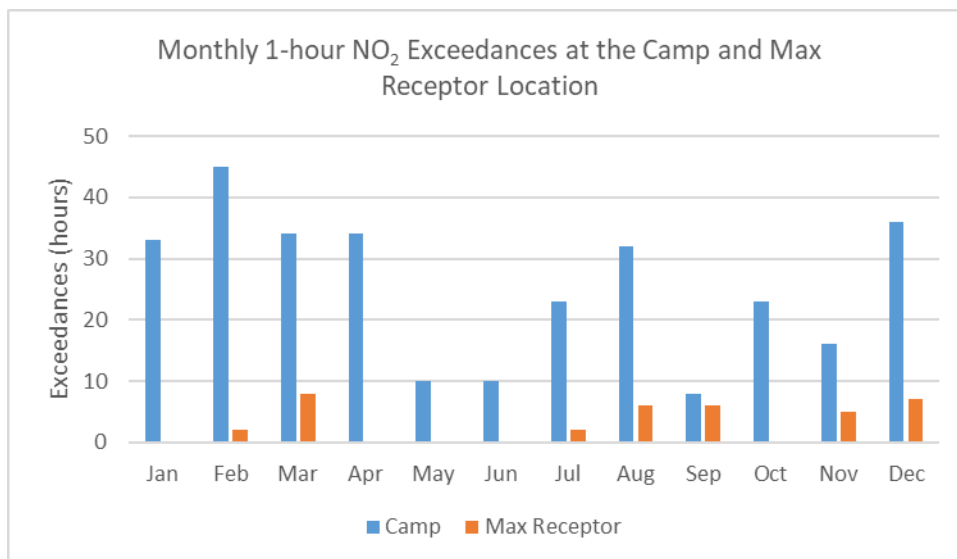


In addition to the previous information, the temporal patterns of the predicted exceedances for 1-hour NO₂, and 24-hour TSP, PM₁₀, and uranium for each of the assessment scenarios have been evaluated at the camp receptor and at the receptor with the maximum predicted concentration. The results of this analysis are presented in a series of figures below. While NO₂ exceedances are limited (i.e., < 5% of the time), some temporal patterns do emerge. Namely, 1-hour NO₂ exceedances are primarily expected to occur during the coldest months (January, February, and December) and during the morning and overnight hours when inversions are more likely to occur. For 24-hour TSP and PM₁₀, exceedances are predicted to be most frequent during the May to October period, corresponding to higher emission rates compared to the November to April period (see Section 4.0 of Appendix 6-A). Being that there are so few 24-hour uranium exceedances, no obvious temporal pattern was identified, but the months with the highest number of exceedances at the camp receptor are expected to be April, October, and

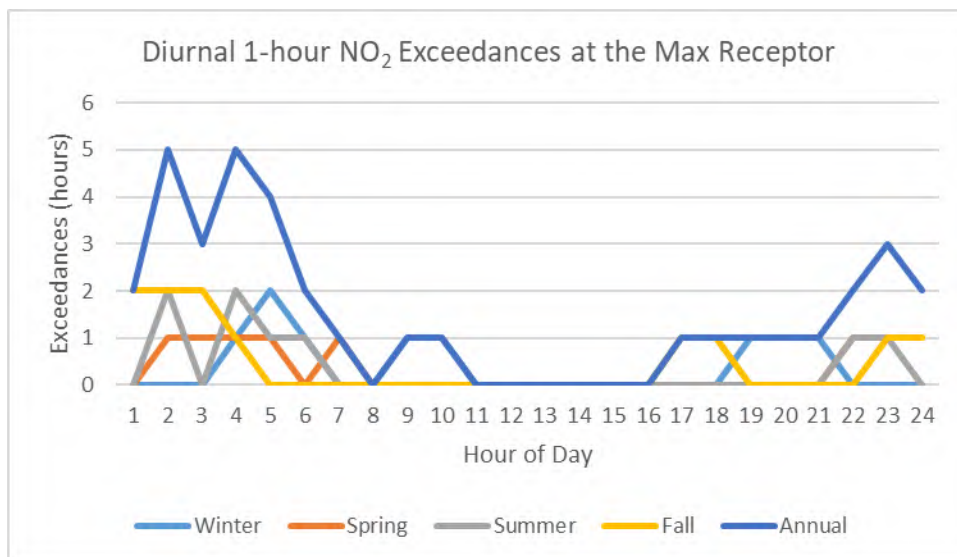
December and only one exceedance is predicted from May to September. This suggests that exceedances of the 24-hour uranium criteria are more likely to occur during the colder months, possibly due to the increased presence of inversions.

The aforementioned information will be considered as mitigation and monitoring plans are developed.

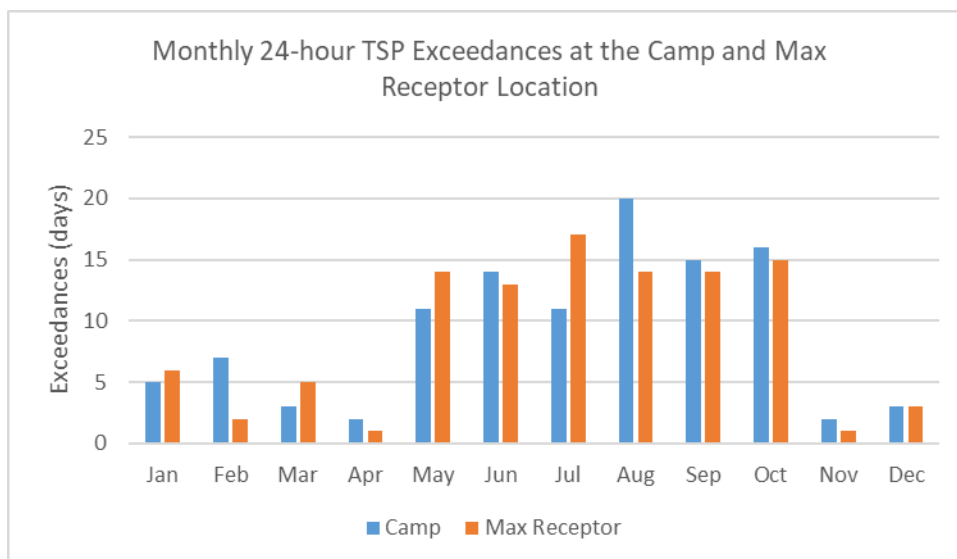
Figures for Construction Exceedances



Note: Winter = Jan, Feb, Dec; Spring = Mar, Apr, May; Summer = Jun, Jul, Aug; Fall = Sep, Oct, Nov



Note: Winter = Jan, Feb, Dec; Spring = Mar, Apr, May; Summer = Jun, Jul, Aug; Fall = Sep, Oct, Nov



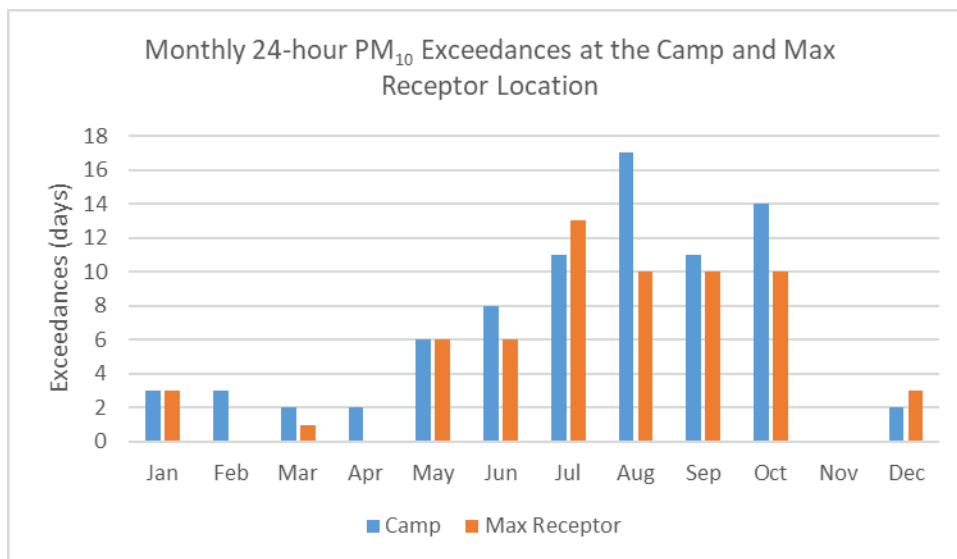
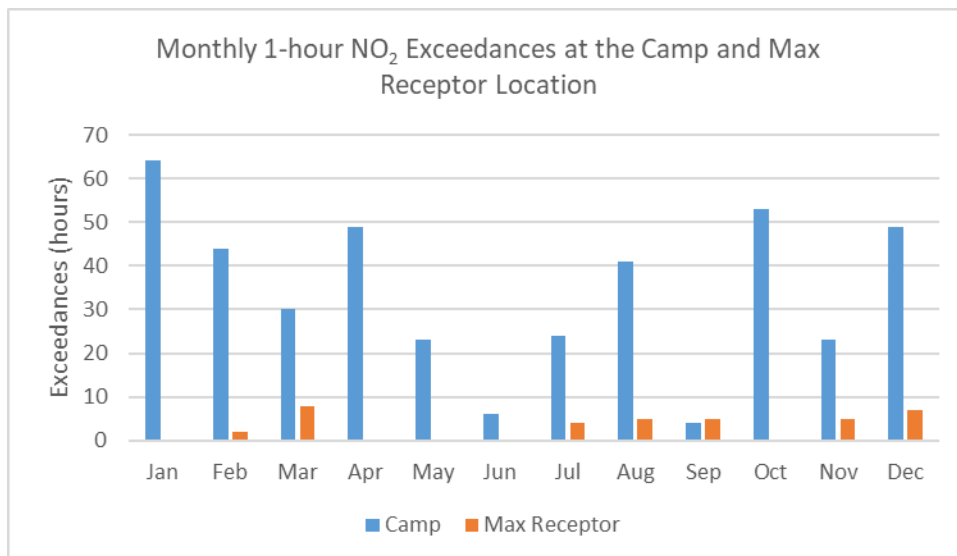
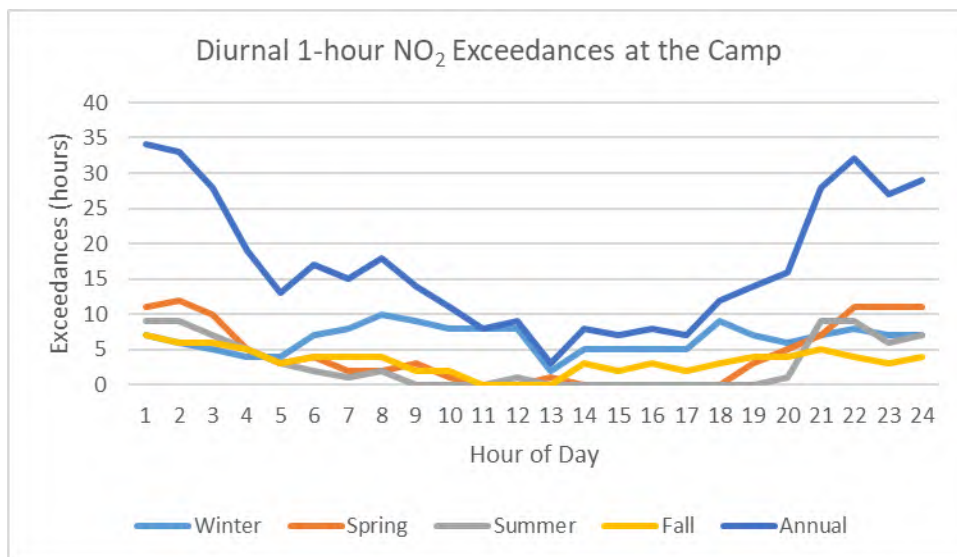
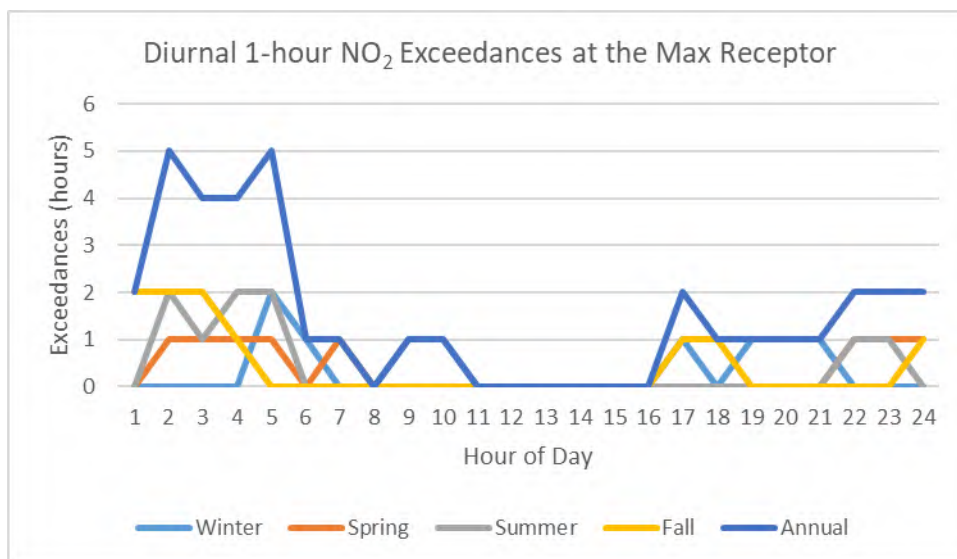


Figure for Operation Exceedances

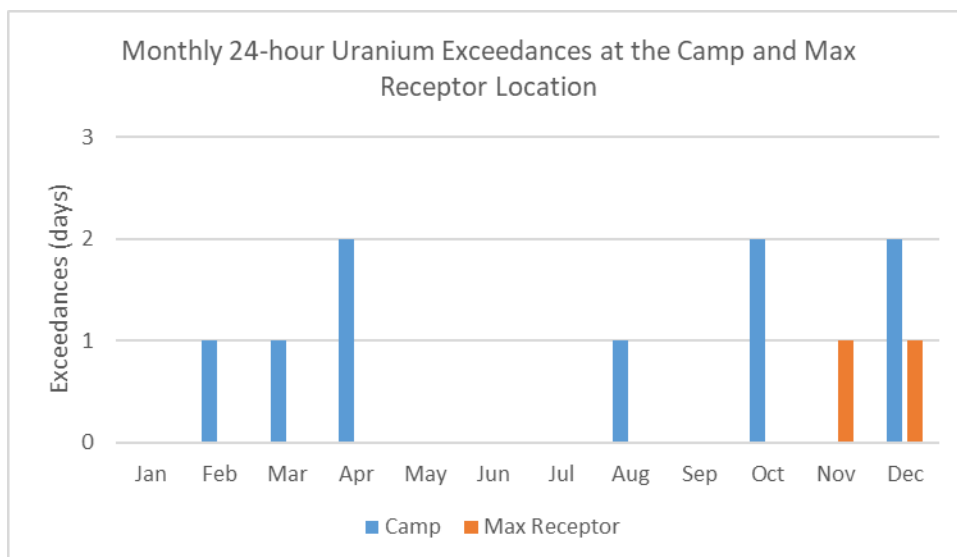
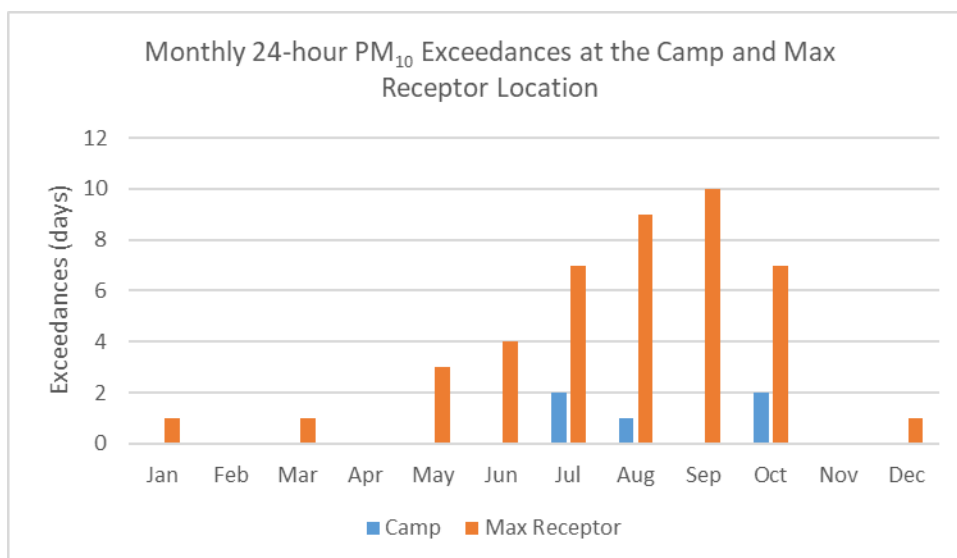
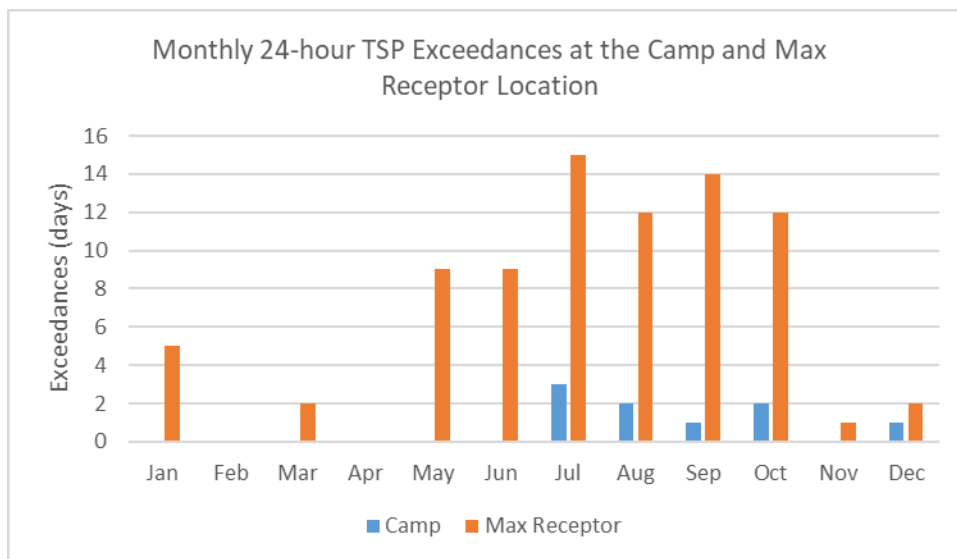




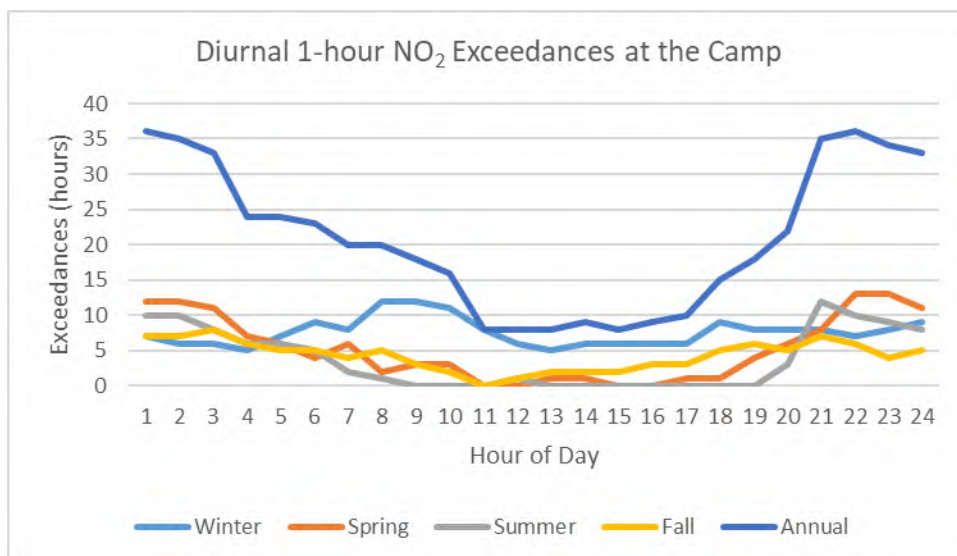
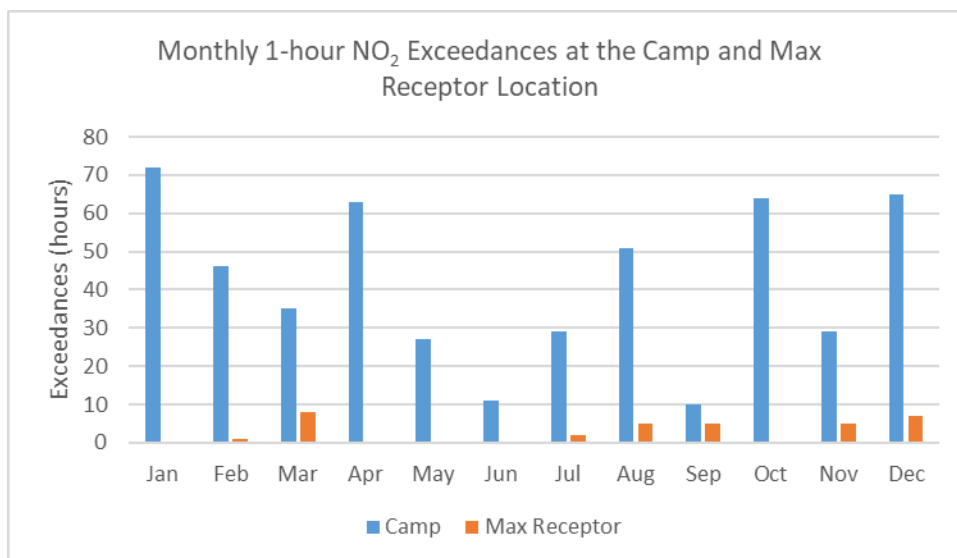
Note: Winter =Jan, Feb, Dec; Spring = Mar, Apr, May; Summer = Jun, Jul, Aug; Fall = Sep, Oct, Nov



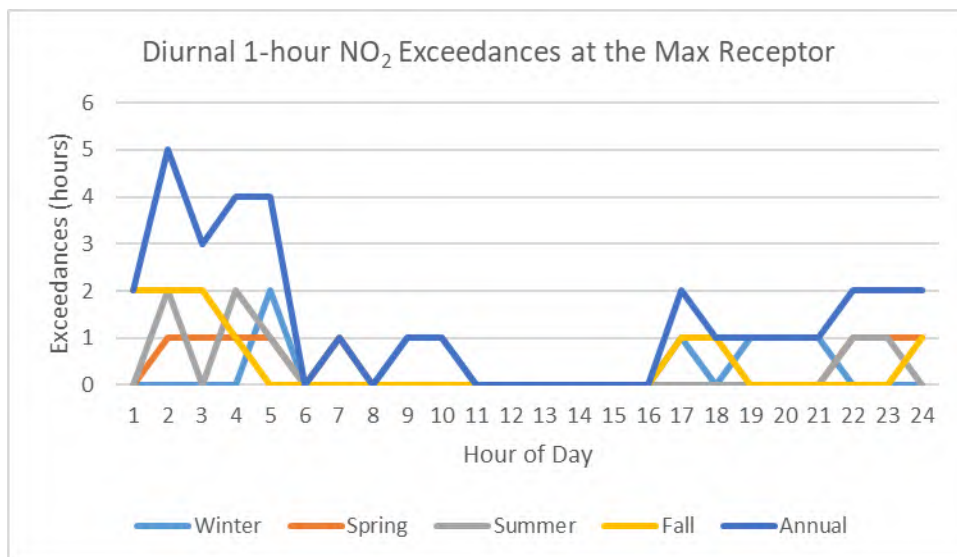
Note: Winter =Jan, Feb, Dec; Spring = Mar, Apr, May; Summer = Jun, Jul, Aug; Fall = Sep, Oct, Nov



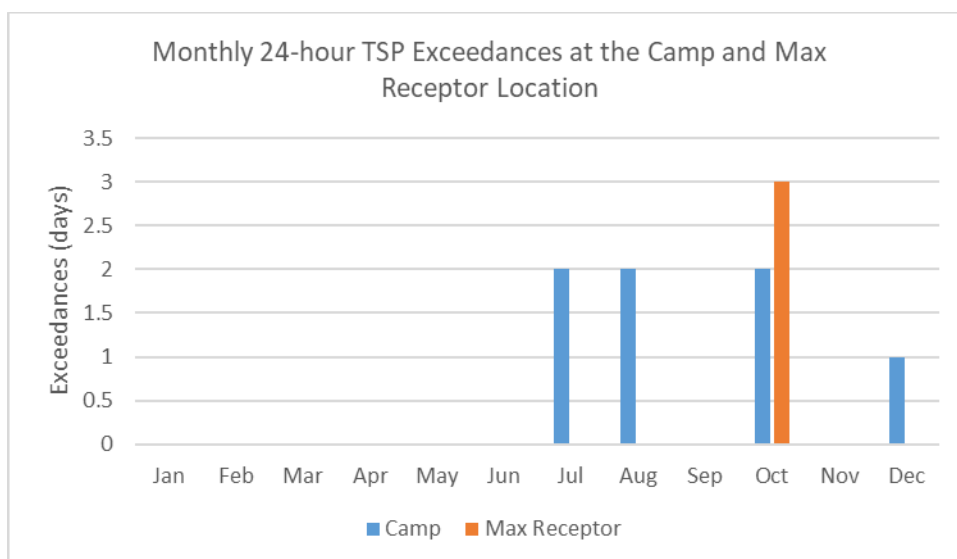
Figures for Decommissioning Exceedances

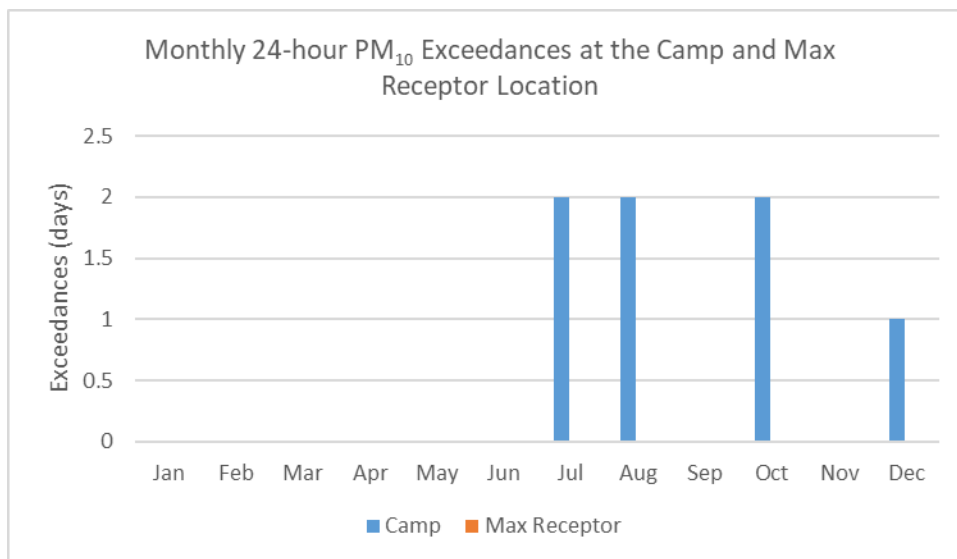


Note: Winter = Jan, Feb, Dec; Spring = Mar, Apr, May; Summer = Jun, Jul, Aug; Fall = Sep, Oct, Nov



Note: Winter = Jan, Feb, Dec; Spring = Mar, Apr, May; Summer = Jun, Jul, Aug; Fall = Sep, Oct, Nov





Note: There were no exceedances predicted at the maximum off-property receptor in the Decommissioning Scenario

Attachment: IR-45

| | |
|---|---|
| Number | IR-45 |
| Dept. | HC |
| Project effects link | Change to an environmental component due to hazardous contaminants |
| Reference to EIS, appendices, or supporting documentation | Section 6 Air Quality Technical Supporting Document Section 6.3.1 |
| Context and Rationale | <p>The carcinogenic risks of diesel exhaust from the project should be assessed.</p> <p>Context: Section 6.3.1 discusses modelled predictions of exceedances for Particulate Matter (PM). TSD p. 22 states: "concentrations of 24-hour PM2.5 are also elevated around the standby generators at the freeze plant, which emit fine particulate matter from combustion of diesel fuel". However, diesel particulate matter is not evaluated for the whole project in the air quality model or the air quality assessment.</p> <p>Rationale: Health Canada has determined that diesel exhaust is carcinogenic in humans which is consistent with the conclusion of the International Agency for Research on Cancer (IARC), and that diesel exhaust is associated with significant population health impacts in Canada.</p> <p>To characterize the carcinogenic risk of diesel exhaust from a project, HC has published a report (2022)¹ which provides a quantitative assessment of the relationship between ambient PM2.5 exposure and lung cancer risk. Specifically, this report quantifies the increase in risk of lung cancer mortality (over the baseline rate in the Canadian population) due to PM2.5 exposure.</p> <p>This quantitative assessment is considered appropriate to characterize risks from diesel PM given the contribution of diesel exhaust to ambient PM2.5 in Canada, and that the carcinogenicity of diesel exhaust has generally been evaluated based on the respirable PM fraction^{1,2,3}.</p> <p>References:</p> <p>[1] HC. 2022. Lung Cancer and Ambient PM2.5 in Canada: A Systematic Review and Meta-analysis. Available at: https://publications.gc.ca/site/eng/9.907038/publication.html</p> <p>[2] HC. 2016. Human Health Risk Assessment for Diesel Exhaust. Available at: http://publications.gc.ca/collections/collection_2016/sc-hc/H129-60-2016-eng.pdf</p> <p>[3] IARC. 2013. IARC monographs on the evaluation of carcinogenic risks to humans. Volume 109. Outdoor air pollution. https://publications.iarc.fr/Book-And-Report-Series/Iarc-Monographs-On-The-Identification-Of-Carcinogenic-Hazards-To-Humans/Outdoor-Air-Pollution-2015</p> |

| | |
|-------------------------|---|
| Information Requirement | 1. Evaluate the carcinogenic risk of all potential diesel exhaust from the project based on the approach proposed by Health Canada (2022). Additional guidance ("Additional Lung Cancer Mortality from PM2.5: Recommended Approach and Sample Calculation") is provided as an appendix to this comment table.[i] |
| | [i] Additional Lung Cancer Mortality from PM2.5: Recommended Approach and Sample Calculation |
| | Health Canada, Water and Air Quality Bureau, October 2022 |
| | |
| | Health Canada (2022) provides a quantitative estimate of the risk of lung cancer associated with exposure to PM2.5 in Canada. The pooled hazard ratio (HR) for lung cancer mortality in the Canadian population is 1.127 (95% CI: 1.085, 1.170) per 10 µg/m³ increase in long-term exposure to ambient PM2.5. The slope coefficient (β) for this relationship is 0.01196, as derived below: |
| | $e^{(\beta \times 10 \mu\text{g}/\text{m}^3)} = \text{pooled hazard ratio per } 10 \mu\text{g}/\text{m}^3$ |
| | $e^{(\beta \times 10 \mu\text{g}/\text{m}^3)} = 1.127$ |
| | $\beta \times 10 \mu\text{g}/\text{m}^3 = \ln 1.127$ |
| | $\beta = (\ln 1.127)/(10 \mu\text{g}/\text{m}^3) \text{ ,}$ |
| | $\beta = 0.01196$ |
| | The additional lung cancer mortality (over the baseline rate) from PM2.5 derived from a given source can be determined using the equation below, based on the attributable fraction or (HR-1)/HR (Greco et al. 2020): |
| | $ALCM = \left[\frac{(e^{\beta \cdot \text{Exposure}} - 1)}{e^{\beta \cdot \text{Exposure}}} \right] \cdot \text{Baseline rate} \cdot \text{Years}$ |

| |
|--|
| ALCM = additional lung cancer mortality cases per 100,000 population |
| β = 0.01196 (slope coefficient from meta-analysis in Health Canada (2022)) |
| Exposure = estimated PM2.5 exposure concentration from the relevant source(s) (µg/m3) (does not include baseline PM2.5 exposure) |
| Baseline rate = 45.5 per 100,000 (current Canadian Age Standardized Mortality Rate (ASMR) for lung cancer from Canadian Cancer Statistics Advisory Committee 2021); the Canadian baseline rate is appropriate as the slope coefficient was derived from Canada-wide studies and an updated ASMR of Canada (if available) would be appropriate for use in the calculation |
| Years = years of project or project phase |
| Sample calculation: |

| | |
|--|--|
| | Project estimates an exposure from relevant source(s) of 0.067 µg/m3 over 50 years of operation |
| | $ALCM = \left[\frac{(e^{\beta \cdot Exposure} - 1)}{e^{\beta \cdot Exposure}} \right] \cdot Baseline\ rate \cdot Years$ $ALCM = \left[\frac{(e^{0.01196 \cdot 0.067} - 1)}{e^{0.01196 \cdot 0.067}} \right] \cdot 45.5 \cdot 50$ |
| | ALCM = 1.8 additional lung cancer mortality cases per 100,000 |
| | |
| | References: |
| | [1] Canadian Cancer Statistics Advisory Committee in collaboration with the Canadian Cancer Society, |
| | Statistics Canada and the Public Health Agency of Canada. Canadian Cancer Statistics 2021. Toronto, ON: |
| | Canadian Cancer Society; 2021. Available at: cancer.ca/Canadian-Cancer-Statistics-2021-EN |
| | [2] Greco, S.L., MacIntyre, E., Young, S. et al. An approach to estimating the environmental burden of cancer |
| | from known and probable carcinogens: application to Ontario, Canada. BMC Public Health 20, 1017 |
| | (2020). https://doi.org/10.1186/s12889-020-08771-w |
| | [3] Health Canada. Lung cancer and ambient PM2.5 in Canada: a systematic review and meta-analysis. |
| | [4] Health Canada, 2022. Available online at: https://publications.gc.ca/site/eng/9.907038/publication.html |

Response:

Sources of Diesel Emissions from the Project

The Project-related atmospheric releases considered in the Environmental Risk Assessment (ERA) in the draft EIS Appendix 10-A were consistent with the air emissions inventory detailed in the Air Quality Assessment (draft EIS Section 6 and Appendix 6-A). The emissions will vary over time based on the schedule of Project activities and the air quality assessment scenarios were developed based on the year with the maximum activity occurring in each Project phase. There are several combustion sources at the site, which would be expected to contribute diesel emissions during the relevant phases of the Project. Combustion sources at the site include:

- diesel generators;
- propane heaters; and
- diesel and gasoline combustion associated with construction equipment and vehicles utilizing the on-site roads.

These combustion sources would contribute particulate matter (PM₁₀ and PM_{2.5}), NO_x, SO₂ and CO to the atmospheric environment. Concentrations of these parameters were predicted in the Air Quality TSD

(Appendix 6-A) at several receptor locations within the Local Study Area and were used as surrogates for diesel emissions from the Project. It is important to note that scoping of the air quality assessment followed a conservative approach. For instance, and of relevance to this IR, although Denison expects the site will be powered by the provincial grid during Operations, the air quality assessment conservatively assumed that the back-up diesel generators would run continuously (24/7) during Operation and Decommissioning in order to predict worst-case concentrations and bound the evaluation of Project residual effects.

Assessment of Diesel Emissions in the ERA

Particulate matter, of which diesel particulate matter would be a subset and in particular a subset of or associated with the PM_{2.5} fraction, was assessed in the ERA in Appendix 10-A based upon predicted concentrations at receptor locations as documented in the Air Quality Assessment (EIS Section 6 and Appendix 6-A). As discussed in Section 3.2.1.3.2 of the ERA (Appendix 10-A), predicted concentrations of particulate matter (including TSP and PM_{2.5}) during Construction, Operation, and Decommissioning all met their respective annual screening values of 60 µg/m³ for TSP and 8.8 µg/m³ for PM_{2.5}. Exceedances were predicted for TSP and PM₁₀ of the 24 hour screening values in all Project Phases, attributable to fugitive dust from earthworks and unpaved roads and not operation of generators. There were, however, no exceedances of the 24 hour screening value for PM_{2.5}, the fraction of particulate matter most likely to be associated with diesel emissions.

Assessment of Diesel Emissions using HC New Approach

The method recommended by HC in this IR was used to calculate the additional lung cancer mortality (ALCM) over the baseline rate from PM_{2.5} using the predicted PM_{2.5} concentrations presented in the EIS. The same human receptor locations assessed in the ERA (Risk2 through Risk5, Table 3-7 in Appendix 10-A) were considered including the residency times for each receptor type consistent with Table 4-2 in Appendix 10-A, and shown in Table IR45-1 below.

Table IR45-1: Summary of Human Receptor Locations and Residency Assumptions

| Receptor ID | Receptor Location Description | Receptor Type | Residency Assumption |
|-------------|----------------------------------|-------------------|----------------------------|
| Risk2 | Human Location Trapper | Fisher/Trapper | 50% at Risk2, 50% at Risk5 |
| Risk3 | Human Location Camp Worker | Camp Worker | 50% at Risk3, 50% at Risk5 |
| Risk4 | Human Location Seasonal Resident | Seasonal Resident | 30% at Risk2, 70% at Risk5 |

Baseline concentrations for PM_{2.5} are 3.1 µg/m³. The following equation (Greco et al., 2020) was used to calculate the ALCM.

$$ALCM = \left[\frac{(e^{\beta \cdot Exposure} - 1)}{e^{\beta \cdot Exposure}} \right] \cdot Baseline\ rate \cdot Years$$

Where $\beta = 0.01196$

Exposure = estimated PM_{2.5} exposure concentration with background removed

Baseline rate = 45.5 per 100,000

Years = years of project or project phase (construction = 2 years, operation = 15 years, decommissioning = 5 years)

The exposure concentrations for PM_{2.5} were scaled to consider the fraction attributable to diesel sources, consistent with Section 4.0 in Appendix 6-A (Construction = 22.8%, Operation = 26.8%, and Decommissioning = 36.2%). Considering these assumptions, the following table provides the ALCM for each project phase:

Table IR45-2: Summary of Additional Lung Cancer Mortality Rates at Human Receptor Locations

| Receptor ID | Construction | Operation | Decommissioning |
|-------------|--------------|-----------|-----------------|
| Risk2 | 0 | 0 | 0 |
| Risk3 | 0 | 0 | 0 |
| Risk4 | 0 | 0 | 0 |

Note: Results are interpreted per 100,000 people.

As shown above, the risks for the general public at Risk2, Risk 3 and Risk4 demonstrate that no additional lung cancer mortality cases are expected per 100,000 population as a result of exposure to diesel particulate matter (using PM_{2.5} as a surrogate) due to the Project. Therefore, there is unlikely to be an increased incidence of lung cancer mortality due to exposure to diesel particulate matter generated by the Project activities.

Mitigation measures to limit diesel emissions and exposure

Various mitigation measures will be implemented to control or reduce the impacts to the atmospheric environment from the Project. These include administrative and physical controls based on best industry practices, as listed below and outlined in the draft EIS Section 6 and Appendix 6-A and in IR responses:

Administrative controls

- Create and implement a dust management plan, including the application of water and/or chemical suppressant to control fugitive dust, in addition to other operational strategies to assist in dust control;
- Planning vehicle and equipment routes to minimize travel distances, where possible; and
- Employ standard operating procedures and complete regular inspections of equipment machinery to ensure it is in good working order.
- Vehicles and equipment will be equipped with Tier 4 engines where feasible (IR-139).

Physical controls

- Avoid dust-generating activities (e.g., earthworks, material handling) during dry or high wind conditions;
- Avoid dropping material from height;

- Ensure all exhausts (e.g., mobile equipment, generators) are in good working condition;
- Turn off vehicles and equipment when not being used;
- Minimize or reduce vehicle and equipment speed by enforcing speed limits;
- Apply water at least twice per day to unpaved roads and surfaces; and
- Maintain unpaved road surfaces via grading or other maintenance practices to reduce the amount of silt (i.e., fines) present in the roadbed material.

Conclusions

Considering PM_{2.5} as a surrogate for diesel particulate matter, the modelled concentrations of PM_{2.5} are not expected to result in any additional lung cancer mortality cases per 100,000 at the receptor locations that are relevant for members of the public (i.e., hunters, trappers, fishers, recreational users, seasonal residents) and the camp worker. The overall risk is expected to be negligible; however, monitoring of particulate matter will be carried out throughout the Project and compared to risk-based criteria. Therefore, no further Project controls beyond those identified are proposed for the protection of human health due to diesel particulate matter.

References

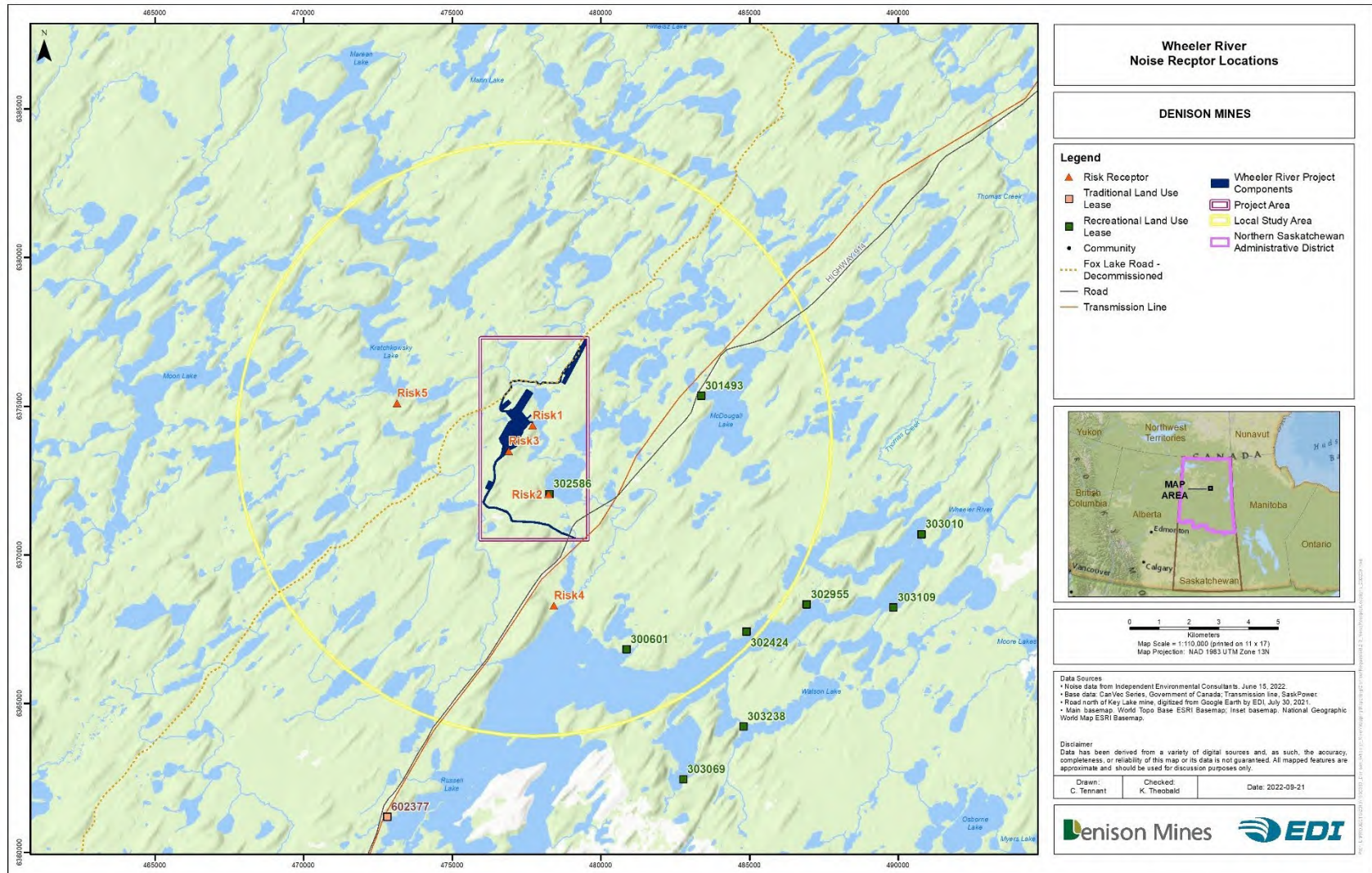
CCME (Canadian Council of Ministers of the Environment). 2023. Canadian Ambient Air Quality Standards. Last accessed online 2023/06/27 from <https://ccme.ca/en/air-quality-report>.

Greco, S.L., MacIntyre, E., Young, S. et al. 2020. An approach to estimating the environmental burden of cancer from known and probable carcinogens: application to Ontario, Canada. BMC Public Health 20, 1017

Attachment: IR-48

| | |
|---|--|
| Number | IR-48 |
| Dept. | HC |
| Project effects link | Physical stressors (noise and vibration) |
| Reference to EIS, appendices, or supporting documentation | Appendix 6-E, Figure 6.2.3, p. 6-57 |
| Context and Rationale | <p>Noise-sensitive receptors are not included on noise contour maps.</p> <p>Context: Noise-sensitive receptors are identified in the acoustic model report in Section 6 Appendix 6-E but not presented on any maps in the atmospheric and acoustic sections of the main report (Figure 6.2-3).</p> <p>Rationale: The noise assessment typically includes a map illustrating modelled noise levels from the project at receptor locations in the study area.</p> <p>Certainty regarding the presence of human receptors in the regional study area is also recommended in order to assess cumulative impacts.</p> |
| Information Requirement | 1. For more clarity, identify noise-sensitive receptors on Figure 6.2-3: Noise Assessment Study Area as well as on contour maps showing the baseline and predicted noise levels. |

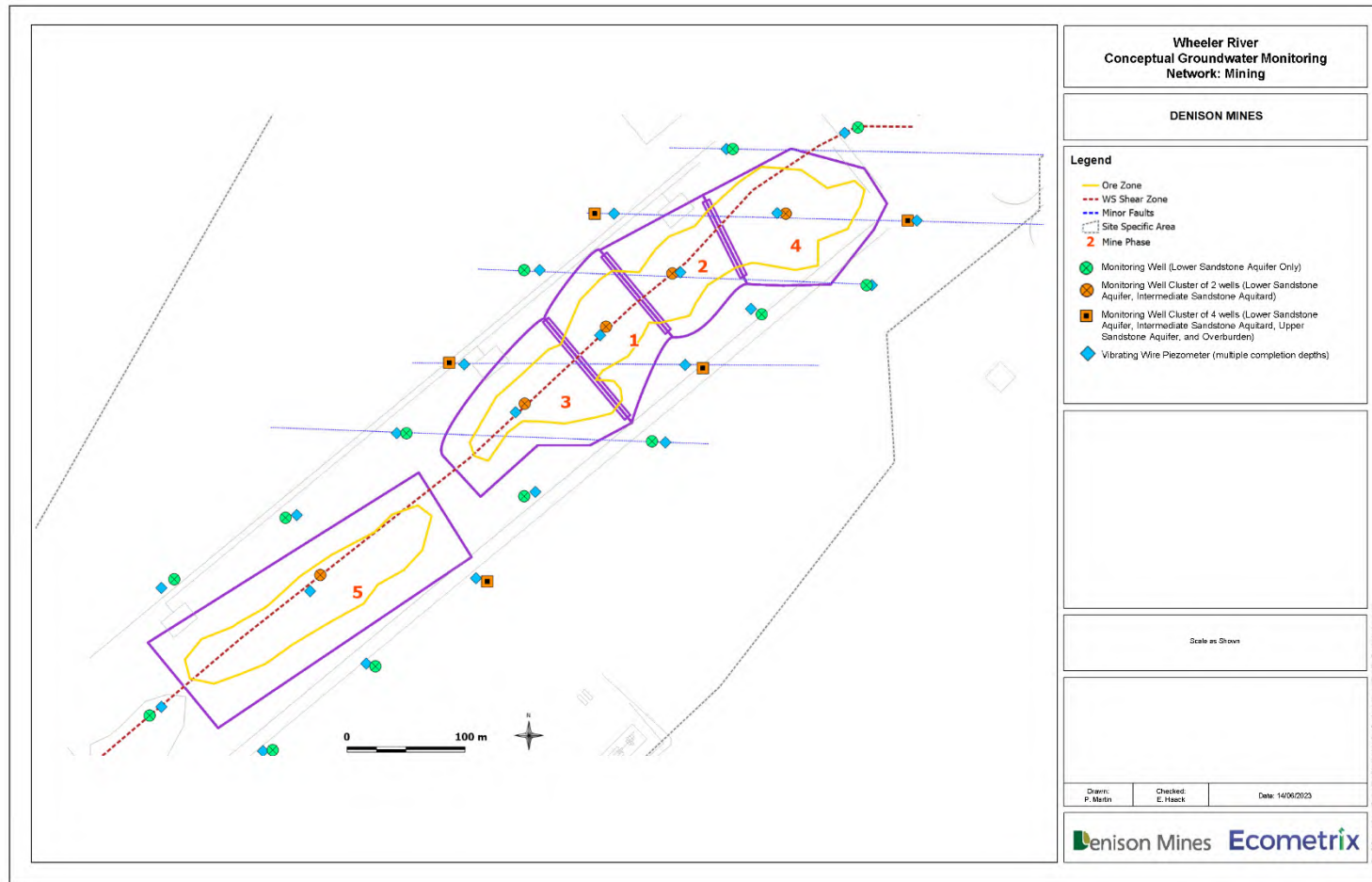
Supporting figure to the response provided in IR table:



Attachment: IR-51

| | |
|---|--|
| Number | IR-51 |
| Dept. | CNSC |
| Project effects link | Geology and Groundwater |
| Reference to EIS, appendices, or supporting documentation | Section 7, Figure 7.8-1 Appendix 7-C |
| Context and Rationale | <p>Context: Figure 7.8-1 (p. 7-107, main EIS report) shows monitoring well cluster outside of the freeze wall.</p> <p>Rationale: It is not clear what the targeted hydro-stratigraphic units of each monitoring well cluster are. In addition, it is not clear how the establishment of the freeze wall and any leakage from the brine solution will be monitored. If there is any “window” within the freeze wall (i.e., the freeze wall is not continuous), is there any way to identify that?</p> |
| Information Requirement | <p>Please clarify the targeted hydro-stratigraphic units of each monitoring well cluster in Figure 7.8-1 (p. 7-107, main EIS report).</p> <p>Please clarify how the establishment of a continuous freeze wall will be monitored.</p> |

Supporting figure to the response provided in table:



Attachment: IR-57

| | |
|---|--|
| Number | IR-57 |
| Dept. | CNSC |
| Project effects link | Fish and fish habitat |
| Reference to EIS, appendices, or supporting documentation | Section 7.3.3.2 Appendix 7-A, Sections 3.1.2 and 3.7, Appendix 7-C, section 2.5.2 |
| Context and Rationale | <p>Context: The proponent's conceptual model of groundwater flow in the Local Study Area (EIS, sec 7.3.3, Figure 7.3-7) involves an unconfined Upper system hosted by overburden and the Upper sandstone aquifer, and a Lower confined system hosted by the Lower Sandstone Aquifer. The Intermediate Sandstone aquitard acts as a confining unit. Vertical heads gradients are directed downwards west of the Phoenix deposit and upwards beneath surface water receptors including Whitefish Lake (EIS, sec. 7.3.3.2).</p> <p>Using head data from nested monitoring wells (Appendix 7-A, sec. 3.1.2, Table 3-1) the proponent calculates upward gradients in cluster WR-607, between the Lower Sandstone aquifer and the Upper Sandstone aquifer. In cluster LA-5, an upward gradient is calculated between the Upper Sandstone and the overburden unit (Appendix 7-A, Table 3-5). In areas west and south-west of the Phoenix deposit, groundwater is estimated to flow downward under a vertical gradient of approximately 0.015 m/m (Appendix 7-A, p.3-15).</p> <p>Rationale: In NRCAN's opinion, the proponent's interpretation of vertical head gradients in the LSA is not fully accurate. For the "Up-Gradient" monitoring well cluster, the tabulated head data (Appendix 7-A, Table 3-1) and data logger hydrographs (Appendix 7-A, Appendix B) indicate a downward gradient (0.014 m/m) from the overburden unit to the Intermediate Sandstone and an upward gradient (0.056 m/m) from the Lower Sandstone to the Intermediate Sandstone. Head data from the "NW" monitoring well cluster indicate a similar pattern of downward (0.016 m/m) and upward (0.014 m/m) gradients converging in the Intermediate Sandstone. In the "Downgradient" and "SE" monitoring well clusters, head observations and data logger hydrographs indicate downward gradients from the shallow aquifer system but essentially equal heads in the Intermediate and Lower Sandstones. This more complex picture of groundwater flow systems in the LSA does not appear to have been captured in the proponent's conceptual model. Given the importance of the baseline hydrogeological regime for predicting the transport and fate of COPCs in the post-decommissioning period, the proponent needs to demonstrate that the numerical groundwater flow model accounts for observed vertical head gradients.</p> |
| Information Requirement | In section 2.5.2 of Appendix 7-C (Calibration Results), the proponent should demonstrate that the numerical groundwater flow model reproduces quantitatively or at least qualitatively the vertical head gradients calculated from observations in the nested monitoring well clusters (Appendix 7-A, Table 3-1). |

Response:

Vertical gradients are presented in Table 3-5, Section 3.7 of Appendix 7-A, while Table 3-1 presents water levels observed at individual groundwater monitoring wells. Discussion of

vertical gradients is limited to groups of wells which are close together (e.g., GWR-036 and GWR-037 which are approximately 10 m apart) rather than clusters of wells which are further apart (e.g., the upgradient cluster, where wells are approximately 400 m apart).

Vertical gradients are implicitly calculated as water levels from all observation wells are incorporated as calibration targets using their coordinates in 3D space. Recognizing that all water level observations are subject to human error, and as such values that are very close to one another (e.g., as observed at GWR-008 and GWR-009) are treated as essentially the same value.

As requested, the table below presents observed and simulated vertical gradients at the well clusters presented in Table 3-1, Appendix 7-A. Observed static water levels are presented as there were issues with the barometric pressure correction for transient water levels.

| Cluster | Well | Unit | Observed Water Level (static) | Simulated Water Level | Screen mid-point Elevation | Observed Gradient | Simulated Gradient | Notes |
|----------------------|---------|------|-------------------------------|-----------------------|----------------------------|-------------------|--------------------|---|
| NW | GWR-003 | OVB | 503.97 | 503.87 | 467.8 | | | |
| | GWR-027 | ISA | 500.91 | 501.00 | 246.3 | 0.0065 | 0.0061 | |
| | GWR-025 | LSA | 502.34 | 502.40 | 146.3 | -0.0058 | -0.0057 | |
| SE | GWR-007 | OVB | 514.12 | 503.48 | 515.2 | | | perched aquifer at GWR-007 impacts gradient calculation |
| | GWR-009 | ISA | 502.20 | 502.57 | 285.5 | 0.0231 | 0.0018 | |
| | GWR-008 | LSA | 502.40 | 502.37 | 166.2 | -0.0007 | 0.0007 | |
| Up-gradient | GWR-006 | OVB | 514.70 | 515.81 | 504.75 | | | |
| | GWR-028 | ISA | 511.00 | 510.40 | 241 | 0.0073 | 0.0107 | |
| | GWR-029 | LSA | 514.80 | 515.07 | 172.25 | -0.0158 | -0.0194 | |
| Down-gradient | GWR-005 | OVB | 501.99 | 500.94 | 382.55 | | | |
| | GWR-014 | ISA | 501.60 | 501.21 | 348.05 | 0.0010 | -0.0007 | |
| | GWR-012 | LSA | 501.27 | 501.40 | 166.5 | 0.0009 | -0.0005 | |

As indicated in this table, the model provides an excellent representation of the observed gradients estimated using these monitoring well clusters.

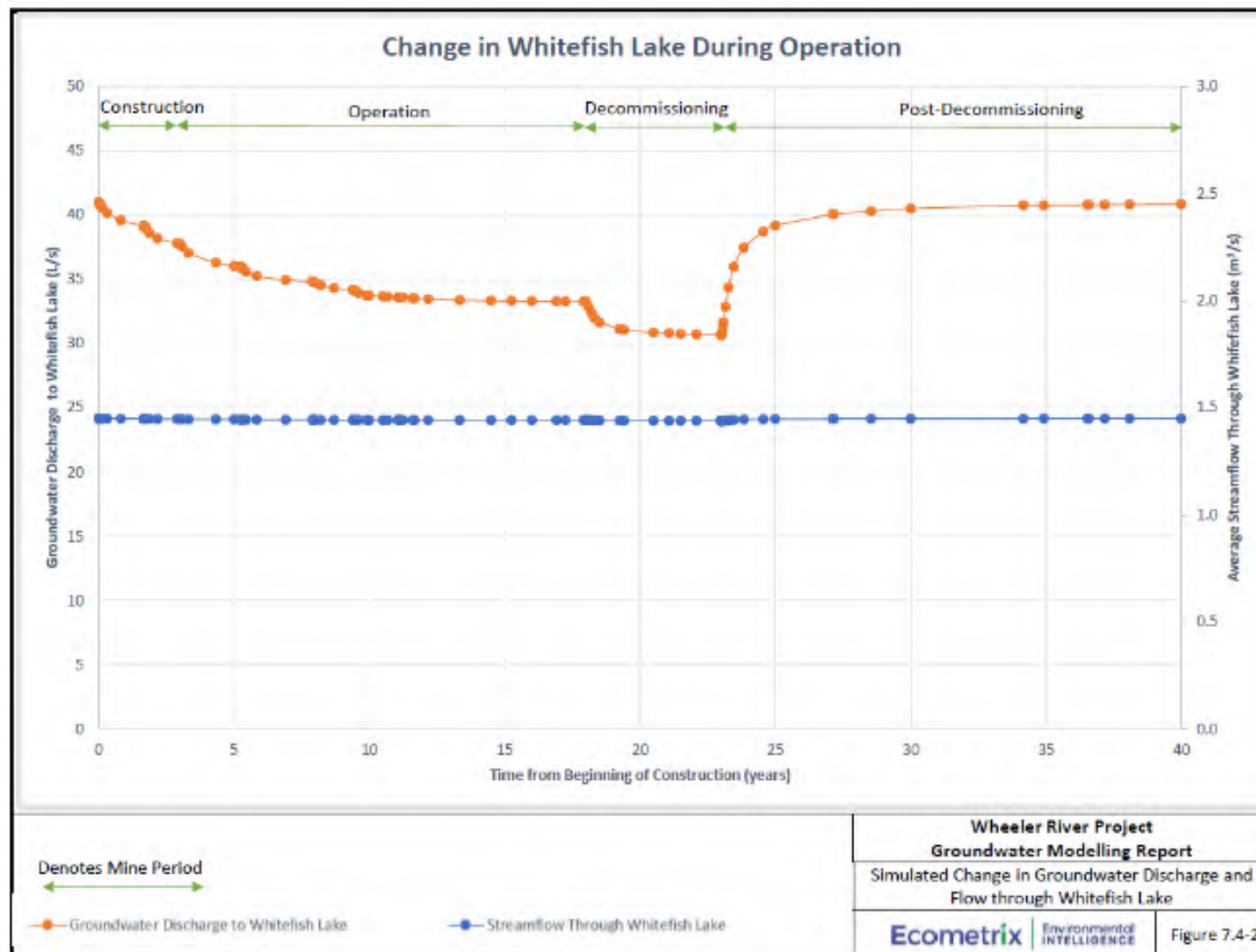
- At the northwest (NW) cluster, the observed and simulated gradients are virtually identical.
- At the southeast (SE) cluster, the gradient from the shallow overburden (OVB) to the intermediate sandstone aquitard (ISA) is under-estimated in the model, however the water level at GWR-007 is believed to be perched above the regional water table, and therefore not a good representation of vertical gradients; regardless both the model and observed data indicate a downward vertical gradient. The gradient between the ISA and the lower sandstone aquifer (LSA) is negligible, which is replicated by the model.
- At the up-gradient cluster, the observed are very well represented by the simulated gradients, including the flow directions.

- At the down-gradient cluster, the gradient between the ISA and the LSA is negligible, which is replicated by the model. The gradient between the OVB and ISA is observed to be downward but given the location of GWR-005 at the shore of Whitefish Lake, the natural hydraulic gradient is expected to generally be upward, as simulated.

Attachment: IR-59

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|---|--|
| Number | IR-59 |
| Dept. | CNSC |
| Project effects link | Fish and fish habitat |
| Reference to EIS, appendices, or supporting documentation | Section 7.4 Assessment of Project-related Effects, Figure 7.4-2 (p. 7-56) |
| Context and Rationale | <p>Context: Figure 7.4-2: Simulated Change in Groundwater Discharge and Flow through Whitefish Lake Over the Life of the Project appears to be missing information.</p> <p>Rationale: Legend is included below the image, but the Legend box is blank. The green dotted line is not represented by anything in the legend.</p> |
| Information Requirement | Please update this Figure to ensure it is complete, and that features are properly indicated in the legend. |

Supporting figure to the response provided in table:



Attachment: IR-63

| | |
|---|---|
| Number | IR-63 |
| Dept. | CNSC |
| Project effects link | Geology and groundwater |
| Reference to EIS, appendices, or supporting documentation | Section 7.4.2.1, Potential Effect #1: Groundwater Quantity – Construction to Decommissioning; Appendix 7-C, Section 2.7, Groundwater Conditions During Mine Operations |
| Context and Rationale | <p>Context: The numerical groundwater model described was calibrated to observed water level and stream baseflow data. Table 7.4-3 in the EIS indicates that Denison recognizes the potential for freeze wall operation to impact groundwater quantity. To simulate this impact, the model was adapted to reduce recharge (to 50%) within the freeze wall area, reduce hydraulic conductivity associated with the vertical freeze walls, and simulate pumping within the freeze wall area. Recovery from pumping and effects on discharge to groundwater discharge to Whitefish Lake are discussed in the potential effects section.</p> <p>Rationale: Although this assessment considered drawdown of the water table and discharge to Whitefish Lake, the discussion did not address the potential effects of operating the freeze wall on the local and semi-regional groundwater regimes. What would the pathway be for groundwater to pass around the freeze wall? What is the basis for the parameters selected, e.g., 50% recharge and lower hydraulic conductivity for freeze well? These factors need to be considered when evaluating the potential impacts of freeze well operations on groundwater flow conditions and corresponding receptors.</p> |
| Information Requirement | Please provide a more fulsome discussion on the impact of freeze wall operations on local and semi-regional groundwater regimes and potential receptors. Please provide the rationale for assumptions made for key model parameters (e.g., selection of 50% recharge, hydraulic conductivity value used to represent freeze wall). In addition, please discuss the potential pathways for groundwater flow around the freeze wall, complete with figures demonstrating these pathways. |

Response:

The impact of the freeze wall on the local and semi-regional groundwater flow regimes is minor. The footprint of the freeze walled area represents < 0.04% of the area of the regional groundwater flow model, and as such the freeze walled area is a relatively small disruption to the regional groundwater flow system.

The effect of the freeze wall was simulated using the regional groundwater flow model, with results shown below. Hydraulic conductivity of the freeze wall was simulated as a reduction of the baseline hydraulic conductivity by four (4) orders of magnitude, which was consistent with expected hydraulic conductivity changes as reported by

Newmans (2020). The recharge reduction on top of the ore zone was estimated at 50% of the pre-development recharge based on the expected regrading and surface drainage at the site to accommodate all of the surficial operations. The simulated effect of the active freeze walls is illustrated through Figures 1 and 2, which illustrate the change in groundwater flow paths resulting from the freeze wall and operational groundwater pumping.

Figure 1 illustrates the pre-mining (and pre-pumping) groundwater flow paths toward Whitefish Lake. The particle traces shown were released at Whitefish Lake and tracked backward in time / space to their recharge area. The provide an understanding of the west-east groundwater flow toward Whitefish Lake, with local recharge creating the driving force for that groundwater flow. On this figure, the groundwater level contours are shown in black, while the flowlines (particle traces) are shown in blue. Note the flowlines closest to the pumping wells (red circles) and the ore body (light brown outline). The colours in the background reflect the shallow hydraulic conductivity zones, which help to explain inflections in the hydraulic head contours and flowlines.

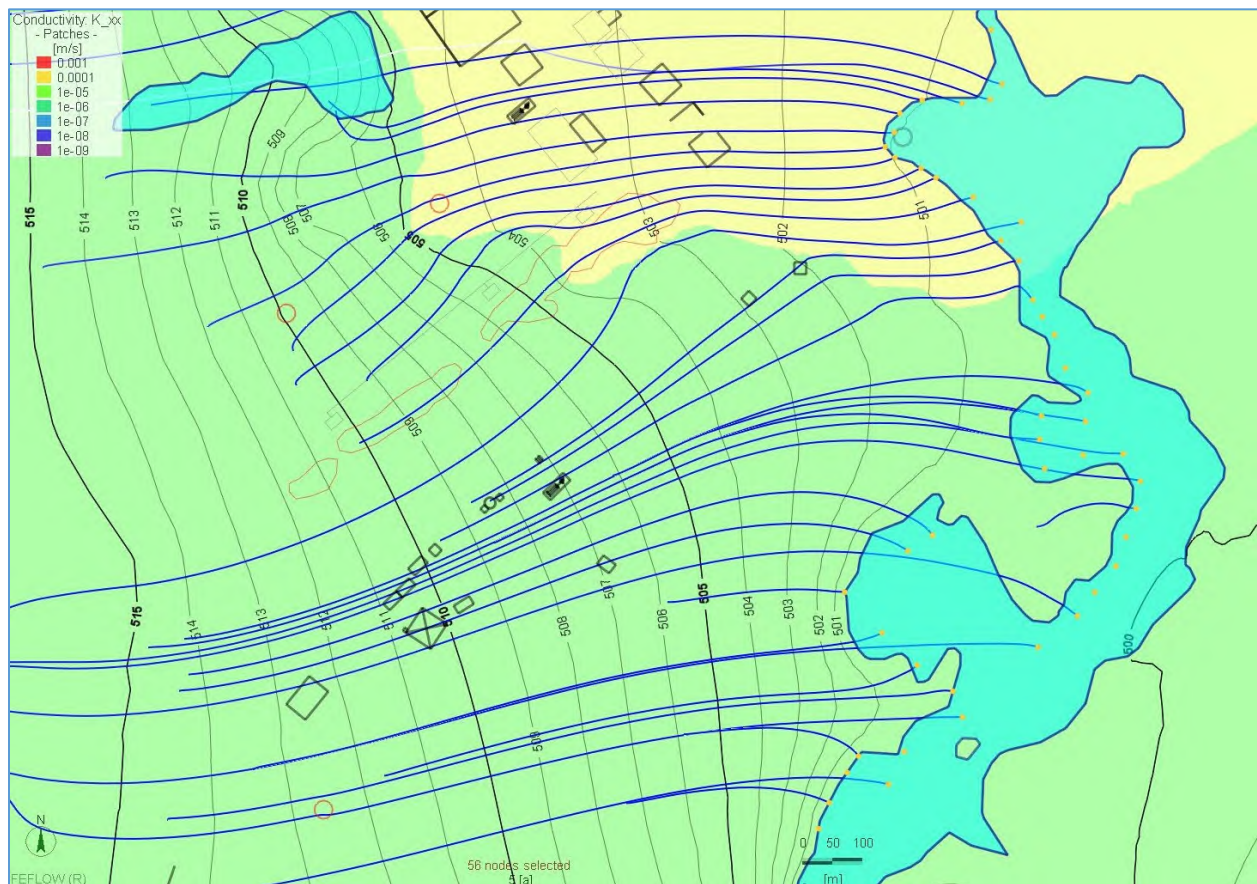


Figure 1: Groundwater Flow Paths Pre-Mining

Figure 2 illustrates the same groundwater flow paths toward Whitefish Lake during mining operations, while pumping was occurring (at red circles) and the freeze walls for phases 1 through 5 are in place. From this figure, the effect of the freeze walls can be seen to be limited to the immediate area around the freeze wall walls. The addition of the freeze walls creates a cluster of water level contours consistent with the freeze wall locations, representing the change in water levels between the area inside and outside of the freeze wall. Note that the water levels outside the freeze wall are simulated to be relatively unchanged during freeze wall operations.

Also evident on this figure are the water level drawdown contours, which deflect around the pumping wells (3 red circles). Note the additional level of drawdown experienced at wells simulated to pump from the lower hydraulic conductivity zone (i.e., green area, as opposed to the yellow area).

The flowlines in Figure 2 indicate how the groundwater flow patterns will change due to the addition of the freeze wall and the onsite pumping. Flowlines are noted to travel around the freeze wall and in between the pumping wells to discharge at the lake. The pumping wells will capture water flowing from the west which would otherwise discharge to Whitefish Lake.

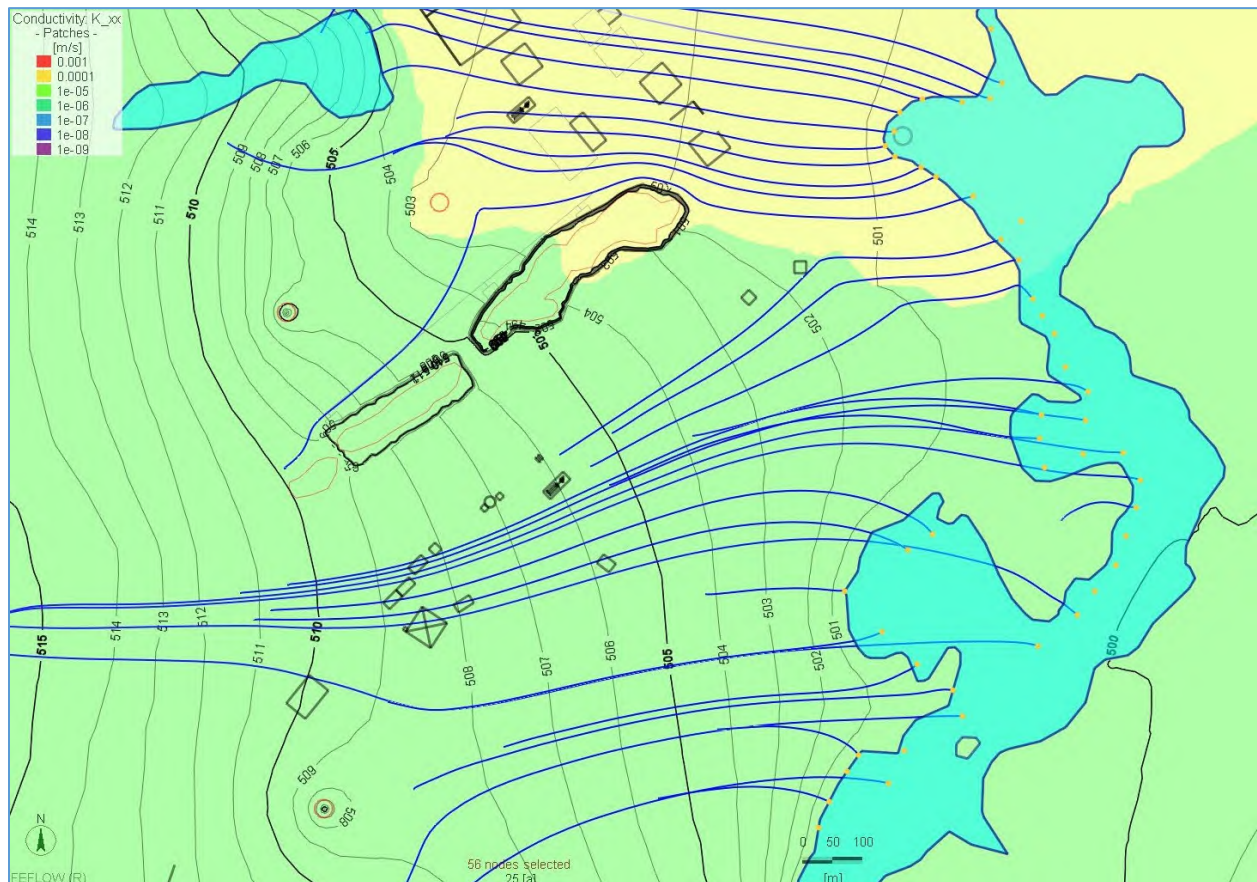


Figure 2: Groundwater Flow Paths During-Mining

Post mining, the groundwater flow path patterns would return to a condition similar to that simulated for pre-mining.

References

Newmans Geotechnique Inc. (2020). Wheeler River In-Situ Leach Surface Freezing Option Pre-Feasibility. Report to Denison Mines Ltd. August 2020.

Attachment: IR-68, IR-94, IR-97

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| Number | IR-68 |
| Dept. | NRCan |
| Project effects link | Fish and fish habitat |
| Reference to EIS, appendices, or supporting documentation | Section 7.6.2.2.3 Appendix 7-C, sections 3.3, 4.1, 4.4.4 and 4.7 |
| Context and Rationale | Context: Sources terms for the COPCs considered in 3D reactive transport modeling are given by the composition of "Restoration Solution #1", which the proponent believes is representative of groundwater quality in the ore zone after remediation at decommissioning (Appendix 7-C, sec. 3.3, Table 3-5; sec 4.0). The proponent considers COPC source terms as "initial conditions" for groundwater quality in the ore zone at the start of the model simulation period. During the simulation, no additional mass of COPCs is transferred to groundwater in the ore zone. Rationale: In NRCan's opinion, this representation of COPC sources is not conservative as it fails to account for various long-term slow mass release processes. These processes could include redissolution of secondary phases formed during ISR mining (e.g., radium-bearing gypsum or barite, jarosite, alunite) and migration of unrecovered lixiviant or restored solution from low-permeability regions or stagnant zones that were not fully swept during mining or remediation. NRCan notes that scenario #2 in the proponent's transport prediction uncertainty analysis (Appendix 7-C, sec. 4.7) does consider an extended source release period for protons (desorption from chlorite). However, in NRCan's opinion, additional modeling scenarios should consider extended-release periods for other COPCs as well. |
| Information Requirement | NRCan requests that the proponent's reactive transport prediction uncertainty analysis (Appendix 7-C, sec. 4.7) consider extended source release periods for additional COPCs. |

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| Number | IR-94 |
| Dept. | CNSC |
| Project effects link | Geology and Groundwater |
| Reference to EIS, appendices, or supporting documentation | Appendix 7-C, Numerical modelling: post-decommissioning evaluation, Section 3.5.5, Subsurface Conditions Incorporated |
| Context and Rationale | <p>Context: It is reported in this section the assumed subsurface conditions that were applied in the geochemical site conceptual models. Critical phenomenon of pH tail was mentioned. Inclusion and exclusion of corresponding geochemical reactions were discussed briefly.</p> <p>Rationale: It was reported that the residual reduced minerals of uraninite and pyrite were not included in the modelling of the remediated mining area. The argument was based on consideration of the upstream groundwater, passing through the mined zone, will not be oxidizing and groundwater conditions are expected to be similar to pre-mine conditions. However, this ignores the pH tail effect that releases proton H⁺ sorbed to solid surface during ISR flooding. By ignoring this process, there is a potential risk of underestimating the source terms for some key COPCs. Exclusion of uraninite and pyrite in remediated mining</p> |

| | |
|-------------------------|--|
| | area modelling is contradictory to pH-tail effect. The justification is not sufficient in the current form. |
| Information Requirement | Please provide additional evidence to justify the approach for excluding uraninite and pyrite from the analysis of remediated mining area. This may require the results from additional modelling. |

| | |
|---|---|
| Number | IR-97 |
| Dept. | ECCC |
| Project effects link | Fish and fish habitat |
| Reference to EIS, appendices, or supporting documentation | Appendix 7-C, Figures 4-6, 4-7a, 4-7b, 4-8a, 4-8b, 4-9a, 4-9b |
| Context and Rationale | <p>Context: Appendix 7, Figures 4-6, 4-7a, 4-7b, 4-8a, 4-8b, 4-9a, 4-9b present contaminant transport simulations of chloride, selenium, cadmium, and uranium. All simulations use initial condition concentrations at t=0 (or end of mining operations). In the 3D FEFLOW contaminant transport model it is not clear why initial condition concentrations were chosen rather than a constant concentration boundary.</p> <p>It is also unclear if mining activities will cause mobilization of the contaminants beyond the end of operations.</p> <p>Rationale: The choice of boundary conditions may impact the predicted transport of contaminants that reach Whitefish Lake through groundwater, which may have impacts to aquatic life.</p> |
| Information Requirement | <ol style="list-style-type: none"> 1. Explain and clarify if mining operations will mobilize contaminants beyond operations? 2. Clarify if the source of contamination, (e.g., uranium, selenium) will cease after operations? 3. For the 3D model please provide the rationale for using initial concentrations rather than constant concentration boundary conditions for contaminant concentrations. |

Response IR-68, IR-94 and Questions 1-3 for IR-97:

In general, the ISR mining process will be sufficiently aggressive, chemically and through permeability enhancement, to access and remove most dissolvable mineral phases within the ore deposit during the mining operation. Metallurgical testing indicates that the mineralogy of the ore zone post-remediation (see IR-67 response) is made up of clay minerals, unreacted sulfide minerals (including pyrite, galena and chalcopyrite) and a small number of secondary mineral phases, discussed further below.

The decision made in the EIS to model geochemical reactive transport of the restored solution in the pore water of the mining zone post-remediation (i.e., initial conditions) and not a long-term contributions of COPCs from the ore zone for the following reasons:

- Uraninite that is not accessible to the mining process will represent residuals in very low permeability zones that will, likewise, have limited contact with groundwater in the future.

- As was discussed in the draft EIS (page 3.30 of Appendix 7-C), groundwater from the Athabasca sandstone that will flow through the ore zone following removal of the freeze wall will not be oxidizing (groundwater is anoxic and free of oxidants (e.g., O₂, Fe³⁺), and thus, further oxidative dissolution of the reduced, low-solubility uraninite and sulphide minerals is not expected.
- Diffusion of UBS (containing U, Se and other COPCs), and lixiviant into the rock matrix may occur. However, the process of diffusion into the matrix will be limited over the relatively short timespan of mining in each zone (<10 years). Back-diffusion from the matrix of COPCs will be a slow process and will have a low mass flux rate.

The use of initial conditions in the model continues to be considered as sufficiently bounding for evaluation of potential effects in the EIS.

Secondary Minerals – Response to IR-68

The metallurgical testing to date suggests that secondary minerals may form in the ore zone during the operation, including jarosite (KFe₃(SO₄)₂(OH)₆), gypsum (CaCO₃•2H₂O), barite (BaSO₄; which could be Ra-bearing) and anglesite (PbSO₄), with XRD evidence for these mineral phases in metallurgical testing at the end of the leaching period, and being flushed out of the mining areas as particulates in the UBS (see details in response to IR-67). Jarosite, gypsum and barite, however, were not identified in a QEMSCAN quantitative analysis on similar materials in the 2022 column leach tests that were designed to inform the understanding of mineralogy and solution composition in the mining area with remediation. Anglesite was present in quantifiable concentrations as mineral phase in the solid-phase residuals of those column tests.

Dissolution of anglesite has the potential to be a longer-term source of Pb from the ore zone, post-decommissioning. Testwork is ongoing to refine understanding of expected concentrations and distribution of Pb phases – meaning anglesite and galena – post-mining and post-remediation. Information from that test work will then be used to direct testing and monitoring during the operational phases.

Beyond the bounding scenario presented in the EIS, additional modelling of a Pb source over the long-term is not considered warranted at this time, for the following reasons:

1. Pb has a high affinity to sorb to clay minerals and iron oxide phases along the transport path. The assimilative capacity of the system, as modelled, will mitigate against maximum Pb concentrations at Whitefish Lake above those modelled in the EIS scenario.
2. Without further understanding of the reactivity of the anglesite – meaning, kinetic factors that may affect dissolution to solubility limits, modelling anglesite dissolution to thermodynamic equilibrium is expected to be overly conservative.
3. Mineral phases in the ore zone, including clay minerals and Fe oxides have the potential to sorb Pb mobilized from anglesite dissolution. Ongoing analysis of the results of the metallurgical testing and further test work will support refinement of that sorptive capacity and understanding of the potential for a long-term source of Pb from the remediated ore zone.

Attachment: IR-80

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| Number | IR-80 |
| Dept. | CNSC |
| Project effects link | Geology and groundwater |
| Reference to EIS, appendices, or supporting documentation | Appendix 7-A, Section 4.3.3, Hydrochemistry by Hydrostratigraphic Unit |
| Context and Rationale | Context: This section provides data for groundwater samples collected during the Cigar Lake analogue study and Millennium Project for further regional context. The previous studies are heavily referenced to support interpretations made for the conceptual site model. Rationale: The Piper Plots in Figure 26 are difficult to interpret (many overlapping circles with variegated colors), and Cigar Lake samples plot predominantly as Na/K-Cl/SO ₄ groundwater facies. Conversely, samples collected as part of the Phoenix Project (current), plot either as Ca-HCO ₃ or Ca-SO ₄ /Cl groundwater facies. No explanation is provided for the observed hydrogeochemical differences between groundwater from the Phoenix project and the Cigar Lake analogue study/Millennium Project. |
| Information Requirement | Please provide additional clarity to and interpretation of Figure 26 in Appendix 7-A, including a revision to the Figure to allow for easier interpretation. This could include clear identification of end members, as well as arrows indicating proposed evolution of groundwater chemistry. Further discussion should be provided describing observed differences between groundwater chemistry at the Phoenix project compared to Millennium/Cigar Lake. |

Response to #1

Figure 26 of the draft EIS was presented as two panels (panel “a” and panel “b”) in Appendix 7-A to the EIS. To support visual clarity and additional interpretation, Figure 26 has been split into two figures:

Figure 26: Hydrochemical Type: Groundwaters for the Wheeler River Project

Figure 27: Hydrochemical Type: Groundwaters for the Wheeler River, Cigar Lake and Millennium Projects

The figure numbering in Appendix 7-A of the draft EIS will be updated accordingly.

The revised Figures 26 and 27 are provided below. The figures have been updated to include visual support on the Piper plots to the interpretations of groundwater chemistry that are detailed in Section 4.3.3 of Appendix 7-A of the EIS. In addition, the text in Section 4.3.3. of Appendix 7-A of the ESI will be updated to provide additional clarity on the interpretations shown in the Piper plots. The new text is provided herebelow with additions shown in blue. .

On page 4-21... The Lower Sandstone Aquifer is characterized by two distinct hydrochemical types. The first is groundwater with low mineralization. The second groundwater type is much more highly

mineralized water that has Cl⁻ as a dominant anion. The distinct nature of the two groundwater types is shown in Figure 25 through comparison of Stiff diagrams for GWR-029 and GWR-012. The mineralization at GWR-012 is much higher than that at GWR-029, and Cl⁻, versus HCO₃⁻, is the dominant anion. The mineralization and groundwater major ion composition of GWR-029 is much more similar to overburden well GWR-006 (shown in Figure 24) than to GWR-012. In the Piper plot shown in Figure 26, the distinct geochemical types are evidenced by:

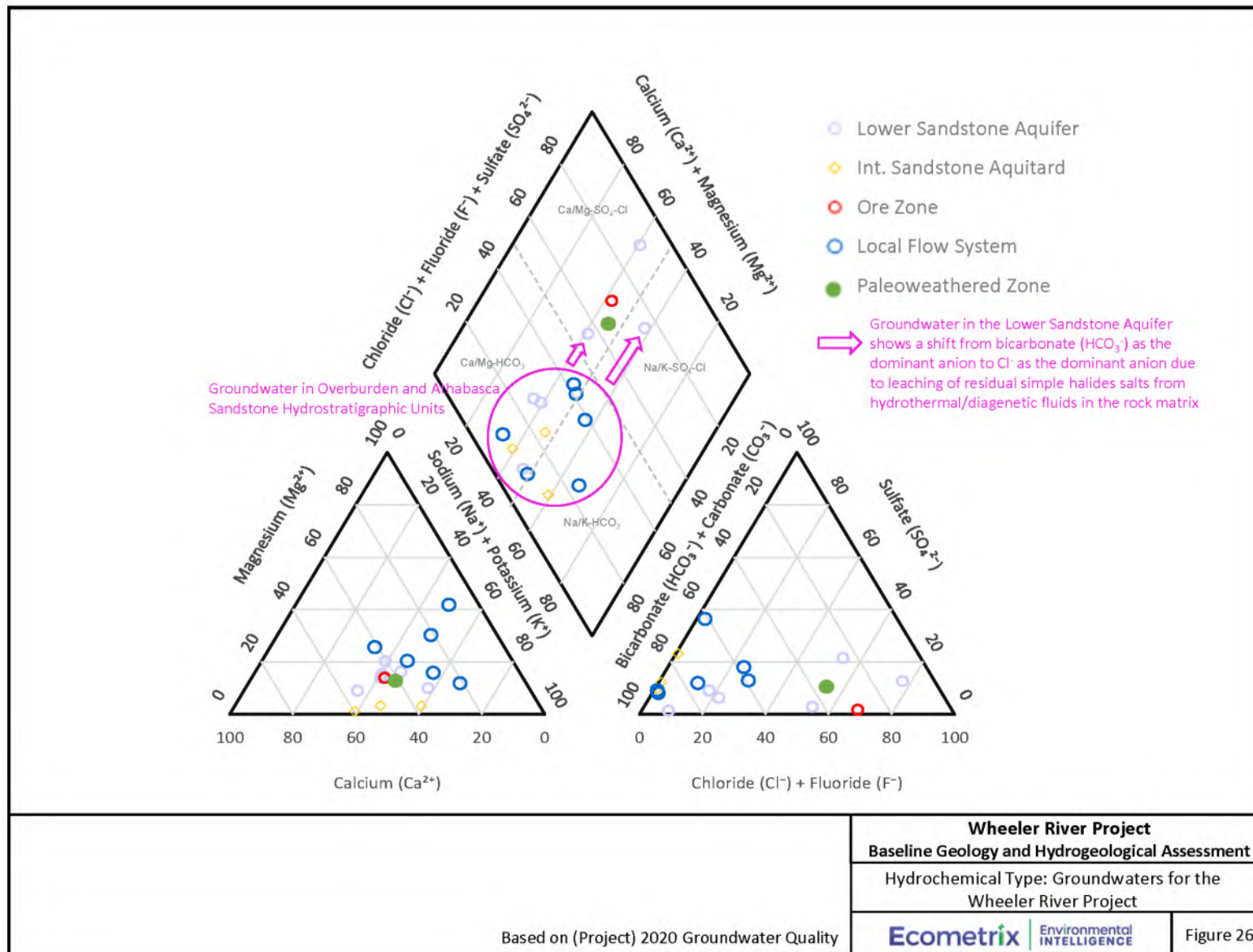
- clustering of groundwater for 3 wells in the Lower Sandstone aquifer with samples from the Intermediate Sandstone Aquitard and local groundwater flow system. This hydrochemical type (dominantly in the Ca/Mg-HCO₃ quadrant of the central diamond of the Piper Plot) is shown within the purple circle; versus
- the other three wells from Lower Sandstone Aquifer, that show a higher relative dominance of Cl⁻ as an anion. This shifts the hydrochemical type of the groundwater to the upper portion of the central diamond in the Piper plot, as shown by the purple arrows in Figures 26. This represents the contribution of leaching of halide salts into the groundwater as it moves along the flow path.

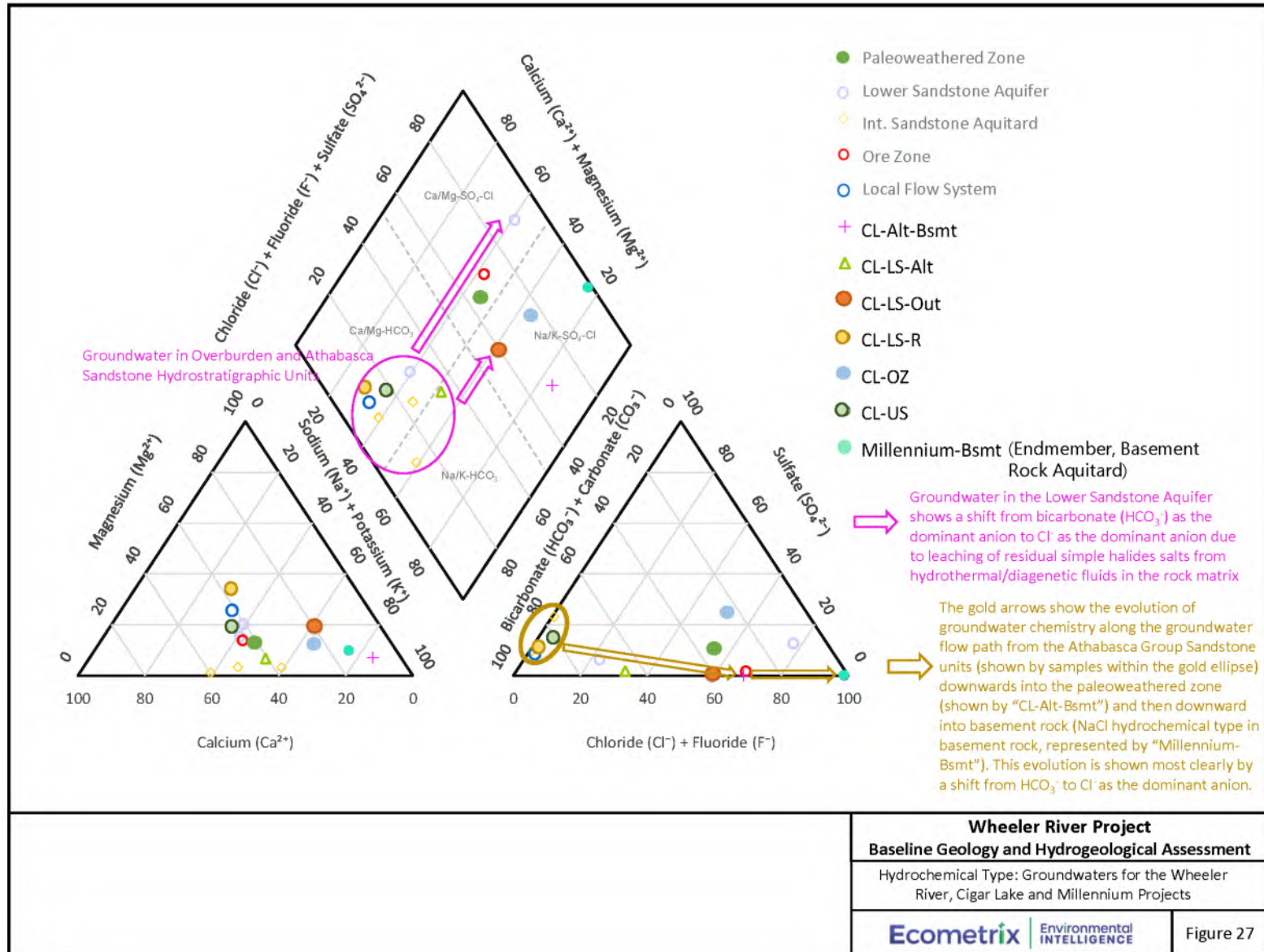
These same two distinct hydrochemical types were also observed in the MFa at Cigar Lake.

On page 4.18 - 4.19.... The higher mineralization groundwater with Cl⁻ as the dominant anion was observed at Cigar Lake in groundwater collected from a monitoring well located within the zone of thermal alteration and in the inferred downgradient direction of the ore zone. This sample is shown in Figure 27 as “CL-LS-Out” and is of Na-Cl-HCO₃ type. The reasons for the hydrochemical type observed in that monitoring well, and specifically for the source of chloride to the water, was evaluated in some detail in the Cigar Lake studies. One possible explanation explored was that the groundwater reflected mixing of groundwater in the MFa with groundwater from the basement rock. Groundwater in the basement rock is known to be of Na-Cl type, and this is shown in Figure 27 by samples collected from monitoring wells installed in the Basement at Millennium (“Millennium-Bsmt”). This sample represents one endmember hydrochemical type for the basement rock of Na-Cl type. However, the potential for the relatively elevated chloride proportion of anions in groundwater in the MFa to be a result of mixing with groundwater from the basement rocks was ruled out at Cigar Lake as groundwater flow conditions in the MFa were identified as dominantly horizontal, with a component of downward flow to the altered basement.

On page 4.21... The paleoweathered zone was sampled at Cigar Lake; analytical results are provided in Appendix J, as samples 199B and 199D. Sample 199D has been referred to in Figure 27 as “CL-Alt-Bsmt”. The hydrochemical type of the Cigar Lake paleoweathered zone is Na-Cl-HCO₃ and of GWR-031 for the Phoenix deposit is a more mixed hydrochemical type (Na-Ca-Mg-Cl-HCO₃-SO₄). In the Cigar Lake study, the hydrochemistry of the sample in the paleoweathered zone was explained by recharge of the basement waters from the overlying flow regime in the Lower Athabasca Sandstones. Evolution of the groundwater chemistry in the paleoweathered zone is aligned with this flow path. The groundwater quality in the paleoweathered zone represents an intermediate along the hydrochemical evolution of groundwater from the hydrochemical type of the Athabasca Group Sandstone hydrogeological units (Ca-Na-HCO₃ to Na-Ca-HCO₃ type) to one endmember in basement rock (NaCl type). This evolution is a result of water-rock interactions within basement aquitard (including the paleoweathered zone) and is

most clearly visualized in the Piper plot by shifts in relative abundance of anions, shown with gold arrows in Figure 27. The difference in hydrochemical types between groundwater from the paleoweathered zone at Cigar Lake (Na-Cl-HCO₃ type) and associated with the Phoenix deposit (Na-Ca-Mg-Cl-HCO₃-SO₄) is likely due to the screened interval of the well, which spans the ore zone, and the paleoweathered zone (Appendix A). Groundwater chemistry in GWR-031 is likely influenced by the hydrochemistry of the ore zone.





Attachment: IR-81

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|---|---|
| Number | IR-81 |
| Dept. | CNSC |
| Project effects link | Geology and Groundwater |
| Reference to EIS, appendices, or supporting documentation | Appendix 7-A, Section 4.3.3, Hydrochemistry by Hydrostratigraphic Unit |
| Context and Rationale | The report states in the description of hydrochemistry of the Lower Sandstone Aquifer that, “On the basis of groundwater chemistry and tritium values in that groundwater, the authors (of the Cigar Lake analogue study in 1994) concluded that the groundwater reflected a younger water component that had penetrated to depth along hydraulically active fractures/faults. The same conclusion is made here (in the Wheeler River EIS) for the Phoenix study area – meaning that fracture/fault conditions are such that some areas of the MFa are characterized by younger/recharge groundwaters”. Rationale: Tritium results for most wells in the Lower Sandstone Aquifer (MFa) reported in Table 4-1 of Appendix 7-A exhibit tritium concentrations <15 Bq/L for the 2020 sample, and 0.1 or <0.1 Bq/L for the 2021 sample. Tritium in modern precipitation typically varies from 1 – 3 Bq/L. Conclusions made in the text are not supported by data, especially given that tritium values are not reported in the EIS for local precipitation or surface water. This is important in reinforcing the assumption from the conceptual model that modern meteoric water circulates at depth in the Lower Sandstone Aquifer. |
| Information Requirement | Provide a further discussion on the interpretation of tritium in groundwater, rather than echoing conclusions from the Cigar Lake analogue study. Consideration should be given to the assertion that modern meteoric water circulates at depth in the Lower Sandstone Aquifer. Collection and analysis of stable isotope (e.g., $\delta^2\text{H}$, $\delta^{18}\text{O}$) samples is a cost-effective solution which would greatly improve understanding of groundwater hydrology and support the development of a conceptual model. |

Response:

$\delta^2\text{H}$, $\delta^{18}\text{O}$ Isotopes in Groundwater

Analysis of $\delta^2\text{H}$, $\delta^{18}\text{O}$ Isotopes in groundwater was not performed for the Wheeler River Project baseline work at Ecometrix’s recommendation. Based on our review of the sampling and analysis of isotope data from neighbouring sites, our interpretation was that similar additional sampling at the Wheeler River Project would not add sufficient value. Other projects in the region including Cigar Lake (AECL, 1994) and Millenium (Devine, 2016) analyzed $\delta^2\text{H}$, $\delta^{18}\text{O}$ isotopes in groundwater. At Cigar Lake, stable isotopes of water were measured in all Athabasca Group Sandstone units (“upper”, “lower”, “altered sandstone”), the ore zone, and the altered basement. The results were (quoted from AECL, 1994):

- “The waters from the glacial overburden all plot on or near the Cigar Lake meteoric water line...indicating their meteoric origin”;

- “deep groundwaters also plot entirely within the envelope, suggesting that the variations in the isotopic signatures observed for the groundwaters result entirely from variation in meteoric water compositions. The simplest explanation for these isotopic trends is that they reflect (moving) averaged meteoric water compositions of the Cigar Lake area”; and
- “[W]aters from the three [groundwater flow] regimes [in the Athabasca Sandstone group units], basement and mineralization have similar low temperature meteoric $\delta^2\text{H}$, $\delta^{18}\text{O}$ values”

Devine, 2016 analyzed stable isotopes in groundwater for shallow groundwater (of depth < 50 m; groundwater in overburden and upper MFD) at the Millenium and McArthur River Projects. It was concluded that “Oxygen and H isotope compositions reveal that the groundwater sampled was meteoric water and has the same $\delta^{18}\text{O}$ and $\delta^2\text{H}$ as Saskatoon precipitation”.

The potential for analysis of stable isotopes in groundwater to add value to the development of the CSM for the Pheonix project was, as such, considered low.

Tritium in Groundwater

The potential for tritium to support development of the CSM for the Wheeler River program was evaluated using the available information. The conclusion was that, beyond alignment between some samples in the overburden and the upper sandstone aquifer, tritium concentrations in groundwater do not provide a robust means of ageing groundwater in the subsurface at the Site. The reasons for this, and information supporting that conclusion are presented below.

Two tables have been presented in this IR to support the discussion below.

- a) Table IR-81-1: Provides tritium concentrations in precipitation over time since the 1950s. The source of the tritium data for Canadian locations, including Churchill, Fort Smith and Ottawa, was from the International Atomic Energy Agency Global Network of Isotopes in Precipitation database (GNIP; <https://nucleus.iaea.org/wiser>). Tritium concentrations over time due to radioactive decay were calculated for examination against tritium concentrations in groundwater concentrations for the Wheeler River Project.
- b) Table IR-87-2: Provides tritium concentrations measured in groundwater under baseline conditions for the Wheeler River Project. The tritium concentrations highlighted in yellow/orange were analyzed at the André E. Lalonde AMS Laboratory, University of Ottawa. The detection limit of < 15 Bq/L at the Saskatchewan Research council does not support interpretation of tritium concentrations with respect to groundwater flow conditions, considering the discussion below. The detection limit at the University of Ottawa is 0.8 TU (0.095 Bq/L). Tritium values measured in groundwater samples in 2021 at the University of Ottawa were examined further in the context of ageing groundwater for the Project.

Tritium concentrations in groundwater measured for the Wheeler River Project must consider several factors. These include:

- a) Tritium concentrations in groundwater can be used to identify recharge to mostly granular aquifers in the last approximately 68-70 years, since the early 1950s (Cherry et al., 2004); water recharged prior to that time will have tritium values below analytical detection limits. This is

shown in Table IR-81-1, where groundwater recharged prior to 1952, extrapolated out more than 60 years, has tritium values that are below the analytical detection limit of 0.1 Bq/L.

- b) Maximum tritium concentrations in the precipitation, associated with “bomb tritium” were observed in the early 1960s. At the present time, tritium concentrations in groundwater recharged at that time would be in the range of 14 Bq/L to 53 Bq/L. Values this high were not observed in groundwater at the Wheeler River Project in 2021, and only in one instance in 2020, which is discussed further below.
- c) Tritium concentrations in precipitation have stabilized from historically high “bomb tritium” values to values of approximately 9-25 Tritium Units (TU), equivalent to 1.1 – 3.0 Bq/L, in the last approximately 20 years (as noted by the CNSC review).
- d) Tritium concentrations may reflect the influence of drilling fluids, which is generally other groundwater from the site.
- e) Tritium is produced within the uranium ore deposits of the Athabasca region; this is evidenced by tritium concentrations at GWR-032 (Table IR-87-1) that were measured to be 950 Bq/L (2020) and 1800 Bq/L (2021) and are higher than can be explained by “bomb tritium” (Table IR-87-3). Tritium production in the ore zone is primarily by neutron capture by ⁶Li (AECL, 1994). The groundwater sample from the paleoweathered zone (GWR-031; 910 Bq/L) are also considered to be reflecting tritium generation associated with the deposit.

It is our opinion, based on the above considerations and the discussion that follows, that measurement and analysis of tritium data at the Wheeler River Project is limited in value to conceptual model development, and the current data suggests it raises more questions than can be answered. Tritium concentrations in groundwater will continue to be measured as part of the routine groundwater sampling, to further evaluate the usefulness of this approach for refining the conceptual site model developed for the Wheeler River Project.

Table IR-81-2: Calculated Tritium Concentrations in Groundwater based on time period of recharge

| Time Periods of Interest for recharge | Tritium concentrations in precipitation | | Half-Lives of Tritium | | | | |
|---|--|-------------------|---|---------|---------|---------|---------|
| | | | 1 | 2 | 3 | 4 | 5 |
| | | | Years Elapsed | | | | |
| | | | 12.3 | 24.6 | 36.9 | 49.2 | 61.5 |
| | TU | Bq/L ^a | Tritium concentration measured in Groundwater (Bq/L) ^{b,c} | | | | |
| Recharged Prior to 1952 (Clark and Fritz, 1997) | 8.2E+00 | 9.8E-01 | 4.9E-01 | 2.4E-01 | 1.2E-01 | 6.1E-02 | 3.1E-02 |
| 1953, annual average, Ottawa | 2.7E+01 | 3.3E+00 | 1.6E+00 | 8.1E-01 | 4.1E-01 | 2.0E-01 | 1.0E-01 |
| 1956, annual average, Ottawa | 1.5E+02 | 1.7E+01 | 8.7E+00 | 4.3E+00 | 2.2E+00 | 1.1E+00 | 5.4E-01 |
| 1959, annual average, Ottawa | 5.4E+02 | 6.4E+01 | 3.2E+01 | 1.6E+01 | 8.0E+00 | 4.0E+00 | 2.0E+00 |
| 1963, monthly maximum, Fort Smith (NWT) | 7.1E+03 | 8.5E+02 | 4.3E+02 | 2.1E+02 | 1.1E+02 | 5.3E+01 | 2.7E+01 |
| 1963, annual average, Fort Smith (NWT) | 3.8E+03 | 4.6E+02 | 2.3E+02 | 1.1E+02 | 5.7E+01 | 2.9E+01 | 1.4E+01 |
| 1969, annual average, Fort Smith (NWT) | 4.0E+02 | 4.8E+01 | 2.4E+01 | 1.2E+01 | 6.0E+00 | 3.0E+00 | 1.5E+00 |
| 1979, annual average, Ottawa | 4.8E+01 | 5.8E+00 | 2.9E+00 | 1.4E+00 | 7.2E-01 | 3.6E-01 | 1.8E-01 |
| 1992 Average (Churchill, MB) | 1.8E+01 | 2.1E+00 | 1.1E+00 | 5.3E-01 | 2.6E-01 | 1.3E-01 | 6.6E-02 |
| 2000-2019, Maximum annual average, Ottawa | 2.3E+01 | 2.7E+00 | 1.3E+00 | 6.7E-01 | 3.4E-01 | 1.7E-01 | 8.4E-02 |
| 2000-2019, Minimum annual average, Ottawa | 9.7E+00 | 1.2E+00 | 5.8E-01 | 2.9E-01 | 1.4E-01 | 7.2E-02 | 3.6E-02 |
| Snow (AECL, 1994) (6 TU) | 6.0E+00 | 7.1E-01 | 3.6E-01 | 1.8E-01 | 8.9E-02 | 4.5E-02 | 2.2E-02 |

Notes

a Tritium concentrations in TU were converted to Bq/L using the conversion factor of 0.1191 used by the André E. Lalonde AMS Laboratory at the University of Ottawa

b Yellow Highlighting indicates calculated concentration at approximate present-day (2019-2021)

c The detection limit for tritium at the André E. Lalonde AMS Laboratory, University of Ottawa in the water samples is 0.8 TU (0.095 Bq/L);
Values shown in italics are below the detection limit

Table IR-81-1: Summary of Tritium Concentrations Measured in Groundwater for the Wheeler River EIS

| Groundwater Well | Hydrostratigraphic Unit | Sampling Date | Tritium Concentration (Bq/L) |
|------------------|-------------------------|---------------|------------------------------|
| GWR-006 | OB | 2020-08-22 | <15 |
| GWR-006 | | 2021-04-14 | 0.1 |
| GWR-029 | LSA | 2020-08-30 | <15 |
| GWR-029 | | 2021-04-12 | 0.1 |
| GWR-003 | OB | 2020-08-16 | <15 |
| GWR-003 | | 2021-04-18 | 1.1 |
| GWR-025 | LSA | 2020-08-22 | <15 |
| GWR-025 | | 2021-04-17 | 0.4 |
| GWR-008 | LSA/DSZ | 2020-09-06 | <15 |
| GWR-008 | | 2021-04-09 | 0.5 |
| GWR-009 | ISA/DSZ | 2020-09-14 | 16 |
| GWR-009 | | 2021-04-10 | 1.2 |
| GWR-033 | LSA | 2020-11-03 | <15 |
| GWR-033 | | 2021-05-25 | 0.5 |
| GWR-034 | ISA | 2020-10-30 | <15 |
| GWR-034 | | 2021-05-24 | 1.2 |
| GWR-035 | USA | 2020-11-03 | <15 |
| GWR-035 | | 2021-05-24 | 0.80 |
| GWR-005 | OB | 2020-08-29 | <15 |
| GWR-005 | | 2021-05-22 | <0.1 |
| GWR-014 | ISA/DSZ | 2020-08-29 | 19 |
| GWR-014 | | 2021-05-21 | 0.13 |
| GWR-012 | LSA/DSZ | 2020-08-29 | <15 |
| GWR-012 | | 2021-05-23 | <0.1 |
| GWR-036 | OB | 2020-11-05 | <15 |
| GWR-036 | | 2021-04-08 | 0.8 |
| GWR-037 | USA/DSZ | 2020-10-24 | <15 |
| GWR-037 | | 2021-04-09 | 0.1 |
| GWR-031 | PWZ | 2020-08-09 | <15 |
| GWR-031 | | 2021-06-04 | 910 |
| GWR-011 | LSA/DSZ | 2020-08-08 | <15 |
| GWR-011 | | 2021-06-01 | 0.13 |
| GWR-013 | ISA/DSZ | 2020-08-09 | <15 |
| GWR-013 | | 2021-06-02 | 0.78 |
| GWR-032 | OZ | 2020-11-01 | - |
| GWR-032 | | 2020-08-08 | 950 |
| GWR-032 | | 2021-06-04 | 1800 |
| GWR-046 | ISA | 9/14/2021 | <40 |
| GWR-047 | ISA/DSZ | 9/10/2021 | <40 |
| GWR-048 | LSA | 9/10/2021 | <40 |

Overburden and Groundwater Wells in the uppermost Upper Sandstone Aquifer

There are three wells monitored as part of the baseline program that are installed in overburden materials: GWR-006, GWR-003 and GWR-005. Two other wells are installed in the uppermost Athabasca Sandstone Group unit (MFd) immediately beneath the overburden. These wells are GWR-036, GWR-035. Tritium values in groundwater wells installed in the overburden and upper sandstone ranged from <0.1 Bq/L to 1.1 Bq/L. Tritium concentrations were 1.1 Bq/L in GWR-003, 0.8 Bq/L in GWR-036 and 0.8 Bq/L in GWR-035. These tritium concentrations in groundwater sampled in these wells is considered to have been recharged in the last 12-25 years. To check alignment between these results and the 3D hydrogeological model, particle tracking was done to estimate minimum groundwater residence times (in years) at each well cluster location. For the overburden unit, the particle tracking results indicated minimum residence times of between 0.5 and 20 years.

Tritium concentrations were at or below the detection limit of 0.1 Bq/L at GWR-006 and GWR-005. Monitoring well GWR-006 is very shallow (screened from 9-15 mbgs), whereas GWR-005 is the deepest of the overburden wells, with a screened interval from 117-123 mbgs. It is considered plausible that the low tritium values reflects the potential for longer residence groundwater times due to heterogeneity in hydraulic conductivities of till material in the overburden. However, tritium concentrations in snow are also lower than in precipitation (AECL, 1994). Thus, it is possible that in the localized areas to those groundwater monitoring wells, materials are lower hydraulic conductivity, and the tritium concentrations are relatively more influenced by snowmelt. Longer residence times in the overburden materials in wells GWR-006 and GWR-005 is supported by higher specific conductance in those wells GWR-003 and GWR-036. Field-measured specific conductance values in GWR-006 and GWR-005 were approximately 150 µS/cm in 2021, whereas values at GWR-003 and GWR-036 were < 75 µS/cm in 2021 (Table 3-2 of Appendix 7-A to the EIS).

Deeper Groundwater

Interpretation of tritium values for “ageing” of groundwater was considered inappropriate beyond the shallowest units at the Site. This is because of the relatively low values of tritium in the groundwater in all but the ore zone, and the numerous confounding factors/complexities. Several tritium concentrations are within 1-3 times the analytical detection limits and are thus considered at the limits of interpretability.

One possible confounding factor at low tritium concentrations is contamination of the sample with drilling fluids. Influence of drilling fluids is possibly a factor in the tritium concentrations observed in groundwater well GWR-014. In that well, tritium values in 2020 were measured as 16 Bq/L at SRC. This is the highest value of tritium detected in groundwater in the Athabasca Sandstone hydrogeologic units and was not reproduced when the well was sampled in 2021; the tritium concentration fell significantly to 0.13 Bq/L. The higher relative concentration of tritium in that well is not considered to reflect “bomb tritium” because of the significant change upon resampling, and it is considered possible that the groundwater quality in that well was influenced by drilling fluids/well construction materials, which was also noted for this well in terms of groundwater quality in the Baseline Report (Appendix 7-A of the EIS). Influence of drilling fluids is also considered the likely explanation for the tritium concentration of 1.2

Bq/L in monitoring well GWR-034. As was noted in the Baseline Report, the water quality in GRW-034 is considered to reflect influence from drilling fluids and additives and is not considered reliable.

Tritium concentrations in groundwater will continue to be measured as part of the routine groundwater sampling, to further evaluate the usefulness of this approach for refining the conceptual site model developed for the Wheeler River Project.

References

AECL (Atomic Energy of Canada Ltd.), 1994. Final Report for the AECL/ SKB Cigar Lake Analog Study. Report No. AECL-10851. July.

Cherry, J.A., Parker, B.L., Bradbury, K.R., Eaton, T.T., Gotkowitz, M.G., Hart, D.J., and Borchardt, M.A., 2004, Role of aquitards in the protection of aquifers from contamination: a “state of the science” report: Awwa Research Foundation, Denver, Colorado.

Clark, I.D., and Fritz P. 1997. Environmental isotopes in hydrogeology. Lewis Publishers: New York. 328pp.

Devine, 2016. Sources and Pathways of Radiogenic Elements in Surface Media Above the Millennium and McArthur River Uranium Deposits in the Athabasca Basin, Saskatchewan, Canada. Ph.D. Thesis, Department of Earth Sciences, Faculty of Science, University of Ottawa.

Attachment: IR-82

| | |
|---|--|
| Number | IR-82 |
| Dept. | CNSC |
| Project effects link | Geology and groundwater |
| Reference to EIS, appendices, or supporting documentation | Appendix 7-A, Section 4.3.3, Hydrochemistry by Hydrostratigraphic Unit Appendix 7-C, Section 3.5 |
| Context and Rationale | <p>Context: A. In-field measurements of Oxidation-Reduction Potential (ORP) for three (3) out of twenty-six (26) groundwater samples are presented in Table 4-1 of Appendix 7-A. Although sparse, these values are also used to characterize redox conditions for representative groundwaters in Table 3-5 of Appendix 7-C.</p> <p>B. In Section 3.5.5 of Appendix 7-C it is stated that groundwaters in the PHREEQC model were allowed to equilibrate with atmospheric concentrations of oxygen, resulting in oxidizing subsurface conditions. In Section 3.7 of Appendix 7-C it states that input files for 3D reactive transport were generated based on outcomes for PHREEQC modelling. However, in reading Section 4 of Appendix 7-C, it is unclear whether this assumption (equilibration with atmospheric oxygen) was carried forward for the 3D model.</p> <p>C. As per p. 3.49 of Appendix 7-C, “A small amount of reactive pyrite was assumed for the first 500 m of transport away from the ore zone in the model, primarily in the desilicified sediments of the Lower Sandstone Aquifer, and deeper portion of the Intermediate Sandstone Aquitard”.</p> <p>Rationale: A. Given the importance of redox conditions for U mobilization and precipitation/dissolution of minerals (e.g., pyrite/metal oxyhydroxides) and the corresponding influence on contaminant transport from both a modelling and monitoring perspective, these should be further characterized. It should also be noted that the measurement of Oxidative-Reductive Potential (ORP) in natural waters can be complex and difficult due to the variability and disequilibrium of natural systems and issues inherent to electrode calibration (e.g., Schuring et al., 2000). Measurements of redox couples (e.g., As(III)/As(V); Fe(II)/Fe(III); S(-II)/S(VI)) are typically recommended to accurately characterize redox conditions in natural waters (Schuring et al., 2000).</p> <p>B. The assumptions regarding redox conditions for the 3D solute transport model should be clarified.</p> <p>C. The amount of pyrite (e.g., % by weight) assumed for the purposes of modelling should be clarified, given the potential role of pyrite as a reducing agent in limiting the transport of COPCs.</p> <p>Reference: [1] Schuring J.; Schulz, H. D.; Fischer, W.R.; Bottcher, J.; and Duijnisveld, M.H.W. 2000. Redox: Fundamentals, Processes and Applications. Springer: Berlin.</p> |
| Information Requirement | 1. Provide further discussions and information (i.e., ORP measurements or analytical data for redox couples) on redox conditions at the Phoenix site. Particular focus should be given to the spatial heterogeneity of redox processes. Tools such as the reference provided [2] |

| | |
|--|---|
| | <p>below provide an example of simplified framework for characterizing redox conditions in aquifers.</p> <p>2. Clarify assumptions regarding initial redox conditions for the 3D solute transport model.</p> <p>3. Provide the % reactive pyrite by weight assumed for models in the text. Justification for proportions used, such as analytical data, should also be provided.</p> <p>Reference: [2] Jurgens, B.C., McMahon, P.B., Chapelle, F.H., and Eberts, S.M., 2009, An Excel workbook for identifying redox processes in ground water: U.S. Geological Survey Open-File Report 2009–1004 8 p.</p> |
|--|---|

Response to #1

Redox conditions within the different hydrostratigraphic units at the site, which addresses spatial heterogeneity, was provided as part of Section 4.3.3 of Appendix 7-A of the draft EIS. As was noted by the CNSC reviewer in this IR (IR-82), the measurement of ORP in the system is qualitative at best, and this is also true of field-measured dissolved oxygen, which, upon exposure of groundwater to the atmosphere will quickly equilibrate with atmospheric oxygen. For the project, where concentrations of nitrate are low in all hydrostratigraphic units, the primary indicators of redox conditions are dissolved iron and sulphate concentrations. At the circumneutral pH range observed in groundwater in all hydrostratigraphic units at the site, concentrations of dissolved iron in groundwater above approximately 0.1 mg/L indicate definitively that the system is anoxic. Ferric oxyhydroxide solid control dissolved ferric iron (Fe^{3+}) concentrations to values less than 0.1 mg/L in near neutral pH water, whereas ferrous iron (Fe^{2+}) is very soluble and mobile in groundwater that is anoxic. The presence of sulphate and qualitative absence of detectable sulphide (based on absence of odour; $\text{H}_2\text{S}_{(\text{g})}$) can typically be detected by odour down to 10 $\mu\text{g/L}$ in the groundwater is also an indicator that the system is not currently highly reducing. Sulphate reduction is typically tied to organic matter oxidation and the system does not appear to have organic carbon sources at this time.

As discussed in Section 4.3.3. of Appendix 7A of the draft EIS, the exception to the above is within the ore zone, where more reducing conditions are evidenced by the mineralogy and the persistence of sulphide minerals and uraninite for more than 1 billion years. In this zone, any oxidant will be scavenged by pyrite, maintaining a reducing environment. This is reflected qualitatively by the ORP measurements in the ore zone which was measured to be -265 mV (page 4.20 of Appendix 7A of the draft EIS).

The technical team acknowledges that there are other redox pairs or species, and specifically As(V)/As(III) and the measurement of dissolved reduced sulphur species sulphide species, that may support the interpretation of redox in groundwater. Holm (1989) concluded on the basis of his work calculating redox potentials from As(V)/As(III), Fe(III)/Fe(II) that the arsenic redox pairs provides supplementary information to that provided by dissolved iron, but is considered qualitative in nature. For the As(V)/As(III) pair, the solution phase speciation of the arsenic ions also has to be considered and may affect the accuracy of calculation of redox potentials from their analytical quantification in groundwater.

It is generally understood that groundwaters are typically not at redox equilibrium (e.g., Lindberg and Runnells, 1984). Thus, in this work, our primary reliance on the concentrations of dissolved iron and sulphate in the groundwater, as well as the mineralogy of the system was considered adequately robust for interpretation of baseline redox conditions in the hydrostratigraphic units for the Wheeler River project. Use of tools like the Jurgen et al., (2009) excel spreadsheet referenced by the CNSC reviewer requires careful consideration and qualification of the results provided, as it based on measured redox indicator ion concentrations and empirical relationships between them. The tool was applied to the available data on groundwater and returns interpretation that is aligned with what was discussed in the draft EIS and herein.

Response to #2

The redox conditions assumed for the 3D modelling, using PiChem, were the same for all scenarios as in the 1D modelling in PHREEQC. This includes the equilibration of the groundwater with atmospheric concentrations of oxygen for most of the modelling scenarios. The one exception was the “Redox Scenario” (page 3.48 of Appendix 7-C of the EIS), in which the solution was equilibrated with pyrite, resulting in reducing conditions controlled by the iron sulphide mineral.

It is noted that this equilibration of the groundwater solutions with atmospheric concentrations of oxygen affects only the speciation of elements that are redox sensitive and is a modelling approach that is used to force redox sensitive species to be in their most oxidized form. As noted above, groundwaters are seldom at equilibrium with respect to the speciation of redox sensitive species and thus, using thermodynamic considerations alone can results in elements being present in the model as species that are not observed in the environment. This was mitigated by forcing the conditions in the model to oxidized conditions. As was discussed in Appendix 7-C of the draft EIS (page 3.29), this is a conservative approach because the important redox-active constituents of concern are more mobile in their oxidized forms, including uranium as U(VI).

Response to #3

The “Redox” scenario model (page 3.48 of Appendix 7-C of the draft EIS) was run iteratively to evaluate the minimum amount of pyrite that would be required to reduce dissolved-phase U(VI) associated with remediation of the mining zone (i.e., the restored solutions). As was outlined on page 3.49 of Appendix 7-C of the draft EIS, the information available included quantification of total iron through wet chemical extraction in core samples, and observations recorded by Denison personnel during core logging. Specifically, pyrite was observed associated with hydrothermally altered materials between an approximate depth interval of 240-390 mbgs (page 3.49 of Appendix 7-C of the draft EIS).

Total (wet chemical) extraction of iron content of the core materials does not provide speciation of iron. The maximum, minimum, and median total iron concentration, expressed as Fe₂O₃ weight %, in the MFa are provided in Table 3-2 of Appendix 7-C of the draft EIS. Not indicated in that table is that these statistics are based on 10,436 elemental analyses of core samples. *(Noted is that as part of the response to IR-92, Table 3-2 is being updated to indicate the total number of samples from which the statistics were derived).*

A sample from the MFa downgradient of the mining zone was recently submitted to the Saskatchewan Research Council (SRC) for analysis of total iron and mineralogy by XRD. The sample was taken from location GWR-062 (located within Phase 1 of mining) at a depth of 398.7 mbgs in sandstone and was

named “Altered Pyrite”. The total iron content of the sample was determined in the whole rock assay (by lithium metaborate fusion) to be 13% by weight; the analytical results are provided in Appendix A. The certification of analysis for the whole rock assay is attached to this IR. Pyrite and marcasite were identified as the iron phases in the sample by XRD; the XRD results are attached to this IR in Appendix A.

Pyrite Content Assumed in the “Redox Scenario”

In the numeric model for the sensitivity “Redox Scenario”, the total iron content was considered was the median value in the MFA. The Median total iron value in the MFA is 1.4 wt % (1.4 g) of Fe_2O_3 per kg of sediment/rock, which is equivalent to 0.0175 moles of Fe per kg of soil. Because of the stoichiometry of pyrite (FeS_2), this is equivalent to 0.0175 moles of pyrite per kg of soil. This value was then converted to moles of Fe per litre of water, as is the convention for PHREEQC. To do this conversion, it was assumed that the groundwater flow was predominantly through the desilicified/hydrothermally altered portion of the MFA, with a porosity of 0.2 and a bulk density of 2.12 g/cm^3 . The total moles of pyrite per litre of soil was calculated as 0.186 moles/L.

Determined through the reactive transport modelling in PHREEQC was that only 0.0001 moles of pyrite per litre of water was required to oxidize the mass of U(VI) transported from the mining zone. This amount of pyrite represents 0.054% of the median total moles of iron present in the MFA.

The pyrite content measured in the “Altered pyrite” sample by XRD, presented herein, exceeds that assumed in the reactive transport modelling.

References

Holm, T.R. and Curtiss, C.D., 1989. A comparison of oxidation-reduction potentials calculated from the As(V)/As(III) and Fe(III)/Fe(II) couples with measured platinum-electrode potentials in groundwater. J. Contam. Hydrol., 5: 67-81.

Jurgens, B.C., McMahon, P.B., Chapelle, F.H., and Eberts, S.M., 2009, An Excel workbook for identifying redox processes in ground water: U.S. Geological Survey Open-File Report 2009–1004 8 p.

Lindberg, R.D. and Runnells, D.D., 1984. Ground water redox reactions: an analysis of equilibrium state applied to Eh measurements and geochemical modeling. Science, 225:925 927.

Attachment IR-82 Appendix A**SRC Mineral Processing**

Attention: Jack Zhang

PO #/Project: 15475

Samples: 3

SRC Geoanalytical Laboratories

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Report No: G-2023-1281

Date of Report: Jun 28, 2023

ICP Whole Rock Assay
Lithium Metaborate Fusion

Column Header Details

Aluminum in wt % (Al₂O₃)

Calcium in wt % (CaO)

Iron in wt % (Fe₂O₃)Potassium in wt % (K₂O)

Magnesium in wt % (MgO)

Manganese in wt % (MnO)

Sodium in wt % (Na₂O)Phosphorus in wt % (P₂O₅)Titanium in wt % (TiO₂)SiO₂ by ICP in wt % (SiO₂)

Barium in ppm (Ba)

Chromium in ppm (Cr)

Scandium in ppm (Sc)

Strontium in ppm (Sr)

Yttrium in ppm (Y)

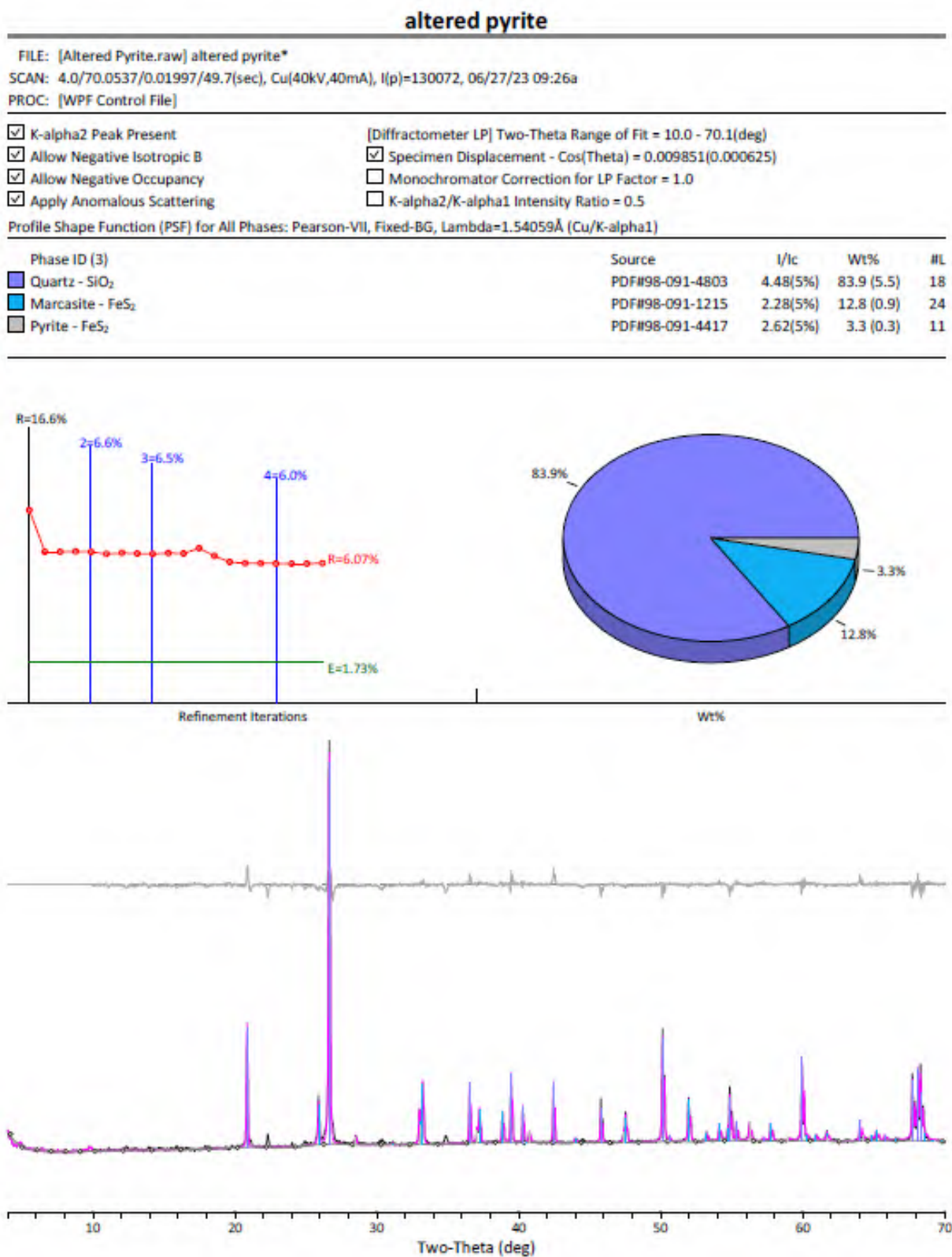
Zirconium in ppm (Zr)

Loss on Ignition in wt % (LOI)

SUM in (SUM)

| Sample Number | Al ₂ O ₃ wt % | CaO wt % | Fe ₂ O ₃ wt % | K ₂ O wt % | MgO wt % | MnO wt % | Na ₂ O wt % | P ₂ O ₅ wt % | TiO ₂ wt % | SiO ₂ wt % | Ba ppm | Cr ppm | Sc ppm | Sr ppm | Y ppm | Zr ppm | LOI wt % | SUM |
|------------------|-------------------------------------|----------|-------------------------------------|-----------------------|----------|----------|------------------------|------------------------------------|-----------------------|-----------------------|--------|--------|--------|--------|-------|--------|----------|--------|
| SY5 | 14.5 | 7.16 | 10.6 | 4.23 | 3.27 | 0.13 | 4.18 | 2.05 | 1.82 | 49.9 | 6410 | 147 | 13 | 3130 | 57 | 743 | N/R | 97.84 |
| ALTERED PYRITE | 2.23 | 0.02 | 13.0 | 0.05 | 0.41 | <0.01 | 0.04 | 0.05 | 0.08 | 67.5 | 9 | 49 | <2 | 151 | 37 | 176 | 16.9 | 100.58 |
| ALTERED PYRITE R | 2.16 | 0.02 | 13.0 | 0.05 | 0.40 | <0.01 | 0.04 | 0.04 | 0.10 | 67.2 | 9 | 48 | <2 | 148 | 36 | 178 | 17.5 | 100.50 |

Whole Rock Analysis: A 0.1 gram pulp is fused at 1000 C with lithium metaborate then dissolved in dilute HNO₃.
The standard is SY5.

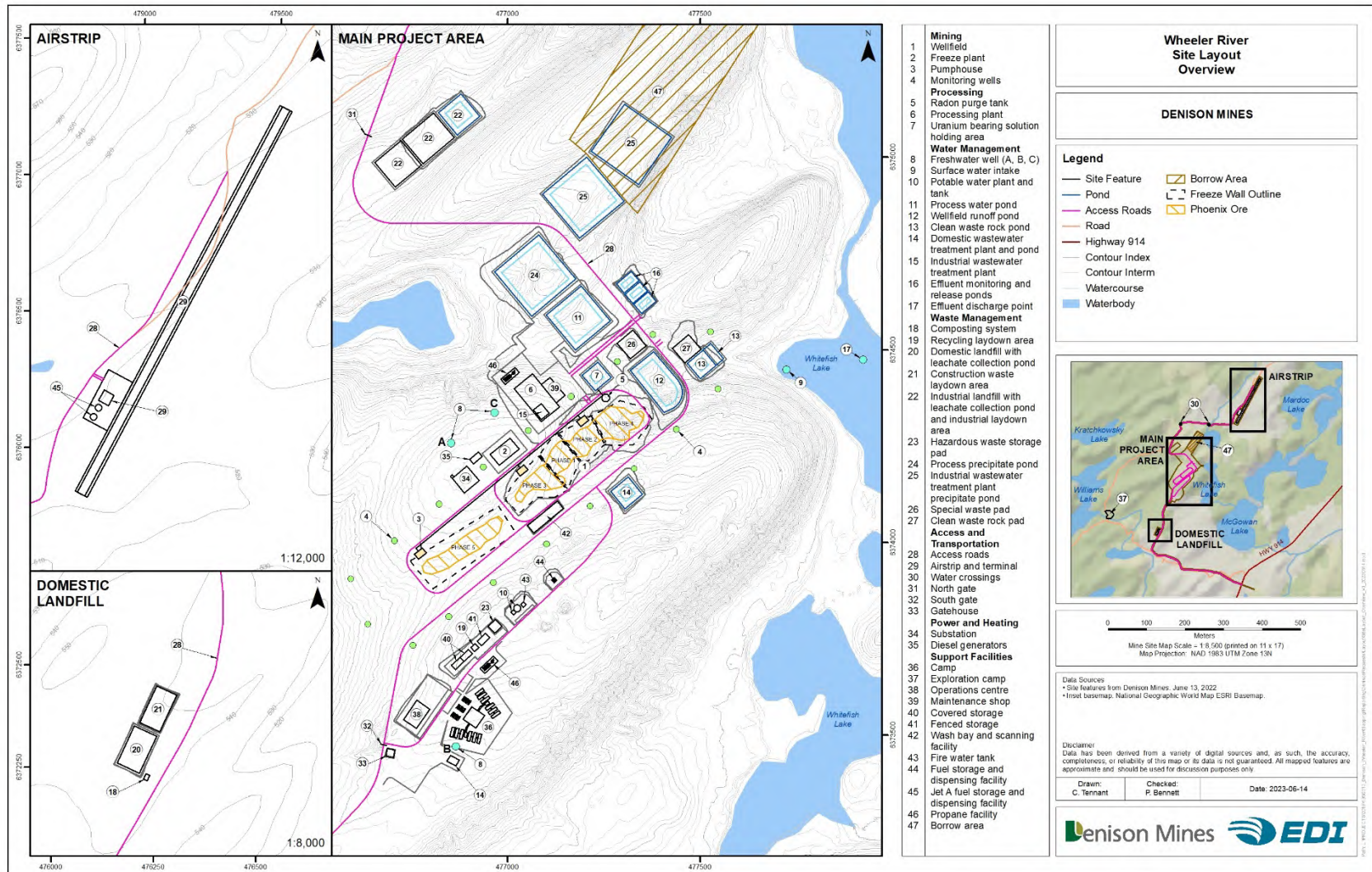


Attachment: IR-85

| | |
|---|--|
| Number | IR-85 |
| Dept. | CNSC |
| Project effects link | Geology and Groundwater |
| Reference to EIS, appendices, or supporting documentation | Appendix 7-C |
| Context and Rationale | Context: Section 2.7.3 (Appendix 7-C) mentions Wells A, B and C, and Figure 2-17 (p. 2.43, Appendix 7-C) illustrates the predicted drawdown ranges at Well B and Well C. Rationale: It is not clear where Well A, Well B and Well C are located. |
| Information Requirement | Please provide the locations of Well A, Well B and Well C illustrated in a Figure. |

Annex 1 – FIRT IR Table – Technical Review of the **Wheeler River Project** draft EIS
Denison Response – August 18th, 2023

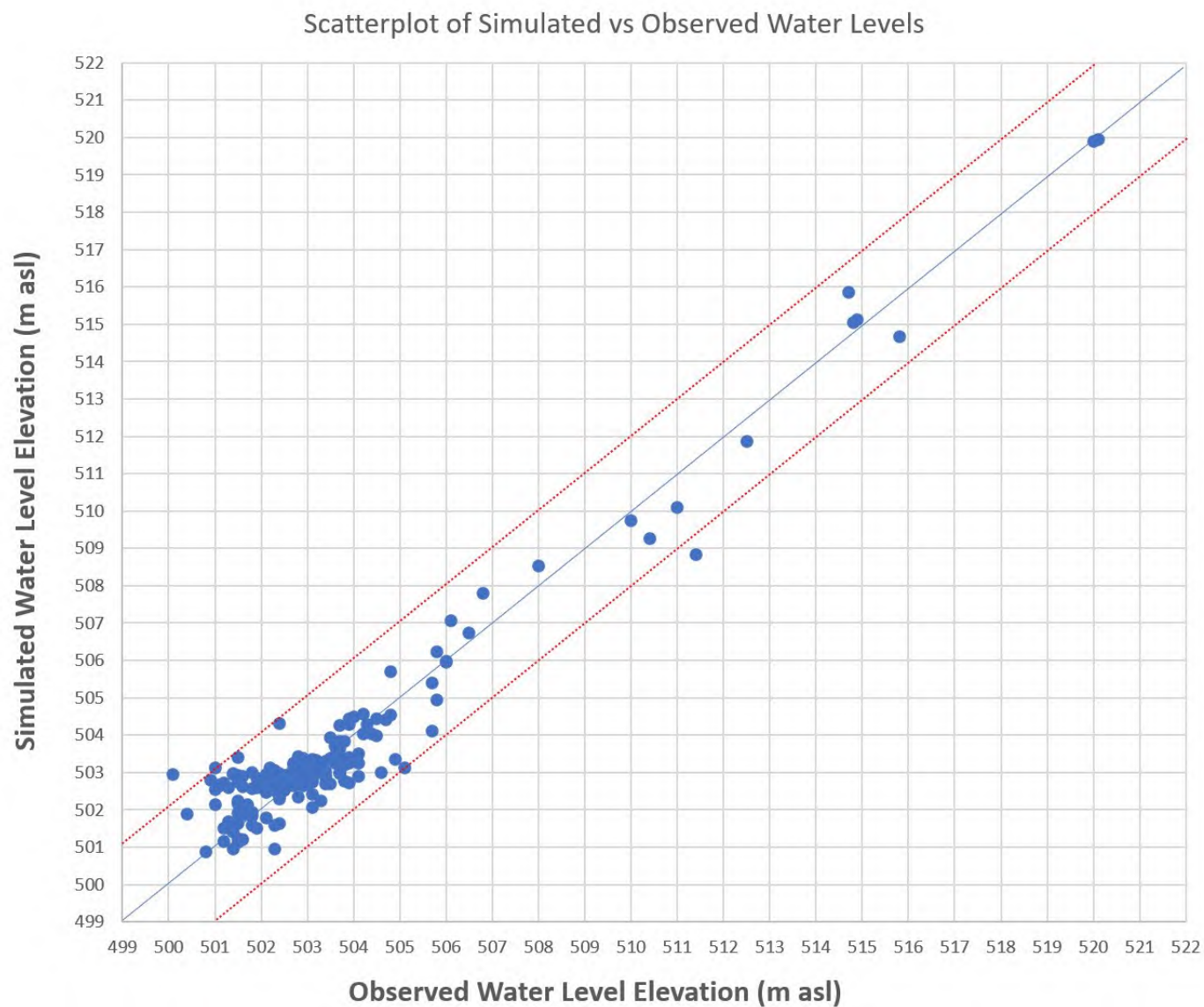
Supporting figure to the response provided in table:



Attachment: IR-91

| | |
|---|--|
| Number | IR-91 |
| Dept. | NRCan |
| Project effects link | Fish and fish habitat |
| Reference to EIS, appendices, or supporting documentation | Appendix 7-C, section 2.5.2 |
| Context and Rationale | <p>Context: The numerical model calibration quality plot (Appendix 7-C, sec. 2.5.2.1, Figure 2-13) contains a small error. The vertical (simulated heads) and horizontal (observed heads) axes do not have the same scales (499 to 521 masl versus 499 to 522 masl). Therefore, the line of ideal fit is offset.</p> <p>Rationale: As a result, NRCan notes that observed heads in the 510-512 masl range are underpredicted by the model. NRCan also notes that the calibration statistics (Appendix 7-C, sec.2.5.2.3) are highly leveraged by two data points from open boreholes south of Kratchkowsky Lake where simulated values are largely controlled by the nearby constant-head boundary in the Lower Sandstone aquifer (520 masl).</p> |
| Information Requirement | The proponent should correct the scales on the axes of Figure 2-13 in Appendix 7-C. The proponent should also comment on the effect on calibration of the clustering of most observation wells in the ore zone. |

Supporting figure to the response provided in table:



Attachment: IR-92

| | |
|---|--|
| Number | IR-92 |
| Dept. | CNSC |
| Project effects link | Geology and Groundwater |
| Reference to EIS, appendices, or supporting documentation | Appendix 7-C, Section 3.2.1, Mineralogical Composition |
| Context and Rationale | <p>Context: Table 3-2 summarizes the clay content of the Athabasca Group sandstones and the Paleoweathered Zone. Although minimum, maximum and median values are provided, the number of samples and variability of the dataset are not. Rationale for incorporating illite into reactive transport modelling and excluding kaolinite/dichlorite is provided in the text.</p> <p>From p. 3.29 in Appendix 7-C: “The illite content was based on the normative clay composition determined from site-specific corehole elemental analysis (median illite by mass is 7.68%; Table 3-2) and using portable infra-red mineral analysis indicating median illite content by mass is 13.1% (data not shown)”</p> <p>From p. 3.30 in Appendix 7-C: “Using the minor amount of illite compared to the more dominant chlorite is conservative in that not all sorptive capacity of the clays is accounted for in the simulated paleoweathered zone”. This conservative assumption appears contrary to assumptions for the desilicified zone (DSZ) and Athabasca</p> <p>Group sandstones “Illite was used to represent the total clay content, which varies from 1.74% to 5.85% by mass in the hydrostratigraphic units within the Athabasca Group sandstones and Desilicified Zone”.</p> <p>Rationale: Information is missing in the EIS regarding the clay composition of hydrostratigraphic units. Results from infrared mineral analysis are not reported. The assumption for the solute transport model is that all clays in the downgradient DSZ are illite. However, clay content in the Read Formation (Lower Sandstone Aquifer) downgradient of the ore zone is low in illite (0.42%) compared to kaolinite (0.52%) and dichlorite (1.18%). A value of 3.9% illite clay by weight is used for the DSZ, but Table 3-2 indicates median content is 2.42% illite. It is not clear why illite was used to represent total clay content for the DSZ, as opposed to the conservative assumptions used for the Paleoweathered Zone, nor has any basis or justification been given.</p> |
| Information Requirement | <ol style="list-style-type: none"> 1. Please provide in Table 3- the number of samples and variability of the datasets used to estimate the clay content of hydrostratigraphic units for the model. Include results from infrared mineral analysis in the text if the information is used to support assumptions for modelling. 2. Please provide further information/discussion within the EIS relating to the assumptions of clay content in hydrostratigraphic units for modelling. Provide further justification and rationale as to why total clay content in the Athabasca Group sandstones and Desilicified Zone is assumed to be illite, and how this assumption is |

| | |
|--|---|
| | conservative. This discussion could include a comparison of the properties (cation exchange capacity, surface area) of illite vs. kaolinite vs. ditrichlorite for the anticipated range of subsurface conditions (pH, redox, U concentrations, etc.). |
|--|---|

Response to #1

Table 3-2 in Appendix 7C of the draft EIS has been updated to indicate the number of samples analyzed and arithmetic average and (one) standard deviation values as a measure of sample variability, in addition to the maximum, median and minimum values that had already been provided. Results from Portable Infrared Mineral Analyzer (PIMA) have also been included for the paleoweathered zone. The updated Table 3-2 is included on the next page.

Note that in Table 3-2 in Appendix 7C of the draft EIS, the normative clay content for kaolinite, illite and ditrichlorite in the paleoweathered zone had been entered erroneously as the % of total clay and had not been converted to wt% in the sediment/rock. This was corrected and the updated values represent wt% of kaolinite, illite and ditrichlorite in the sediment/rock.

Response to #2

Unlike the iron oxide minerals goethite and ferrihydrite and gibbsite, for which there is an existing compilation of thermodynamic surface complexation constants for sorption of metals, metalloids, and anions to a single, laboratory-produced mineral phase (Dzombak and Morel, 1991; Mathur and Dzombak, 2006; Karamalidis and Dzombak, 2006), such a compilation does not exist for clay minerals. Rather, to develop the database of surface complexation constants for metals and metalloids to illite clay for the modelling work presented in Appendix 7-C of the draft EIS took an extensive review of the literature to make decisions on the most defensible constants to include in the work. For kaolinite, a similarly comprehensive databased could have been developed, but not for chlorite, where the number of studies identified in the literature for sorption characteristics is much more limited.

The decision was made to use illite to represent the clays present in the Athabasca Sandstone group units because:

- for the reasons give above and the discussion provided below, it was not practicable to develop a database of surface complexation constants for more than one clay mineral phase;
- using the updated Table 3-2 provided as part of this IR response, the median illite content (weight %, based on normative clay calculations) of the Athabasca Sandstone Group units is, with only one exception, always more than twice (2x) the median kaolinite content, and three times (3x) the median chlorite content. The exception is the “MFa in downgradient DSZ”, where the median illite content is lower, than the median kaolinite and chlorite contents.

In the model, the choice was made to represent the clays assemblage as a whole as 3.9% illite/kg of sediments/rock (wt %, based on normative clay calculations). Median normative clay contents in the Athabasca Sandstone Units (MFa, MFb, MFC, and MFD) and overburden materials ranged from 1.74-5.85 wt %, and for the locations downgradient of the mining zone (“Downgradient Desilicified Zone, All Units”) was 4.14 %. The robustness of selection of illite to represent the clay assemblage is discussed here below using CEC as an important characteristic of the sorption behaviour of the clays present in the system (illite, kaolinite and chlorite).

Updated Table 3-2 in Appendix 7-C of the draft EIS: CaO, Fe Oxide and Clay Contents of the Athabasca Group Sandstones and Paleoweathered Zone

| Lithologic Unit | Number of Samples (CaO and Fe2O3, %) | Number of Samples (Clay %) | Statistic | Elemental Analysis (wt % in sediment/rock) | | Normative Clay (wt % in sediments/rock) ^b | | | | | PIMA (% of total clay content) ^c | | | |
|---|---|-------------------------------|--------------------|---|---------------------------------|--|---------------|------------|----------------|-------------|---|--------------|------------------|-----------------------------|
| | | | | CaO (% Total) | Fe2O3 (% Total) ^a | Clays (%) | Kaolinite (%) | Illite (%) | Dichlorite (%) | Dravite (%) | Illite (%) | Chlorite (%) | Kaolinite (%) | Dravite ¹ (%) |
| Overburden | 8 | 84 | Max | 0.21 | 0.38 | 6.7 | 3.63 | 5.23 | 2.17 | 0.62 | Data Not Collected | | | |
| | | | Min | 0.005 | 0.03 | 0.20 | 0.00 | 0.06 | 0.00 | 0.01 | | | | |
| | | | Median | 0.165 | 0.28 | 1.74 | 0.29 | 1.06 | 0.04 | 0.03 | | | | |
| | | | Average | 0.14 | 0.26 | 1.94 | 0.47 | 1.22 | 0.25 | 0.08 | | | | |
| | | | Standard Deviation | 0.063 | 0.10 | 1.23 | 0.52 | 0.94 | 0.47 | 0.11 | | | | |
| MFd | 3077 | 3556 | Max | 0.71 | 1.7 | 39.6 | 17.2 | 24.4 | 15.2 | 8.03 | | | | |
| | | | Min | 0.005 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | | | | |
| | | | Median | 0.005 | 0.05 | 2.05 | 0.32 | 1.45 | 0.00 | 0.28 | | | | |
| | | | Average | 0.009 | 0.085 | 2.27 | 0.47 | 1.49 | 0.30 | 0.45 | | | | |
| | | | Standard Deviation | 0.014 | 0.120 | 1.45 | 0.76 | 1.20 | 0.66 | 0.53 | | | | |
| MFc | 8532 | 9065 | Max | 1.44 | 9.1 | 60.5 | 18.9 | 46.1 | 27.8 | 16.3 | | | | |
| | | | Min | 0.005 | 0.02 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | | | | |
| | | | Median | 0.01 | 0.29 | 3.76 | 0.44 | 2.60 | 0.08 | 0.30 | | | | |
| | | | Average | 0.02 | 0.52 | 4.08 | 0.84 | 2.73 | 0.49 | 0.66 | | | | |
| | | | Standard Deviation | 0.02 | 0.60 | 2.50 | 1.23 | 1.96 | 1.17 | 0.99 | | | | |
| MFb | 6086 | 7115 | Max | 2.48 | 7.23 | 64.3 | 32.61 | 31.95 | 52.59 | 21.60 | | | | |
| | | | Min | 0.005 | 0.04 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | | | | |
| | | | Median | 0.02 | 0.89 | 5.85 | 0.95 | 4.17 | 0.00 | 0.17 | | | | |
| | | | Average | 0.02 | 1.10 | 6.23 | 1.56 | 4.24 | 0.41 | 0.51 | | | | |
| | | | Standard Deviation | 0.06 | 0.87 | 3.28 | 1.99 | 2.20 | 2.12 | 1.07 | | | | |
| MFa | 10436 | 10817 | Max | 3.74 | 25.8 | 68.0 | 34.2 | 38.2 | 63.7 | 45.0 | | | | |
| | | | Min | 0.005 | 0.01 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | | | | |
| | | | Median | 0.01 | 0.14 | 3.53 | 0.67 | 1.74 | 0.20 | 0.33 | | | | |
| | | | Average | 0.021 | 0.52 | 4.76 | 1.16 | 2.67 | 0.93 | 1.00 | | | | |
| | | | Standard Deviation | 0.056 | 1.08 | 4.73 | 1.94 | 2.95 | 2.79 | 2.03 | | | | |
| MFa in Downgradient DSZ | 510 | 542 | Max | 0.28 | 5.77 | 41.3 | 28.8 | 17.0 | 20.9 | 9.22 | | | | |
| | | | Min | 0.005 | 0.03 | 0.40 | 0.00 | 0.00 | 0.00 | 0.01 | | | | |
| | | | Median | 0.02 | 0.09 | 2.62 | 0.51 | 0.42 | 1.18 | 0.15 | | | | |
| | | | Average | 0.021 | 0.30 | 3.96 | 0.78 | 1.66 | 1.52 | 0.52 | | | | |
| | | | Standard Deviation | 0.022 | 0.64 | 3.95 | 1.70 | 2.55 | 1.89 | 1.23 | | | | |
| Downgradient Desilicified Zone, All Units | 1376 | 1459 | Max | 0.28 | 6.73 | 41.3 | 28.8 | 17.0 | 20.9 | 9.2 | | | | |
| | | | Min | 0.005 | 0.03 | 0.30 | 0.00 | 0.00 | 0.00 | 0.01 | | | | |
| | | | Median | 0.02 | 0.23 | 4.14 | 0.47 | 2.42 | 0.64 | 0.17 | | | | |
| | | | Average | 0.019 | 0.58 | 4.63 | 0.79 | 2.94 | 0.90 | 0.47 | | | | |
| | | | Standard Deviation | 0.017 | 0.78 | 3.05 | 1.28 | 2.60 | 1.36 | 0.89 | | | | |
| Paleoweathered Zone | 109 | 109 | Max | 10.1 | 23.598 | 67.1 | 17.9 | 36.0 | 65.3 | 43.3 | 98.5 | 95.4 | 21.1 | 11.1 |
| | | | Min | 0.1 | 0 | 2.81 | 0.00 | 0.00 | 0.00 | 0.06 | 0 | 1.5 | 0 | 0 |
| | | | Median | 0.29 | 2.05 | 47.1 | 0.00 | 9.20 | 35.5 | 0.97 | 13.1 | 69.5 | NC ^d | NC ^e |
| | | | Average | 0.61 | 3.4 | 48.5 | 1.70 | 10.10 | 36.7 | 1.67 | 28.1 | 64.5 | NC ^d | NC ^e |
| | | | Standard Deviation | 1.51 | 4.2 | 10.4 | 3.60 | 7.60 | 12.60 | 4.10 | 33.2 | 30 | NC ^d | NC ^e |

Notes

^a Iron oxide content for the paleoweathered zone is % Hematite (vs. total iron as Fe₂O₃)
^b Normative clay values for predominantly basement-hosted paleoweathered zone may be erroneous due to variable host lithology chemistry
^c The number of samples analyzed by PIMA for the paleoweathered zone was 9 (i.e., n= 9)
^d Kaolinite was only detected in 3 samples in the paleoweathered zone using PIMA, and was "0" in all other samples. A. Median, average and standard deviation values were not calculated.
^e Dravite was only detected in 1 sample in the paleoweathered zone using PIMA, and was "0" in all other samples. A. Median, average and standard deviation values were not calculated.

Cation Exchange Capacity (CEC) in the Overburden and Athabasca Sandstone Group Units

Literature ranges for cation exchange capacity for kaolinite, illite and chlorite are shown below in Table IR-92-1. Because there is a range of CEC values for each clay mineral in the literature, the maximum and minimum CEC value in the range provided in the literature was used to evaluate the CEC of the overburden and Athabasca Sandstone Group units for the Wheeler River Project. The range of calculated CECs based on the clay mineral assemblage in each sample is given in Table IR-92-2. Note that the number of samples used for each of the lithologic units is the same as that provided in the updated Table 3-2.

In Table IR-92-2, the “Kaolinite+Illite+Dichlorite CEC – Minimum” and “Kaolinite+Illite+Dichlorite CEC- Maximum” were calculated in the following way, to estimate the range of CEC that may be expected by lithologic unit.

Kaolinite + Illite + Dichlorite CEC – Minimum

$$= \frac{\text{wt\% kaolinite } (\frac{kg}{kg})}{100} * 10 \frac{meq}{kg} + \frac{\text{wt\% illite } (\frac{kg}{kg})}{100} * 100 \frac{meq}{kg} + \frac{\text{wt\% dichlorite } (\frac{kg}{kg})}{100} * 14 \frac{meq}{kg}$$

Kaolinite + Illite + Dichlorite CEC – Maximum

$$= \frac{\text{wt\% kaolinite } (\frac{kg}{kg})}{100} * 150 \frac{meq}{kg} + \frac{\text{wt\% illite } (\frac{kg}{kg})}{100} * 400 \frac{meq}{kg} + \frac{\text{wt\% dichlorite } (\frac{kg}{kg})}{100} * 100 \frac{meq}{kg}$$

This was then compared to the CEC used in the reactive transport modelling presented in Appendix 7-C of the draft EIS. The CEC of illite assumed was 225 meq/kg (Baeyans and Bradbury, 2009), which is a value intermediate to range in the literature sources (Table IR-92-1). At 3.9% illite, which was the illite content assumed in the base case of the modelling scenarios, the CEC assumed for the overburden and Athabasca Sandstones was (3.9 wt % (kg/kg)/100 * 225 meq/kg = 8.87 meq/kg of sediments/bedrock). In the modelling sensitivity analysis, 1/10 of the reactive phases, including illite, were assumed to be accessible to solution, so that the CEC of the bedrock/sediments was assumed to be 0.887 meq/kg.

The CEC values evaluated in the modelling (0.887 and 8.87 meq/kg) are within the range of median CECs that are represented for the lithologic units for the project. Because groundwater movement from the mining zone is understood to be preferentially through the desilicified zone (DSZ), as presented in Appendix 7-C of the draft EIS, it is important that the CEC assumed in the model is reflective of conditions in that unit. The calculated CEC for the “Downgradient Desilicified Zone, All Units” ranged from 2.7-11.8 meq/kg (Table IR-92-2). The CEC value assumed in the base case of the model (8.87 meq/kg) is intermediate to this range, and the sensitivity analysis value of 0.887 meq/kg is reflective of not all cation exchange sites being accessible for reaction with constituents in groundwater.

Further, three core samples from the desilicified zone at depth were submitted for CEC analysis. Details of the samples, the normative clay content, and the measured CEC using the ammonium-saturation method are provided in Table IR-92-3.

Table IR-92-1: CEC values from the Literature

| Clay Mineral | Cation Exchange Capacity (meq/kg) | | |
|-------------------------------|-----------------------------------|---------|-----------------|
| | Kaolinite | Illite | (DiTri)Chlorite |
| Minimum CEC Applied | 10 | 100 | 14 |
| Maximum CEC Applied | 150 | 400 | 100 |
| Ranges in Literature (meq/kg) | | | |
| Drever (1982) | 10-100 | 100-400 | <100 |
| Bain et al., (1994) | 30-150 | 100-400 | 100-400 |
| Zazzi, 2009 | - | - | 14-40 |
| Bradbury and Baeyens (2009) | | 225 | |

Applied for geochemical reactive transport modelling in Appendix 7-C of the draft EIS

Table IR-92-2: Calculated CEC ranges for the Lithologic Units for the Wheeler River Project

| Lithologic Unit | Statistic | Clays (%) | Kaolinite (%) | Illite (%) | Dichlorite (%) | Dravite1 (%) | Kaolinite+Illite +Dichlorite CEC - Minimum | Kaolinite+Illite +Dichlorite CEC - Maximum |
|---|-----------|-----------|---------------|------------|----------------|--------------|--|--|
| Overburden | Max | 6.7 | 3.63 | 5.23 | 2.17 | 0.62 | 5.4 | 22.2 |
| | Min | 0.20 | 0.00 | 0.06 | 0.00 | 0.01 | 0.076 | 0.39 |
| | Median | 1.74 | 0.29 | 1.06 | 0.04 | 0.03 | 1.1 | 4.9 |
| MFd | Max | 39.6 | 17.2 | 24.4 | 15.2 | 8.03 | 26.6 | 112.9 |
| | Min | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| | Median | 2.05 | 0.32 | 1.45 | 0.00 | 0.28 | 1.5 | 6.3 |
| MFc | Max | 60.5 | 18.9 | 46.1 | 27.8 | 16.3 | 48.1 | 198.7 |
| | Min | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| | Median | 3.76 | 0.44 | 2.60 | 0.08 | 0.30 | 2.8 | 11.7 |
| MFb | Max | 64.3 | 32.61 | 31.95 | 52.59 | 21.60 | 34.9 | 149.2 |
| | Min | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| | Median | 5.85 | 0.95 | 4.17 | 0.00 | 0.17 | 4.4 | 18.6 |
| MFa | Max | 68.0 | 34.2 | 38.2 | 63.7 | 45.0 | 38.8 | 157.1 |
| | Min | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0 |
| | Median | 3.53 | 0.67 | 1.74 | 0.20 | 0.33 | 2.0 | 9.0 |
| MFa in Downgradient DSZ | Max | 41.3 | 28.8 | 17.0 | 20.9 | 9.22 | 19.6 | 92.3 |
| | Min | 0.40 | 0.00 | 0.00 | 0.00 | 0.01 | 0.11 | 0.64 |
| | Median | 2.62 | 0.51 | 0.42 | 1.18 | 0.15 | 0.7 | 3.9 |
| Downgradient Desilicified Zone, All Units | Max | 41.3 | 28.8 | 17.0 | 20.9 | 9.2 | 19.6 | 92.3 |
| | Min | 0.30 | 0.00 | 0.00 | 0.00 | 0.01 | 0.11 | 0.64 |
| | Median | 4.14 | 0.47 | 2.42 | 0.64 | 0.17 | 2.7 | 11.8 |

Table IR-92-3: Normative Clay and Measured CEC for Desilicified Zone Samples

| Sample Name | Corehole Location | Normative Clay Content | | | | | CEC (meq/kg) |
|-------------|-------------------------------|------------------------|------------------|---------------|----------------------|-------------|--------------|
| | | Clays (wt %) | Kaolinite (wt %) | Illite (wt %) | DiTriChlorite (wt %) | Dravite (%) | |
| DS-1 | GWR-054 | 10.16 | 0.14 | 9.5 | 0.49 | 0.24 | 21 |
| DS-2 | GWR-059 | 5.74 | 0.40 | 6.2 | 3.6 | 0.743 | 26 |
| DS-3 | GWR-060 | 12.12 | 0.89 | 6.7 | 2.6 | 0.312 | 25 |
| DS-Feed | Composite of DS-1, DS-2, DS-3 | 7.91 | 0.61 | 7.4 | 2.2 | 0.404 | 21 |

The Paleoweathered Zone

Conceptually, the paleoweathered zone mineral assemblage was made up of 9% clay by mass, as illite, and 25% quartz, as was described on page 3-29 of Appendix 7-C of the draft EIS. For the paleoweathered zone, there is a smaller dataset and the normative clay content in this unit can be inaccurate due to the host (basement) mineralogy. This is because the normative clay percentages for kaolinite, illite, dravite and chlorites are calculated from the bulk total geochemical composition of the sandstones using an in-house set of linear equations that govern the distribution of oxides into minerals of interest. Key oxide inputs are Al₂O₃, Fe₂O₃, K₂O, and MgO in percent and B in ppm. Unlike the sandstones, that contain little parent basement rock material, calculation of clay content in samples from the paleoweathered zone – because this unit is basement-hosted – can be influenced by the presence of parent rock material that has the same/similar chemical composition. In the paleoweathered zone, portable infrared mineral analysis (PIMA) was used to support the information from the normative clay content in terms of the relative abundance of the clay mineral phases. PIMA does not quantify the total clay in the rock sample (i.e., clay as a wt% of rock), but it does provide the relative abundances of the clay minerals present.

The conceptualization of the paleoweathered zone with respect to reactive mineral phases in the numeric modelling presented in Appendix 7-C of the draft EIS is considered conservative and robust based on the alignment of the following:

- The normative clay content, which as shown in the updated Table 3-2 presented above in this IR has a median value of 47.1 wt % clay content, with median illite and chlorite contents of 9.20 wt %, and 35.3 wt %, respectively.

- The PIMA results, presented in the updated Table 3-2. The PIMA results support the normative clay content results in that the dominant clay is chlorite (median of 69.5% relative abundance) followed by illite (median 13.1% relative abundance).
- Characteristics of the paleoweathered zone have been discussed for the Cigar Lake program (AECL, 1994) and for other study areas in the Athabasca Basin by Macdonald (1980) and by Wilson (1986). Macdonald (1980) studied the Precambrian regolith in areas of the Athabasca Basin that were not mineralized – meaning away from areas of hydrothermal alteration. The mineralogy of the regolith depended on the depth in the regolith and on the specific parent basement rock (Meta-arkose, meta-semipelite, and meta-pelite). The quartz content of the regolith ranged from 5-40 volume % with values generally close to 25 volume %.
- In Wilson (1996), the author identifies zones of hydrothermal alteration overprinting the regolith that are dominated by quartz, illite, and kaolinite.
- In the Cigar Lake study (AELC, 1994) the paleoweathered zone beneath the ore body is described in the following way: *“A noticeable feature is the funnel-shaped zone of hydrothermally altered basement rock which also overprints the older regolithic alteration immediately underneath the unconformity. This hydrothermal alteration is characterized by a weakening of the rock strength through shearing and foliation dominated by clay-mineral development”*.

Support from CEC and XRD Analyses

Using the same calculation method as above, the CEC of the paleoweathered materials would be 20.25 meq/kg assuming 9% wt% illite.

Recently, a composite sample of 4 core samples taken from the paleoweathered zone (“PW-Feed”) was analyzed by XRD for mineralogy and the CEC was measured. Details of the samples included in the “PW-Feed” sample are provided below in Table IR-92-4. The CEC for PW-Feed is also included in that table, and was 72 meq/kg, and is aligned with a higher content of illite in the PW-Feed sample than is assumed for the numerical modelling and suggests a contribution to the CEC from the chlorite. The XRD results are provided as Appendix A of this IR response. The results indicate that the mineralogical makeup of PW-feed is: 24.4 wt% quartz (which aligns very well with the assumptions of 25 wt% in the conceptualization), 31.4 wt% illite, and 40.5 wt% chlorite. There is also a small amount of basement rock/parent material present in the sample (3.7wt% biotite).

The measured CEC was substantively (~3x) higher than assumed in the numeric model. It was understood in representing the clay mineral phases in the paleoweathered zone by 9% illite that the sorptive capacity may be underestimated. The decision was made to take a conservative approach because the dataset of surface complexation constants developed for the project was for illite, and it was considered inappropriate to apply the same sorptive reactivity to the much larger relative content of chlorite in this zone. The results of the XRD and the measured CEC provide support to the approach in the reactive transport modelling of assuming illite as the sorptive clay mineral as a conservative one.

Table IR-92-4: Measured CEC for PW-Feed Sample

| Sample Name | Corehole Location | CEC (meq/kg) |
|-------------|--------------------------------|--------------|
| PW-1 | GWR-054 | - |
| PW-2 | GWR-061 | - |
| PW-3 | GWR-057 | - |
| PW-4 | GWR-060 | - |
| PW-Feed | Composite of PW-1 through PW-4 | 72 |

Changes to the draft EIS text

To reflect the discussion above and updates to Table 3-2 of Appendix 7-C of the draft EIS, the following changes will be made to the text on page 3.29-3.20 of Appendix 7-C of the EIS.

Conceptually, the paleoweathered zone mineral assemblage was made up of 9% clay by mass, as illite, and 25% quartz. The illite content was based on the normative clay composition determined from site-specific corehole elemental analysis (median illite by mass is 9.20%; Table 3-2). Portable infra-red mineral analysis supported the normative clay content in that chlorite is the dominant clay mineral (69.5% relative abundance) followed by illite (median 13.1% relative abundance). The quartz content was based on a regional study by Macdonald (1980) evaluating the mineralogical composition of the weathered bedrock/saprolite regionally. The mineral composition of the paleoweathered zone was conceptualized in this manner because the data set for the project with respect to clay minerals was for the sorptive properties of illite. Using the relatively smaller illite content of the paleoweathered zone compared to the more dominant chlorite content is conservative in that not all sorptive capacity of the clays is accounted for in the simulated paleoweathered zone.

References

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Macdonald, C.C., 1980. Mineralogy and geochemistry of a precambrian regolith in the Athabasca Basin. Master's Thesis Submitted to the University of Saskatchewan.

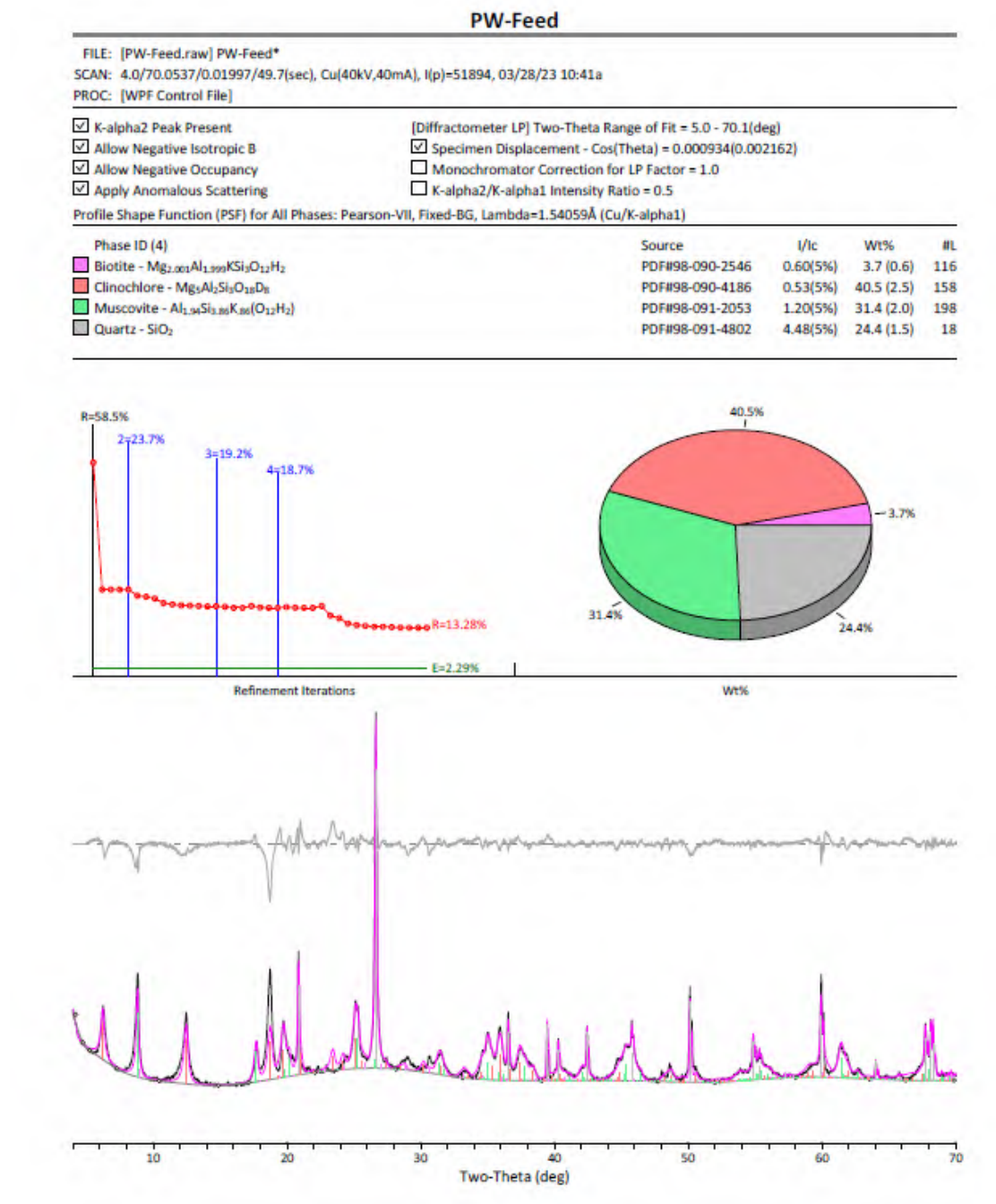
Mathur, S.S., Dzombak, D.A., 2006. Surface Complexation: Goethite, in: Surface Complexation Modelling. Elsevier, p. 443.

Wilson, J.A., 1986, Geology of the basement beneath the Athabasca Basin in Alberta. Bulletin 55. Geological Survey Department, Alberta Research Council, Edmonton, Alberta, Canada.

Attachment IR-92 Appendix A

Note the following on the XRD results for the PW-Feed sample:

- Chlinochlore is part of the chlorite group of minerals.
- The diffraction patterns for illite and muscovite are nearly identical, and thus, muscovite is interpreted as illite in this sample.



Attachment: IR-93

| | |
|---|--|
| Number | IR-93 |
| Dept. | CNSC |
| Project effects link | Geology and Groundwater |
| Reference to EIS, appendices, or supporting documentation | Appendix 7-C, Table 3-10: Properties of Adsorbing Mineral Phases |
| Context and Rationale | <p>Context: In Appendix 7-C, section 3.5.6.2.2 Ion Exchange and Surface Complexation, the consideration of ion exchange and surface complexation and the corresponding parameters and chemical reaction are discussed.</p> <p>Rationale: The site density of sorbent Goethite was reported in Table 3-10 to be 1.6E3 mol/kg. Taking into account the specific surface area of 60 m²/g, this equals to 1600/6E4 mol/m², or 0.0266 mol/m², 1.6e4 sites/nm². This value largely overestimates the site density of goethite, which is reported to be in the range of 2~6 sites/nm². The reference used in the EIS report indicates the similar range of variation for this specific parameter.</p> <p>There are plenty of similar studies on SCM of iron oxides in literature. It is suggested to consult with more than one single study to enhance the reliability of model parameters. The overestimation of sorption site density will directly result in underestimation of the affected COPCs' concentrations in pore fluid. This will result in underestimation of COPC transport plume in the affected underground space, and potentially the dissolved concentrations in the hydrogeological sink.</p> |
| Information Requirement | Please provide additional evidence to justify the model parameter of site density for goethite, applied to the numerical model. If necessary, the reactive transport modelling should be re-run to update the contents presented in the EIS report. |

Response:

The value provided in Table 3-10 for site density on goethite was a typographical error. The correct value for the density of reactive sites for goethite is 0.203 moles/kg. This value is derived below.

Equation for site density on goethite per kg of goethite:

$$\text{Site Density} \left(\frac{\text{mole sites}}{\text{kg Goethite}} \right) = \text{Site Density} \left(\frac{\text{mole sites}}{\text{mole Fe}} \right) \times \text{MW Goethite} \left(\frac{\text{g}}{\text{mol}} \right) \times 1000 \left(\frac{\text{g}}{\text{kg}} \right)$$

$$\text{Site Density} \left(\frac{\text{mole sites}}{\text{kg Goethite}} \right) = 0.018 \left(\frac{\text{mole sites}}{\text{moles Fe}} \right) \times 88.8517 \left(\frac{\text{g}}{\text{mol}} \right) \times 1000 \left(\frac{\text{g}}{\text{mol}} \right)$$

$$\text{Site Density} \left(\frac{\text{mole sites}}{\text{kg Goethite}} \right) = 0.203 \left(\frac{\text{mol}}{\text{kg}} \right)$$

The values for site density of 0.018 mole sites/mole Fe and the was given by Mathur and Dzombak (2006). The formula of goethite is FeOOH (also given by Mathur and Dzombak, 2006) and has a molecular weight ("MW") of 88.8517 g/mol.

The corrected table 3-10 is provided here below. Noted is that the value for site density for quartz has also been corrected. Please see the discussion below.

Table 3-10: Properties of Adsorbing Mineral Phases

| Sorbent Phase | Site Density (mol/kg) | Specific Area (m ² /g) | Reference |
|----------------------------|--|-----------------------------------|----------------------------|
| Goethite (FeOOH) | 0.203 | 60 | Mathur and Dzombak, 2006 |
| Quartz (SiO ₂) | 0.00118 | 0.31 | Prikryl et al., 2001 |
| Illite | Strong Sites: 0.002 (metals and protons sorb); Weak Sites: 0.04 (protons only sorb) | 97 | Bradbury and Baeyans, 2009 |

Properties of Sorbent Phases used in PHREEQC/piChem modelling

The erroneous values reported in Table 3-10 were not used in the modelling. Below, example calculations are given for goethite to derive the total number of binding sites, in moles, for the mineral phase. The total number of sites for the clay, quartz and goethite were provided in the example PHREEQC file given in Appendix E of Appendix 7C of the EIS.

In PHREEQC, the default assumption is that a reaction occurs within 1L of the aqueous phase. This aqueous phase is pore water in the calculations of geochemical reactive transport through rocks and soils. Thus, the total moles of reactive sites associated with goethite (and other reactive phases) is expressed as that which is present in contact with 1L of pore water.

For total density of reactive sites on the goethite surface in the model, the following information was used:

- Site density: 0.018 mole of sites/mole Fe
- Fe₂O₃ content of sediment/rock: 0.29 wt % in whole rock (from rock core)
(equivalent to 2.9 g/kg in whole rock)
- MW of Fe₂O₃ 159.6882
- MW of FeOOH (goethite) 88.8517
- Specific Area of goethite 60 m²/g
- (Rock) Effective Porosity 0.2 (Desilicified Zone; Appendix 7C, Table 2-4)
- Bulk Density of sediment/rock 2.12 g/cm³ (calculated) (equivalent to 2.12 kg/L)
- Density of quartz 2.65 g/cm³

Step 1: Total moles of reactive sites on goethite per kg of soil

Total moles reactive sites on goethite per kg of soil

$$= \text{mass Fe}_2\text{O}_3 \left(\frac{\text{g}}{\text{kg soil}} \right) \div \text{MW Fe}_2\text{O}_3 \left(\frac{\text{g}}{\text{mol}} \right) \times 2 \left(\frac{\text{mole Fe}}{\text{mole Fe}_2\text{O}_3} \right) \times 0.018 \left(\frac{\text{mole reactive sites}}{\text{mole Fe}} \right)$$

$$\text{Total moles reactive sites on goethite per kg of soil} = 2.9 \left(\frac{\text{g}}{\text{kg soil}} \right) \div 159.6882 \left(\frac{\text{g}}{\text{mol}} \right) \times 2 \left(\frac{\text{mole Fe}}{\text{mole Fe}_2\text{O}_3} \right)$$

$$\text{Total moles reactive sites on goethite per kg of soil} = 0.000654 \left(\frac{\text{moles reactive sites}}{\text{kg soil}} \right)$$

Step 2: Bulk Density of the sediment/soil

Quartz is the predominant mineral present in the Athabasca Sandstones. Thus, the bulk density of the sediment/rock was first calculated for the modelling purposes using the density of quartz, for a given effective porosity.

Density of Quartz (ρ_{quartz}) = 2.65 kg/L (Appelo and Postma)

Effective porosity (ϵ) = 0.2 (Desilificied zone, as above)

$$\text{Bulk Density of Soil} \left(\frac{\text{kg}}{\text{L}} \right) = \frac{(1 - \epsilon)}{\left(\frac{1}{\rho_{\text{quartz}} \left(\frac{\text{kg}}{\text{L}} \right)} \right)}$$

$$\text{Bulk Density of Soil} \left(\frac{\text{kg}}{\text{L}} \right) = \frac{1 - 0.2 \text{ (unitless)}}{\frac{1}{2.65 \left(\frac{\text{kg}}{\text{L}} \right)}}$$

$$\text{Bulk Density of soil} = 2.12 \text{ kg/L}$$

Step 3: Reactive sites per 1L of aqueous solution (groundwater)

Total moles reactive sites on goethite per 1L porewater

$$\begin{aligned} &= \text{Total moles of reactive sites on goethite per kg of soil} \left(\frac{\text{moles}}{\text{kg}} \right) \times \text{soil bulk density} \left(\frac{\text{kg}}{\text{L}} \right) \\ &\div \text{soil effective porosity (unitless)} \end{aligned}$$

Total moles of reactive sites on goethite per 1L porewater

$$= 0.000654 \left(\frac{\text{moles reactive sites}}{\text{kg soil}} \right) * 2.12 \div 0.2$$

$$\text{Total moles of reactive sites on goethite per 1L pore water} = 0.00693 \text{ moles/L}$$

This is the value for reactive sites on goethite provided in the example PHREEQC File “**#PHREEQC Input File_Transport_PWZ_DSZ and Sediments2_Chlorite2.phr**” provided in Appendix E of Appendix 7-C of the EIS. Goethite in the model was indicated by “Hfo_”. The values “60” and “32.4” are the specific surface area of goethite (60 m²/g) and mass of goethite in contact with 1 L of porewater, respectively. The specific area and mass of goethite are not used in the model calculations, as the reactive sites are provided as the absolute number of moles (0.00693 moles reactive sites per 1 L of porewater).

(Excerpted from the PHREEQC input file provided)

Annex 1 – FIRT IR Table – Technical Review of the **Wheeler River Project** draft EIS
Denison Response – August 18th, 2023

| | | | |
|---|-----------|------|-------|
| Surface 56-145 #Mineral Assemblage, reactive sites, Desilicified zone | | | |
| -equilibrate with solution 96-145 | | | |
| Hfo | 0.00693 | 60 | 34.2 |
| -no_edl | | | |
| Hao_s | 0.0008268 | 97 | 413.4 |
| Hao_w | 0.0165 | | |
| Hao_ww | 0.0165 | | |
| -no_edl | | | |
| QOH | 0.0119 | 0.31 | 10017 |
| -no_edl | | | |

References

Appelo, C.A.J, and Postma, D. Geochemistry, groundwater and pollution, 2nd edition. CRC Press, Boca Raton, Florida. 649 pages.

Attachment: IR-95

| | |
|---|--|
| Number | IR-95 |
| Dept. | CNSC |
| Project effects link | Geology and Groundwater |
| Reference to EIS, appendices, or supporting documentation | Appendix 7-C, Table 3-11 |
| Context and Rationale | <p>Context: The Table 3-11 reported the Solid-Phase Concentrations and Partitioning Constants for COPCs. Data were both measured and simulated. Rationale: It is unclear how the partition coefficients of various COPCs upon desilicified and paleoweathered rocks were obtained. It was not reported at what pH were these K_d analyzed. Sorption of chemicals on solid phase is known to be pH dependent. It is unclear whether pH influence was considered in the measurement and analysis of apparent partition coefficients. In addition, uptake of metals on clay is highly nonlinear, and always has a maximum capacity. Even with a very strong affinity towards specific metal ions, the sorption will be saturated at elevated concentrations. Therefore, assuming a linear correlation needs to be cautious of the concentration range of target COPC species, and the applicable sorption capacity of the clay mineral.</p> <p>In the current model, only the linear form of sorption is considered, although with discussion of K_d value selection. Additional rationale is needed to justify if the applied methodology is sufficient for assessment.</p> |
| Information Requirement | Please justify the choice of applying a linear form partition coefficient for the modelling and assessment, and whether it provides a conservative approach to the assessment results. Clarity around the experimental conditions during the measurement of partitioning coefficient of various COPCs on the target rocks may help support this assumption. |

Response:

Solid-liquid partition coefficients (K_d values) were not used in the geochemical reactive transport modelling for groundwater except for the lake bottom sediments of Whitefish Lake, as described in Appendix 7-C, Sections 4.5.1 and 4.5.6.2.3 of the draft EIS. The lake bottom sediments are encountered only at the very end of the (much longer; approximately 1000 m) transport pathway from the mining area to Whitefish Lake and were conceptualized as a 1 m zone between the overburden soils and the lake (page 4.6 of Appendix 7-C of the draft EIS).

For reactive transport of groundwater through all subsurface hydrogeologic units (paleoweathered zone, Athabasca Group Sandstone units, and overburden materials), the geochemical code PHREEQC was incorporated for geochemical reactive transport modelling, and sorption reactions included cation exchange and adsorption of constituents from solution to reactive sites at the surface of mineral phases as surface complexes (i.e. using the Surface Complexation Model). The Surface Complexation Model accounts for:

- non-linear sorption of metals and other constituents

- competition amongst these constituents for reactive sites at mineral surfaces
- pH-dependent sorption.

K_d values were presented in Appendix 7-C, Section 3.5.6.2.3 of the draft EIS as a check on the reasonableness of the modelled. COPC adsorption that was conceptualized in the model as occurring at quartz, illite and goethite mineral surfaces. It was important, *as a check*, to demonstrate that modelled sorption to these surfaces was not overpredicting COPC concentrations in the solid phase under initial/baseline conditions. To do this, measured concentrations of COPCs in core material were compared to predicted solids concentrations in the model. Further, using concentrations of COPCs in representative groundwater, K_d values were calculated from both the measured COPC concentrations and those modelled.

Supplemental Information – calculation of K_ds

Information supplemental to the response above is presented herein to detail how the K_d values provided in Appendix 7-C, Section 3.5.6.2.3 and Table 3-11 of the draft EIS were calculated.

The K_d (L/kg) is calculated as the solid phase concentration of an element, divided by the dissolved-phase concentration of that element.

Measured Solid-Phase COPC Concentrations:

- “Desilicified Zone” refers to solid phase elemental concentrations in core from wells indicated in Figure 3-1 of Appendix 7-C of the draft EIS. Elemental concentrations were measured on total and partial digestions. The total number of samples used in the calculation of the maximum, minimum and median values of the solid phase concentrations was 1,459 for samples for which total digestion results were presented. This includes all elements presented other than arsenic (As) and selenium (Se). For these elements, only partial digestion results were available. The total number of samples used to calculate maximum, minimum and median solid phase concentrations for As and Se was 843.
- Elemental Analysis for the Paleoweathered Zone represents a total of 108 samples, as provided in Appendix E of Appendix 7C, Table E-1.

Measured Solution-Phase Concentrations: Representative groundwater concentrations of COPCs were those used in the model, and are presented in Appendix 7-C, Table 3-5.

An example K_d calculation is provided here below for chromium in the Desilicified Zone, using the measured median solid-phase concentration and the Cr concentration in groundwater:

$$K_d \text{ (L/kg)} = \text{Median Solid phase Cr concentration (total digestion; mg/kg)} \div \text{Solution Phase Concentration of Cr in Representative Solution for Desilicified Zone (mg/L)}$$

$$K_d \text{ (L/kg)} = 8 \text{ mg/kg} \div 0.0005 \text{ mg/L}$$

$$K_d \text{ (L/kg)} = 1.6 \times 10^4 \text{ L/kg}$$

Calculating K_d values in this way is appropriate because it is calculated using measured data. Thus, no assumptions were made with respect to pH. The pH of groundwater in the system is circumneutral (i.e., pH = 6-7) and the measured solid-phase concentrations are from rock material that was in equilibrium with the groundwater when collected and analyzed.

In the PHREEQC and, likewise, piChem models, solid phase concentrations are yielded by assuming equilibrium occurs between the solution phase concentrations of COPCs, which are the inputs to the model, and the sorbing phases. As is described in Appendix 7C, Section 3.5.6.2.3, within the model the solid sorbent phases (quartz, illite and goethite) are “pre-loaded” (pre-equilibrated) with COPCs to bring the solid phase concentrations into equilibrium with the dissolved phase, groundwater, concentrations before the transport simulation is started. Outside of the model, an “Apparent K_d ” was then calculated by dividing the modelled solid phase concentration for each COPC by its solution phase concentration. These K_d values are referred to as “apparent” because they are modelled and because they are derived from the modelled concentrations metals sorbed to mineral surfaces and the modelled solution phase concentrations of those metals; they do not account, for example, for metals that are present within the crystal structure of the minerals in the bedrock.

The K_d s derived from the core and groundwater data were compared to the Apparent K_d s. For the majority of the COPCs and for both the Desilicified and paleoweathered zones, the modelled solid phase concentrations and apparent K_d values were below those measured, and calculated from measured values, respectively. This indicates that the model is not overpredicting solid-phase concentrations based on sorption, nor are the apparent K_d values exceeding those reported in the literature.”

It was noted that there a few were minor transcription errors in the results presented for the Desilicified Zone in Table 3-11 of Appendix 7-C. None of the corrections affect the interpretation above. The corrected table is given here (below), and will be updated in the final EIS.

Table 3-11: Solid-Phase Concentrations and Partitioning Constants for COPCs, measured and simulated (Updated)

| Desilicified Zone | | | | | | | | | | | | | |
|--|--------|------------------|-----------------|------------------------------------|------------------|-------------------|---------------|------------------|-----------------------|--------------|-------------------------------------|----------|--------------------------------------|
| | Units | As (Partial) | Cd | Co | Cr | Cu | Mo | Ni | Pb | Se (Partial) | U | V | Zn |
| Solid Phase Concentration - Maximum | mg/kg | 8.46E+00 | 7.00E-01 | 2.25E+01 | 1.09E+02 | 1.09E+02 | 4.51E+00 | 1.58E+02 | 7.33E+01 | 4.00E-01 | 2.13E+02 | 3.71E+02 | 9.30E+01 |
| Solid Phase Concentration - Minimum | mg/kg | 9.00E-02 | 5.00E-02 | 1.20E-01 | 2.00E+00 | 2.00E-01 | 4.00E-02 | 1.00E+00 | 7.80E-01 | 1.00E-01 | 5.00E-01 | 1.40E+00 | 5.00E-01 |
| Solid Phase Concentration - Median | mg/kg | 5.60E-01 | 1.00E-01 | 4.90E-01 | 8.00E+00 | 2.00E+00 | 1.70E-01 | 6.00E+00 | 2.95E+00 | 1.00E-01 | 1.77E+00 | 7.70E+00 | 3.00E+00 |
| Concentration in Representative Groundwater | mg/L | 1.30E-03 | 1.00E-05 | 1.00E-04 | 5.00E-04 | 1.80E-03 | 4.20E-03 | 1.00E-04 | 1.00E-04 | 1.00E-04 | 7.00E-04 | 1.00E-04 | 1.20E-02 |
| K _d - maximum value | L/kg | 6.51E+03 | 7.00E+04 | 2.25E+05 | 2.18E+05 | 6.06E+04 | 1.07E+03 | 1.58E+06 | 7.33E+05 | 4.00E+03 | 3.04E+05 | 3.71E+06 | 7.75E+03 |
| K _d - minimum value | L/kg | 6.92E+01 | 5.00E+03 | 1.20E+03 | 4.00E+03 | 1.11E+02 | 9.52E+00 | 1.00E+04 | 7.80E+03 | 1.00E+03 | 7.14E+02 | 1.40E+04 | 4.17E+01 |
| K _d - median value | L/kg | 4.30E+02 | 1.00E+04 | 4.90E+03 | 1.60E+04 | 1.11E+03 | 4.05E+01 | 6.00E+03 | 2.95E+04 | 1.00E+03 | 2.53E+03 | 7.70E+04 | 2.50E+02 |
| Modelled Solids Concentration Base Case | mg/kg | 7.70E-03 | 1.11E-04 | 5.62E-03 | 1.90E+00 | 3.57E+00 | 5.51E-07 | 1.30E-02 | 8.68E-02 | 6.60E-06 | 7.25E-02 | 3.90E-07 | 1.37E+00 |
| Apparent K _d value in the Base Case model | (L/kg) | 5.92E+00 | 1.11E+01 | 5.62E+01 | 3.81E+03 | 1.98E+03 | 1.31E-04 | 1.30E+02 | 8.68E+02 | 6.60E-02 | 1.04E+02 | 3.90E-03 | 1.14E+02 |
| Apparent K _d value in the model; 1/10 reactive sites | (L/kg) | 5.92E-01 | 1.11E+00 | 5.62E+00 | 3.81E+02 | 1.98E+02 | 1.31E-05 | 1.30E+01 | 8.68E+01 | 6.60E-03 | 1.04E+01 | 3.90E-04 | 1.14E+01 |
| Paleoweathered Zone | | | | | | | | | | | | | |
| | Units | As (Partial) | Cd | Co | Cr | Cu | Mo | Ni | Pb | Se (Partial) | U | V | Zn |
| Solid Phase Concentration - Maximum | mg/kg | 5.66E+02 | 8.00E+00 | 4.23E+02 | 4.41E+02 | 5.24E+04 | 3.93E+03 | 5.88E+02 | 5.15E+03 | 2.00E+02 | 5.56E+04 | 6.05E+03 | 1.58E+03 |
| Solid Phase Concentration - Minimum | mg/kg | 5.00E-01 | 1.00E-01 | 6.00E+00 | 6.00E+00 | 5.00E+00 | 5.00E-01 | 4.40E+01 | 1.00E+00 | 5.00E-01 | 9.00E+00 | 2.20E+01 | 7.00E+00 |
| Solid Phase Concentration - Median | mg/kg | 2.40E+01 | 1.00E+00 | 2.80E+01 | 1.55E+02 | 2.28E+02 | 5.00E+00 | 1.67E+02 | 4.60E+01 | 1.00E+00 | 4.03E+02 | 3.10E+02 | 3.10E+01 |
| Concentration in Representative Groundwater | mg/L | 5.00E-02 | 1.00E-05 | 1.00E-02 | 4.50E-03 | 5.00E-03 | 1.28E-02 | 1.50E-02 | 1.00E-04 | 1.00E-04 | 1.24E-02 | 1.00E-04 | 4.25E-03 |
| K _d - maximum value | L/kg | 1.13E+04 | 8.00E+05 | 4.23E+04 | 9.80E+04 | 1.05E+07 | 3.07E+05 | 3.92E+04 | 5.92E+07 | 2.00E+06 | 4.49E+06 | 6.05E+07 | 3.72E+05 |
| K _d - minimum value | L/kg | 1.00E+01 | 1.00E+04 | 6.00E+02 | 1.33E+03 | 1.00E+03 | 3.91E+01 | 2.93E+03 | 7.00E+04 | 5.00E+03 | 7.26E+02 | 2.20E+05 | 1.65E+03 |
| K _d - median value | L/kg | 4.80E+02 | 1.00E+05 | 2.80E+03 | 3.44E+04 | 4.56E+04 | 3.91E+02 | 1.11E+04 | 8.30E+05 | 1.00E+04 | 3.25E+04 | 3.10E+06 | 7.29E+03 |
| Modelled Solids Concentration Base Case | mg/kg | 1.87E-01 | 9.80E-05 | 4.69E-01 | 0.00E+00 | 5.30E+00 | 0.00E+00 | 2.34E+00 | 6.34E-02 | 2.87E-06 | 3.63E-01 | 0.00E+00 | 4.41E-01 |
| Apparent K _d value in the Base Case model | (L/kg) | 3.74E+00 | 9.80E+00 | 4.69E+01 | 0.00E+00 | 1.06E+03 | 0.00E+00 | 1.56E+02 | 6.34E+02 | 2.87E-02 | 2.93E+01 | 0.00E+00 | 1.04E+02 |
| Apparent K _d value in the model; 1/10 reactive sites | (L/kg) | 3.74E-01 | 9.80E-01 | 4.69E+00 | 0.00E+00 | 1.06E+02 | 0.00E+00 | 1.56E+01 | 6.34E+01 | 2.87E-03 | 2.93E+00 | 0.00E+00 | 1.04E+01 |
| Literature K _d values (mean value and range) ^{a,b} | L/kg | 550 (25-3000) | 15 (2.0-250) | 1.9x10 ³ (29-99,000) | 18 (1.0-1600) | 530 (760-2700) | 40 (7-130) | 58 (7.0-1100) | 2000 (25- 130,000) | 56 (4-1600) | 740 (2.6 - 6.2x10 ⁴) | 1.1-2.7 | 1.6x10 ³ (6.2- 30,000) |

Notes

^a Literature K_d values are for pH values ranging from 5-8 from IAEA, 2010. These values show mean values (and range). Value for Cd is for soils with pH < 6.5. Where pH dependent K_d values were not available, the mineral soil texture values were obtained. Where a K_d was not available for mineral soil, the value for "All soil" texture or "Sand" was used.

^b Literature range of K_d values for Vanadium taken from US EPA, 2005

^c Literature value of maximum K_d for pH values ranging from 5-7 from IAEA, 2010.

Attachment: IR-96

| | |
|---|--|
| Number | IR-96 |
| Dept. | CNSC |
| Project effects link | Geology and Groundwater |
| Reference to EIS, appendices, or supporting documentation | Appendix 7-C, Section 4.4.4, Sub-Domain Model Transport Boundary Conditions |
| Context and Rationale | <p>Context: From the text, “Transport parameters were specified for diffusion ($1 \times 10^{-9} \text{ m}^2/\text{s}$), longitudinal dispersivity (10 m along the plume trajectory), and transverse dispersivity (5 m)”. The source of this information is not provided in Appendix 7-C. It is unclear if the values used are defaults in the modelling software, from literature, from small-scale laboratory tests, or are site-specific values determined through tracer tests.</p> <p>Rationale: The use of a calibrated flow model does not imply that the solute transport model is calibrated. The transport parameters (such as effective porosity, dispersivity and reactive transport parameters) can only be calibrated by matching simulated and observed spatial and/or temporal distributions of a solute. Sensitivity analysis indicates that decreasing longitudinal and transverse dispersivities by a factor of two resulted in exceedances of groundwater criteria for both selenium (Se) and cobalt (Co). Given the clear influence of these values on contaminant transport, it is important that transfer parameter values are justified in the solute transport model. In addition, the influence of large-scale heterogeneity on dispersion and solute transport predictions should be discussed, to identify any uncertainty in the model predictions, and provide confidence that the applied model is adequately representing groundwater flow and solute transport. Further guidance on solute transport modelling can be found in BC MOE (2012) [1].</p> <p>Reference: [1] British Columbia Ministry of the Environment (BC MOE). 2012. Guidelines for Groundwater Modelling to Assess Impacts of Proposed Natural Resource Development Activities. Report no. 194001, 385 p.</p> |
| Information Requirement | <p>1. Please provide the source of the numerical value used for diffusion and longitudinal and transverse dispersivity, and provide justification if default values by the model code were used.</p> <p>2. Please provide a discussion on the influence of large-scale heterogeneity on dispersion and solute transport predictions in the modelling report.</p> <p>See also related: IR-89</p> |

Response Part 1:

The transport parameters applied in the model were not calibrated and that is why they were: a) selected to be conservative, and b) why more conservative parameters were selected for prediction uncertainty analyses.

Diffusion rates are unknown, as is commonly the case at most sites, and so a representative literature value was selected. Matrix diffusion of mass into lower permeability zones is considered the most relevant area for diffusion; migration to Whitefish Lake is advection-dominated such that diffusion along

the flow path would not appreciably enhance transport timing. Matrix diffusion was accounted for in the set-up of transport simulation parameters using PHREEQC.

Longitudinal and transverse dispersivity rates can vary greatly and are generally scale dependent. Literature references for dispersivity are noted below and used to estimate longitudinal and transverse dispersivity rates for the plume, which is estimated to have a length of 0.9 to 1.7 km. Graphic representation of the values suggested by the literature are appended.

- Gelhar et al. (1992), as quoted in the B.C. guidance (BC MOE, 2012), suggests a representative longitudinal dispersivity of approximately 40 m (with a range from 10 to 150 m), and a transverse dispersivity of 5 m.
- Neuman (1995) suggests a “best fit” longitudinal dispersivity of 350 m to be consistent with field observed values (note the range of model-calibrated values was 10 to 350 m).
- Schulze-Makuch (2005), suggests a best fit value for sandstone units of 10 to 20 m.
- Chapman et al (2014) found a longitudinal dispersivity for a site in a similar fractured sandstone environment to be 10 m for a plume 1.2 km in length. Martin et al. (2019) found the equivalent longitudinal dispersivity appropriate under dual porosity and EPM simulations was 10.7 m for the same site.

Recognizing all of this, the longitudinal dispersivity applied (i.e., 10 m) is considered reasonable, and the more conservative value of 5 m represents a reasonable lower bounding limit. Similarly, the literature supports the transverse dispersivity value of 5 m applied. It was noted that minor exceedances were noted under the lower dispersivity simulations; however, these simulations more importantly also contain conservative geochemical assumptions, such that we feel such breakthrough is unlikely.

Response Part 2:

As noted in the literature (e.g., Neuman et al., 2003; Neuman, 2006) dispersivity is expected to increase as a plume encounters heterogeneities of increasing length-scales. This is the foundation of scale-dependent dispersivity. As such, large-scale heterogeneity will enhance dispersion of the plume, and reduction of solute concentrations, as the plume gets larger and encounters heterogeneities of increasing length-scales. At the Phoenix site, an example of such large-scale features is the desilicified zone, wherein dispersion is simulated to play a role in reducing transported solute concentrations. The dispersion of solute concentrations is coupled with geochemical reactions along the plume trajectory. The plume dispersion exposes concentrations to a greater surface area of the geologic materials, which enhances the ability of geochemical processes to curtail plume migration.

References

- British Columbia Ministry of the Environment (BC MOE). 2012. Guidelines for Groundwater Modelling to Assess Impacts of Proposed Natural Resource Development Activities. Report no. 194001, 385 p.
- Chapman, S.W., B. Parker, J. Cherry, P. Martin, D. Abbey, S.D. McDonald. 2014. Combined EPM-DFN Modelling Approach for Plume in Sedimentary Bedrock Aquifers. DFNE 2014-236.
- Gelhar, L.W., Welty, C., & Rehfeldt, K.R. (1992). A critical review of data on field-scale dispersion in aquifers. *Water Resources Research* 28, no. 7, 1955-1974.
- Martin, P.J., B. Parker, S. Chapman, and K. Walton. 2019. Utilizing the DFN-M Framework to Inform Transport Modelling. Presentation to the American Geophysical Union (AGU).

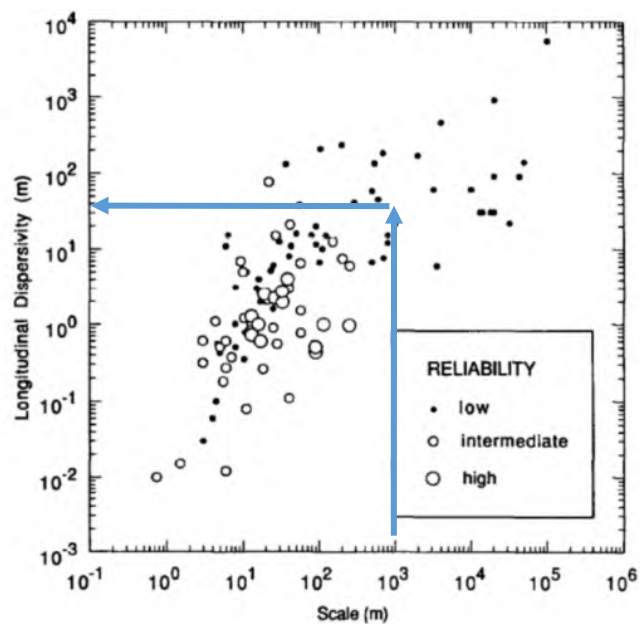
Neuman, S.P. 1990. Universal scaling of hydraulic conductivities and dispersivities in geologic media. *Water Resources Research* 26, no. 8: 1749–1758.

Neuman, S.P. 1995. On advective dispersion in fractal velocity and permeability fields. *Water Resources Research* 31, no. 6: 1455–1460.

Neuman, S.P., and V. Di Federico. 2003. Multifaceted nature of hydrogeologic scaling and its interpretation. *Reviews of Geophysics* 41, no. 3: 1014.

Neuman, S.P. 2006. Response to paper: Longitudinal Dispersivity Data and Implications for Scaling Behavior. *GROUND WATER* 44, no. 2: 139–141.

Schulze-Makuch, D. 2005. Longitudinal Dispersivity Data and Implications for Scaling Behavior. *GROUND WATER* 43, no. 3: 443–456.



(b)

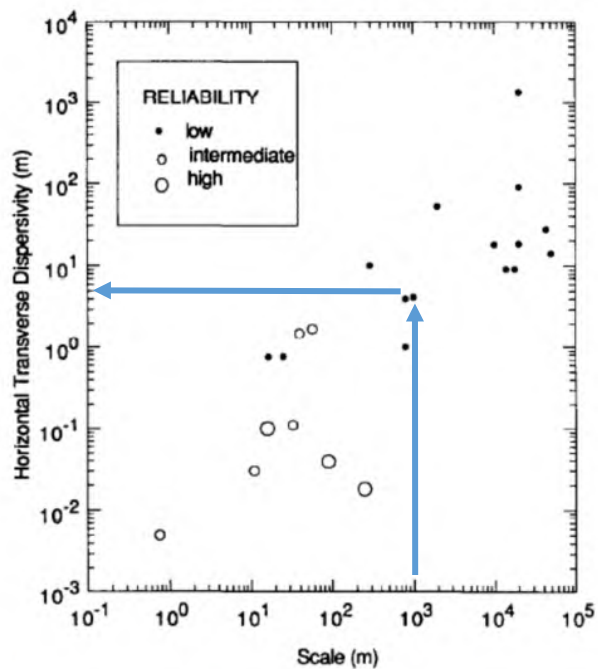


Figure 9-5: (a) Longitudinal dispersivity versus scale with data classified by reliability and (b) horizontal transverse dispersivity as a function of observation scale (from Gelhar et al., 1992).

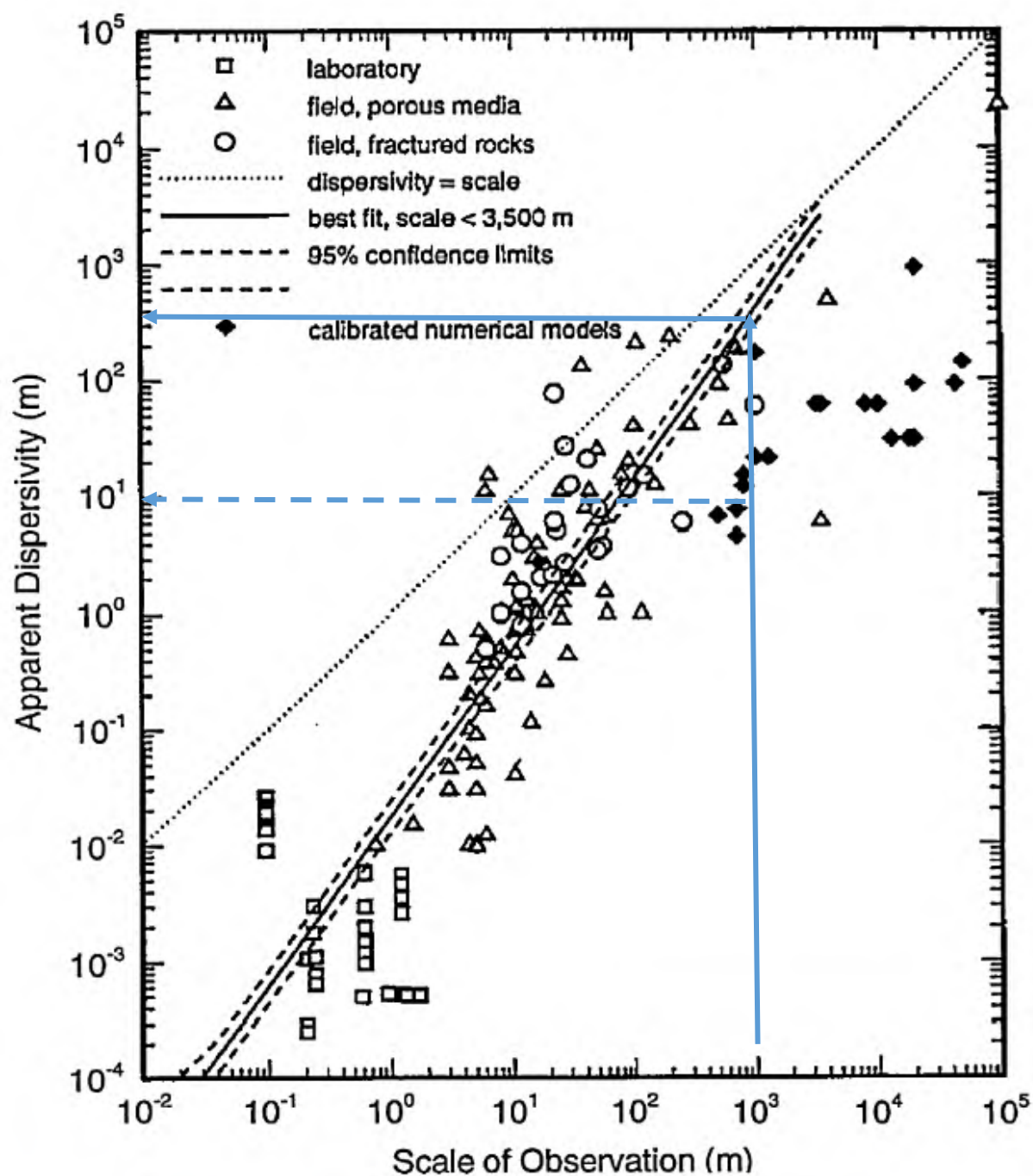


Figure 1. Apparent longitudinal dispersivities vs. scale of observation based on worldwide tracer studies (after Neuman 1995).

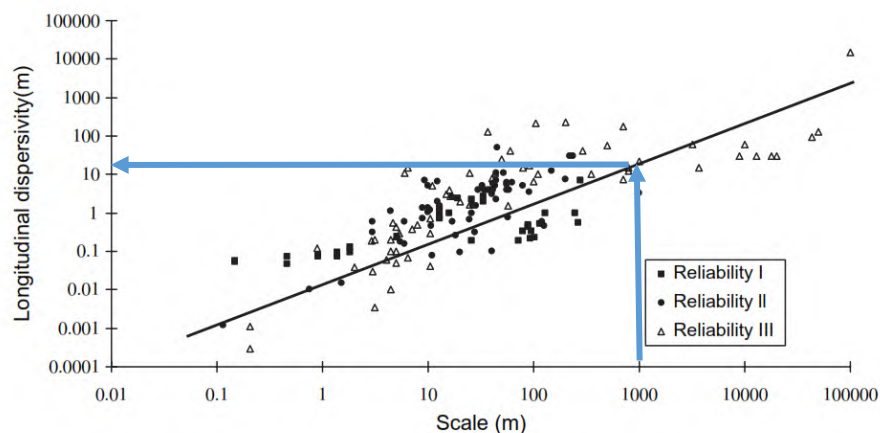


Figure 1. Relationship of longitudinal dispersivity to scale of measurement for unconsolidated sediments. The line represents the regression line for all data points (regardless of assigned reliability class) with a scaling exponent of 0.81 and a c value of 0.085 m.

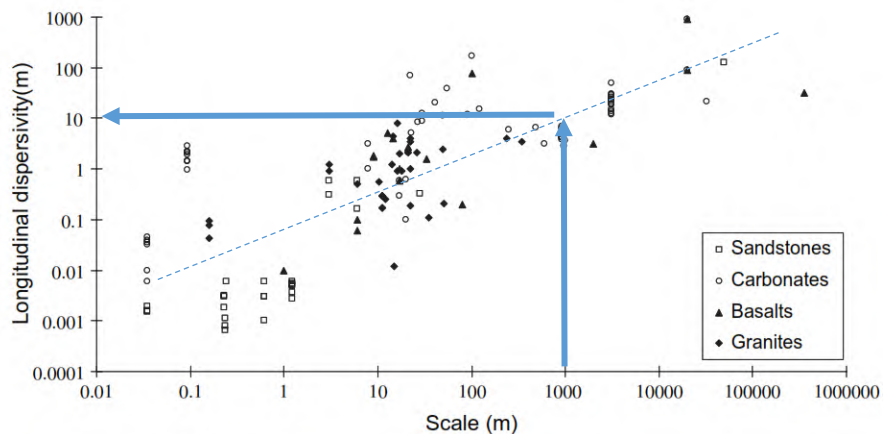


Figure 2. Relationship of longitudinal dispersivity to scale of measurement for various rock types. The scaling behavior for each rock type is quantified in Table 3.

Attachment: IR-99

| | |
|---|--|
| Number | IR-99 |
| Dept. | CNSC |
| Project effects link | Aquatic environment |
| Reference to EIS, appendices, or supporting documentation | Section 8, Water Quality, Table 8.2-13 |
| Context and Rationale | <p>Context: Table 8.2-13 shows the maximum concentration of hazardous and radiological COPC's in surface water throughout the local study area. However, the concentration for all constituents is stated as mg/L.</p> <p>Rationale: It is unusual for radiological COPC's to be displayed in mg/L, radiological constituents are typically displayed in Bq/L.</p> |
| Information Requirement | Please use Bq/L when displaying concentration of radiological COPC's. If this was a typographical error in the table, please indicate as such and revise the table to indicate values are indeed in Bq/L. Please also review other tables displaying concentrations of radiological constituents to ensure this error is not repeated in other tables. |

Revised Table 8.2-13 to support response in IR table:

Table 8.2-13: Maximum Concentration of Surface Water Constituents of Potential Concern in Surface Water (Updated)

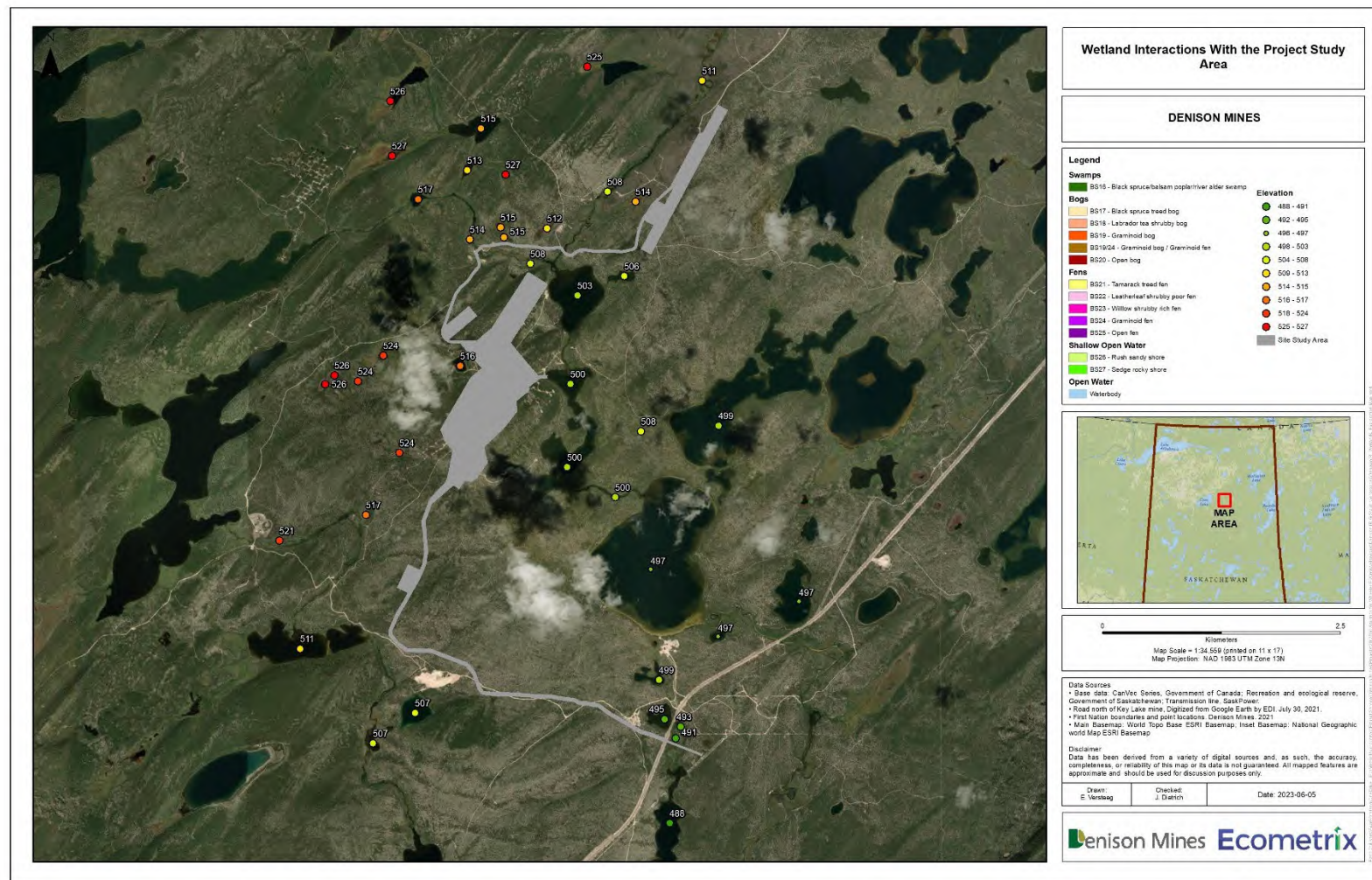
| Location | Maximum Concentration (mg/L) of Non-radionuclides in Surface Waters During Project Phases | | | | | | | | | | |
|-----------------------|---|-------------|-------------|------------|----------|--------------|------------|----------|----------|----------|----------|
| | Arsenic | Cadmium | Chloride | Cobalt | Chromium | Copper | Molybdenum | Sulphate | Selenium | Uranium | Zinc |
| Kratchkowsky Lake | 1.19E-04 | 2.38E-05 | 3.22E-01 | 1.01E-04 | 5.30E-04 | 6.22E-04 | 1.07E-04 | 6.87E-01 | 3.35E-05 | 3.12E-05 | 7.00E-04 |
| Whitefish Lake North | 1.10E-04 | 2.34E-05 | 3.22E-01 | 1.01E-04 | 5.24E-04 | 6.20E-04 | 1.07E-04 | 6.87E-01 | 3.28E-05 | 3.05E-05 | 6.89E-04 |
| Whitefish Lake Middle | 1.46E-04 | 3.97E-05 | 6.53E+00 | 1.29E-04 | 7.46E-04 | 8.22E-04 | 2.43E-02 | 5.80E+01 | 4.33E-04 | 5.74E-04 | 1.06E-03 |
| Whitefish Lake South | 1.49E-04 | 3.86E-05 | 6.50E+00 | 1.28E-04 | 7.30E-04 | 8.17E-04 | 2.39E-02 | 5.78E+01 | 4.12E-04 | 5.46E-04 | 1.03E-03 |
| McGowan Lake | 1.26E-04 | 3.27E-05 | 4.46E+00 | 1.19E-04 | 6.53E-04 | 7.50E-04 | 1.57E-02 | 3.89E+01 | 2.58E-04 | 3.37E-04 | 9.00E-04 |
| Icelander River | 1.26E-04 | 3.26E-05 | 4.42E+00 | 1.19E-04 | 6.52E-04 | 7.48E-04 | 1.56E-02 | 3.85E+01 | 2.56E-04 | 3.33E-04 | 8.98E-04 |
| Russell Lake Inlet | 1.22E-04 | 3.01E-05 | 3.46E+00 | 1.14E-04 | 6.17E-04 | 7.17E-04 | 1.18E-02 | 2.97E+01 | 1.95E-04 | 2.51E-04 | 8.40E-04 |
| Location | Maximum Concentration (Bq/L) of Radionuclides in Surface Waters During Project Phases | | | | | | | | | | |
| | Uranium-238 | Uranium-234 | Thorium-230 | Radium-226 | Lead-210 | Polonium-210 | | | | | |
| Kratchkowsky Lake | 3.85E-04 | 3.85E-04 | 1.01E-02 | 5.70E-03 | 6.22E-03 | 6.33E-03 | | | | | |
| Whitefish Lake North | 3.77E-04 | 3.77E-04 | 1.01E-02 | 5.63E-03 | 5.68E-03 | 5.78E-03 | | | | | |
| Whitefish Lake Middle | 7.05E-03 | 7.05E-03 | 1.87E-02 | 6.87E-03 | 8.35E-03 | 6.71E-03 | | | | | |
| Whitefish Lake South | 6.71E-03 | 6.71E-03 | 1.85E-02 | 6.73E-03 | 8.25E-03 | 7.22E-03 | | | | | |
| McGowan Lake | 4.14E-03 | 4.14E-03 | 1.57E-02 | 6.32E-03 | 6.68E-03 | 6.23E-03 | | | | | |
| Icelander River | 4.10E-03 | 4.10E-03 | 1.56E-02 | 6.32E-03 | 6.66E-03 | 6.20E-03 | | | | | |
| Russell Lake Inlet | 3.08E-03 | 3.08E-03 | 1.43E-02 | 6.14E-03 | 6.41E-03 | 6.16E-03 | | | | | |

Attachment: IR-101

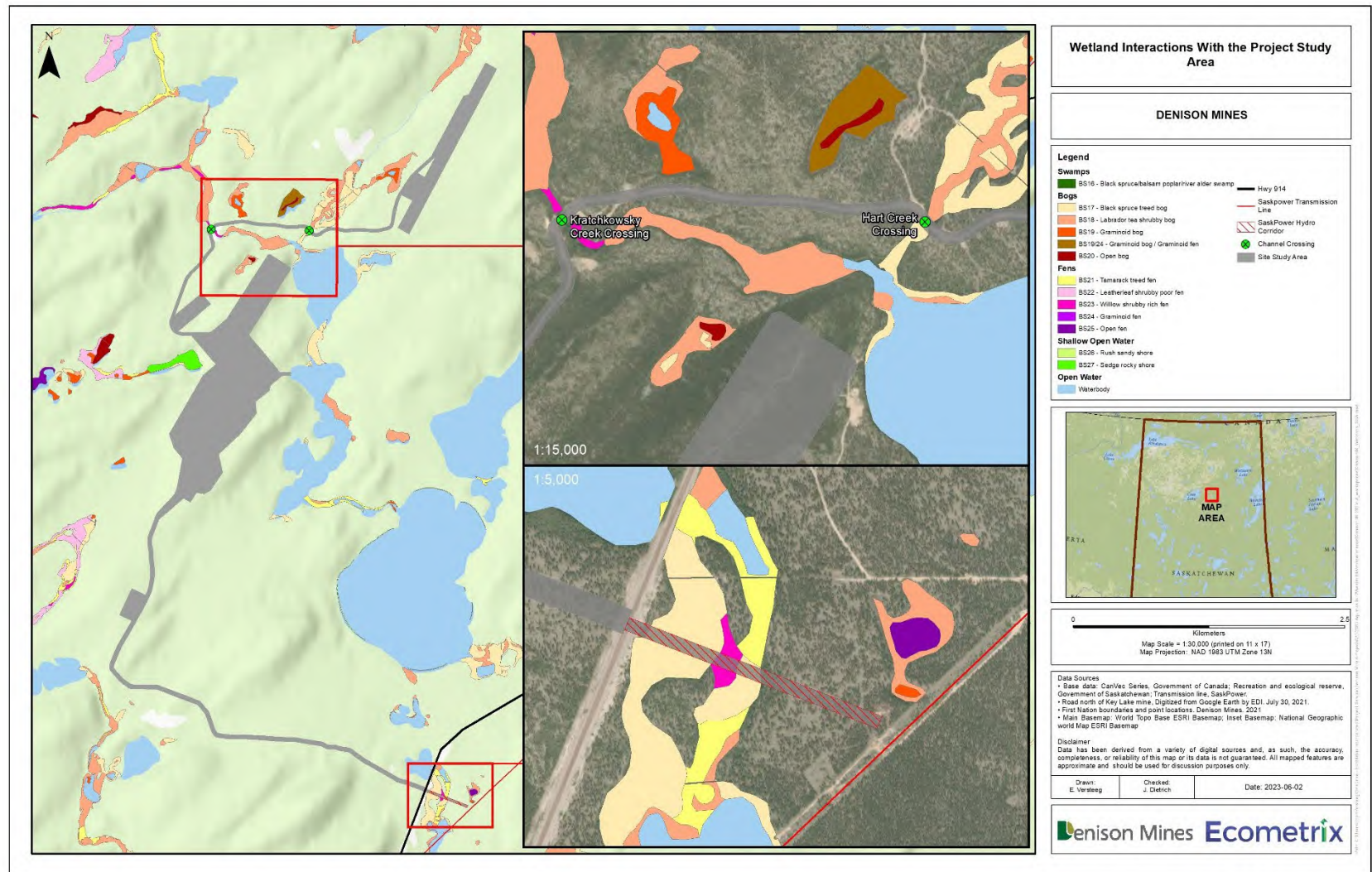
| | |
|---|--|
| Number | IR-101 |
| Dept. | ECCC |
| Project effects link | Fish and fish habitat |
| Reference to EIS, appendices, or supporting documentation | Section 8.1.1.3, Section 8.2.1.3 Aquatic Environment |
| Context and Rationale | <p>Context: In Section 8.1.1.3 Spatial and Temporal Boundaries the Project Area, Local Study Area (LSA) and Regional Study Area (RSA) are established as they pertain to surface water quantity. The same is done in Section 8.2.1.3 for surface water quality. In Section 8.1.1.3 Figure 8.1-4, the locations of the Project Area, LSA, RSA and surface water features and monitoring stations are provided.</p> <p>However, the locations of wetlands located near the Project area and within the LSA and RSA have not been provided. The location of wetlands within or near the Project footprint, as well as the other wetlands existing within the LSA can be confirmed from Part II_S9 Terrestrial Environment, Section 9.2.3.3 Figure 9.2.-8, including the wetland classifications. There appears to be at least one shallow open water wetland and several bogs located within the Project Area. There is no consideration of wetlands or potential effects to wetland hydrology, surface water or sediment quality throughout the aquatic environment assessments. There is no baseline information regarding wetlands and their status as fish habitat and ecological function, or assessment of potential effects to flow rates, water levels, water quality, sediment quality, or biota.</p> <p>Rationale: There is currently not enough information provided for ECCC to provide advice on the potential risks of the proposed Project to wetland hydrology, surface water and sediment quality within the LSA. This pathway of effects is important to assess in terms of potential effects to wetland habitat availability and quality due to changes in flow rates, water levels, water quality, sediment transport, sediment quality and potential effects to terrestrial and aquatic receptors. It is necessary to evaluate if changes in groundwater and surface water runoff flows and routing will affect water levels and habitat availability within wetlands. Potential effects from COPCs and radionuclides to surface water and sediment, or potential effects to ecological receptors within wetlands have not been evaluated.</p> |
| Information Requirement | 1) Provide baseline information regarding wetland characterization within the Project Area and LSA, including: locations, wetland type, size, water surface elevation, depth, water flow pathways, and the presence of |

| | |
|--|--|
| | <p>wildlife receptors including presence of fish/fish habitat within the Aquatic Environment section of the draft EIS. If this information is available in annexes or baseline studies, summarize it within the main body of the Aquatic Environment section of the draft EIS with references to respective documents for review.</p> <ol style="list-style-type: none">2) Provide baseline information on wetland surface water and sediment quality characterization for wetlands within the Project footprint.3) Provide an assessment of potential effects to wetlands within the LSA and potential effects to ecological receptors during all phases of the proposed Project.4) Provide further information on mitigation measures and monitoring that would be applied for the protection of wetlands. |
|--|--|

Supporting figures to the response provided in table:



Attachment IR-101 Figure 1 – Elevations of Wetland Features in the LSA.



Attachment IR-101 Figure 2: Denison Wheeler River Project SSA and Wetland Feature Distribution

Attachment: IR-102

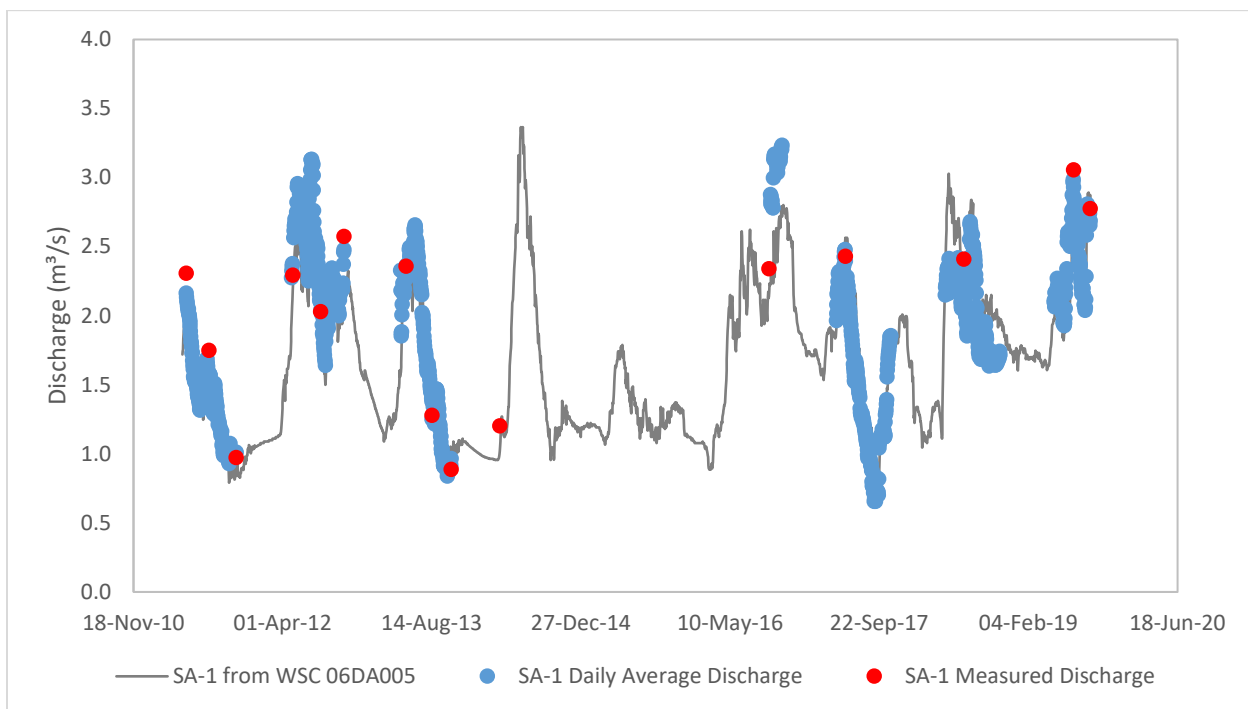
| | |
|---|--|
| Number | IR-102 |
| Dept. | ECCC |
| Project effects link | Fish and fish habitat |
| Reference to EIS, appendices, or supporting documentation | 8.1.3.1 Appendix 8-C, including Appendix II, Table 1 (p. 2) |
| Context and Rationale | <p>Context: Only one measured-results dataset for baseline stream flow exists that is relevant to the Project data from the Water Survey of Canada (WSC) station for Wheeler River (06DA005), and the Proponent used constructed records. The Proponent states that data from 06DA005 was used to extend local hydrometric station records and calculate baseline water quantity metrics. However, this was done through a complex combination of daily data correlation or monthly unit area runoff relationship, with or without offset, where some stations were based off constructed records instead of the real long-term dataset at 06DA005 (see Section 8.1.3.1 and Appendix II of Appendix 8-C, Table 1, p.2 (PDF p. 569)). Appendix 8-C references previous reports in its own appendices, but no equations are shown and there is no description of the accuracy of the fit, or explanation for not referring back to the one dataset (WSC station). Subsequent statistics calculated from these constructed records (e.g., 7Q10 needed for SK water licenses) would be affected by this uncertainty.</p> <p>Rationale: Fish habitat can be altered by changes to depositional and erosional patterns in streams. Confidence in the Proponent's estimate of baseline water quantity, and by extension Project effects to fish habitat, cannot be established without a complete description of the method applied, as well as a discussion of its accuracy.</p> |
| Information Requirement | <ol style="list-style-type: none"> 1. Provide more information on the extension of Project hydrometric station data using WSC station 06DA005. 2. Discuss the accuracy of any correlations/relationships and justify any deviations from simple unit area runoff relationships in the estimation of baseline water quantity values for the Project hydrometric stations. Constructing records from records that are themselves constructed is not recommended. 3. If baseline water quantity metrics need to be revised, discuss (if any) resulting changes to the effects assessment. |

Supporting information to the response provided in table:

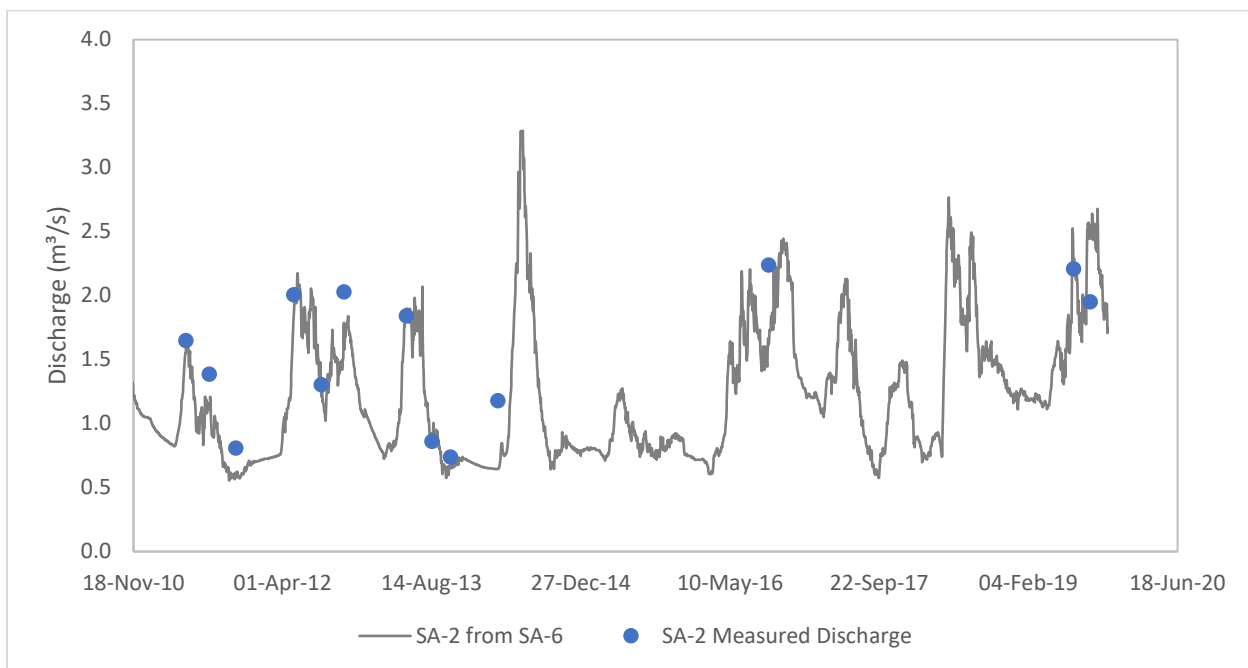
Attachment IR-102 Table 1: Record Extension Variables

| Assessment Node (AN) | Assessment Node Drainage Area (km ²) | Source Station (SS) | Source Station Drainage Area (km ²) | Extension Method | Equation Parameters: QAN = A(B+C(QSS+D)E) | | | | |
|----------------------|--|---------------------|---|--|---|-------------|------------|------------|------------|
| | | | | | A | B | C | D | E |
| SA-1 | 280.55 | 06DA005 | 3030 | Correlation | 7.1250E-01 | 0.0000E+00 | 1.3029E-01 | 0.0000E+00 | 1.0599E+00 |
| SA-2 | 257.36 | SA-6 | 251.69 | Unit Area Runoff with Scaling and Offset | 1.0000E+00 | -6.2600E-02 | 1.0708E+00 | 0.0000E+00 | 1.0000E+00 |
| SA-3 | 15.537 | SA-1 | 280.55 | Unit Area Runoff with Scaling | 1.0000E+00 | 0.0000E+00 | 2.3453E-01 | 0.0000E+00 | 1.0000E+00 |
| SA-4 | 80.498 | SA-6 | 251.69 | Correlation | 7.6738E-01 | 0.0000E+00 | 3.4997E-01 | 0.0000E+00 | 9.0494E-01 |
| SA-5 | 167.32 | SA-6 | 251.69 | Unit Area Runoff | 6.6479E-01 | 0.0000E+00 | 1.0000E+00 | 0.0000E+00 | 1.0000E+00 |
| SA-6/LA-6 | 251.69 | SA-1 | 280.55 | Correlation | 8.0221E-01 | 3.3463E-01 | 2.1528E-01 | 5.3078E-01 | 2.0643E+00 |
| SB-3 | 24.869 | SA-1 | 280.55 | Unit Area Runoff | 8.8644E-02 | 0.0000E+00 | 1.0000E+00 | 0.0000E+00 | 1.0000E+00 |
| LA-1 | 277.52 | SA-1 | 280.55 | Unit Area Runoff | 9.8920E-01 | 0.0000E+00 | 1.0000E+00 | 0.0000E+00 | 1.0000E+00 |
| LA-5 | 257.18 | SA-2 | 257.36 | Unit Area Runoff | 9.9930E-01 | 0.0000E+00 | 1.0000E+00 | 0.0000E+00 | 1.0000E+00 |

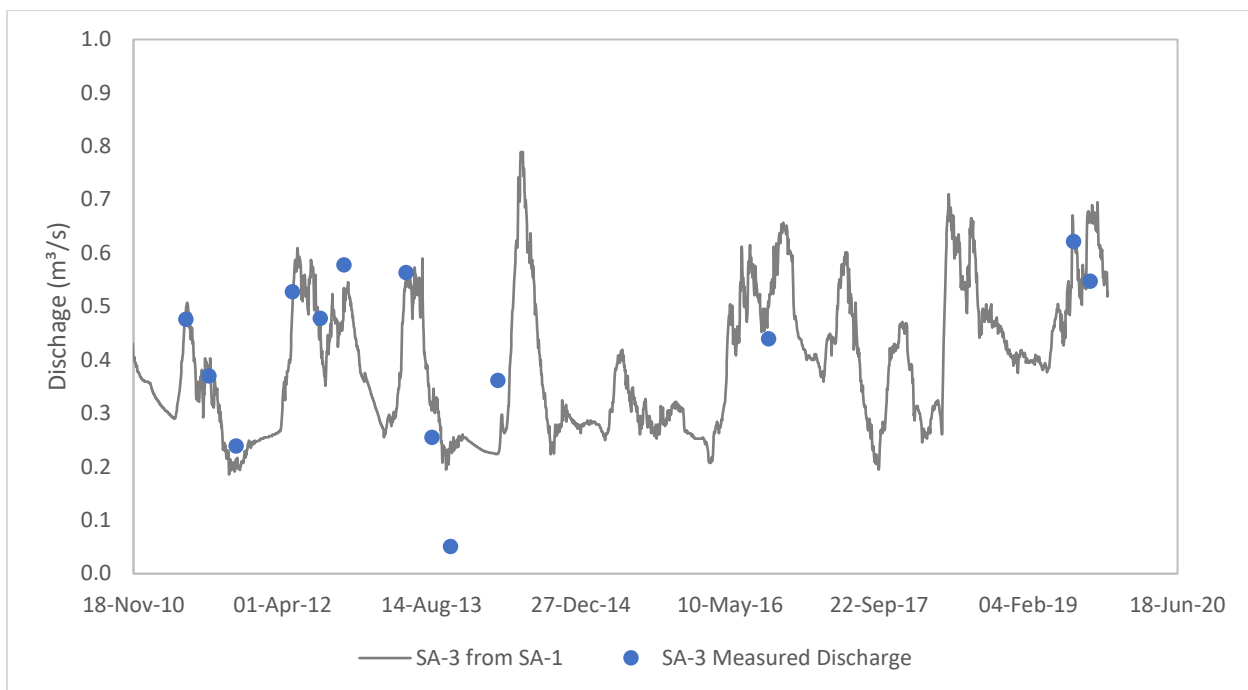
Attachment IR-102 Figure 1: SA-1 from WSC 06DA005



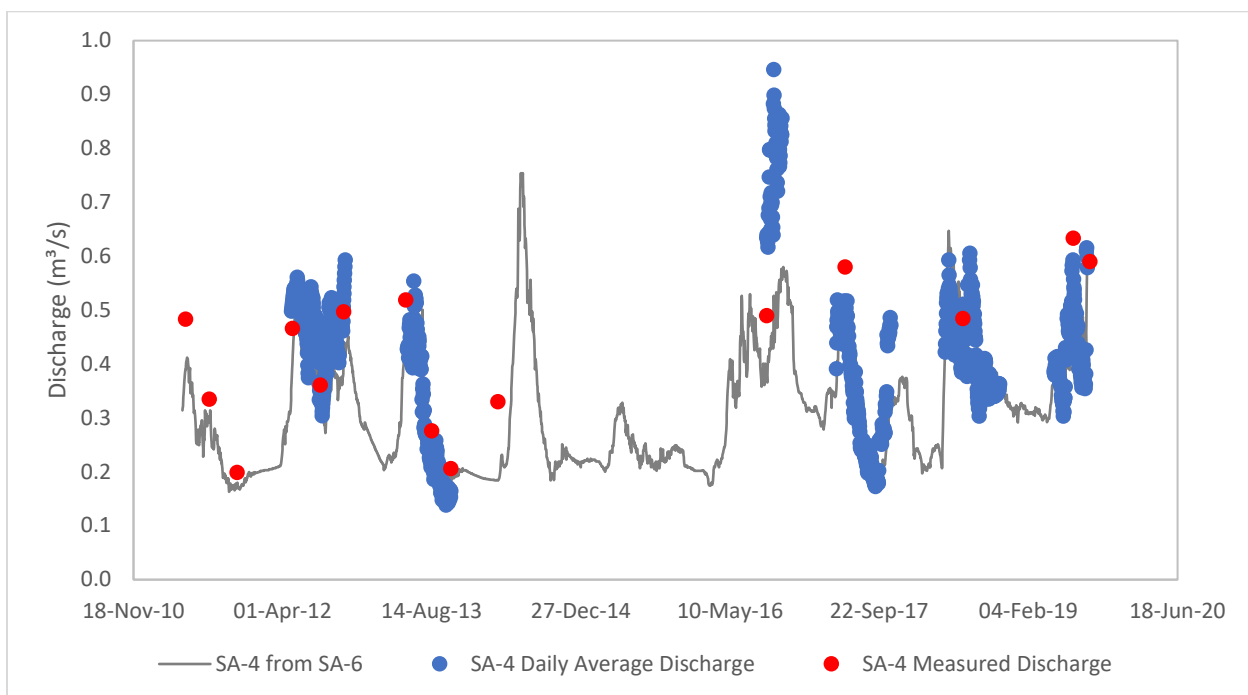
Attachment IR-102 Figure 2: SA-2 from SA-6



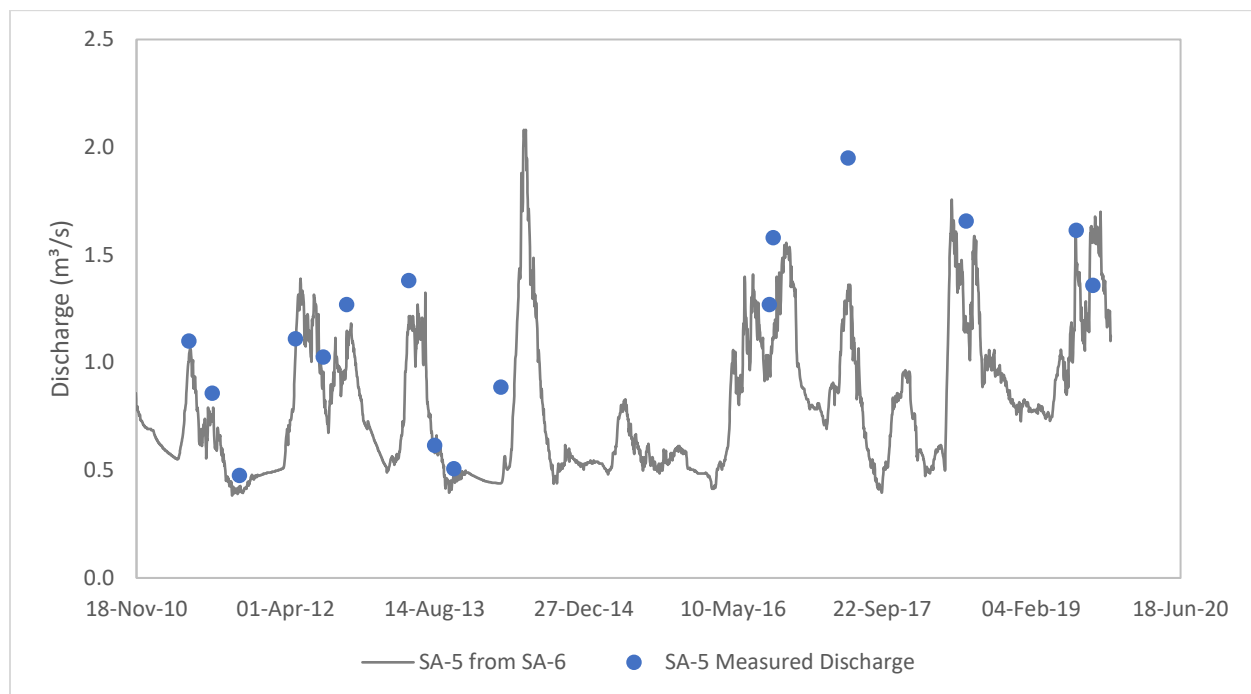
Attachment IR-102 Figure 3: SA-3 from SA-1



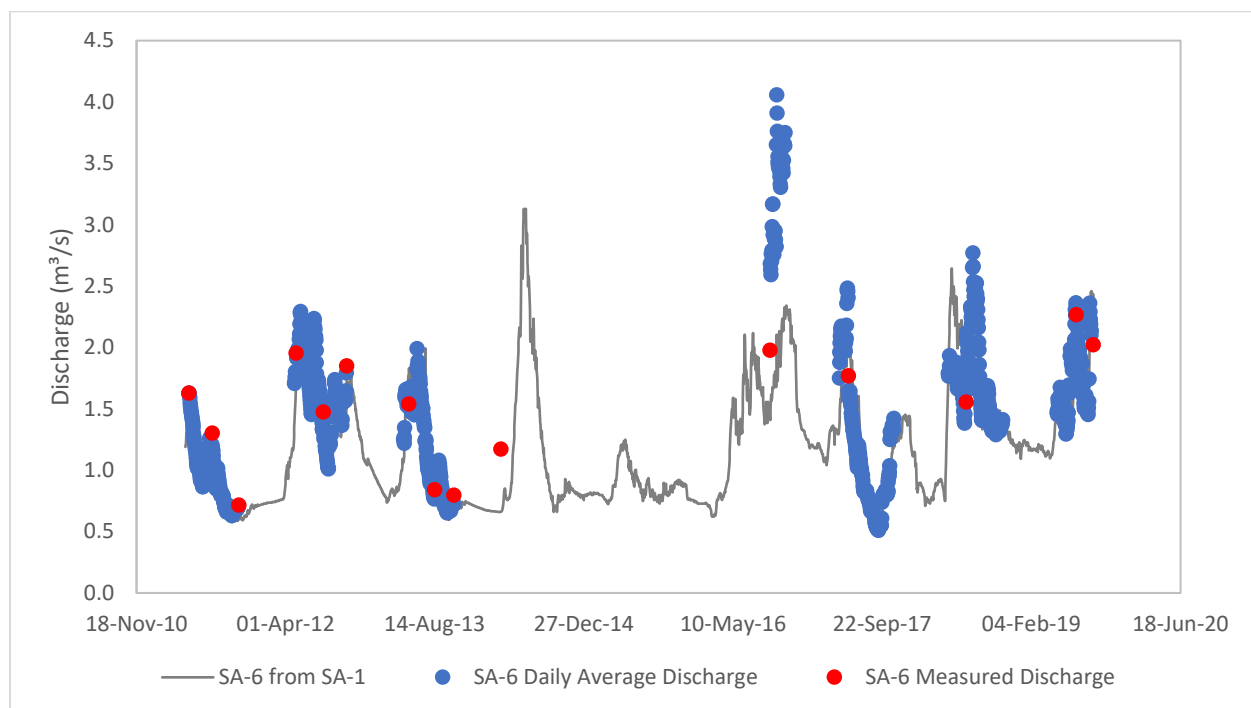
Attachment IR-102 Figure 4: SA-4 from SA-6



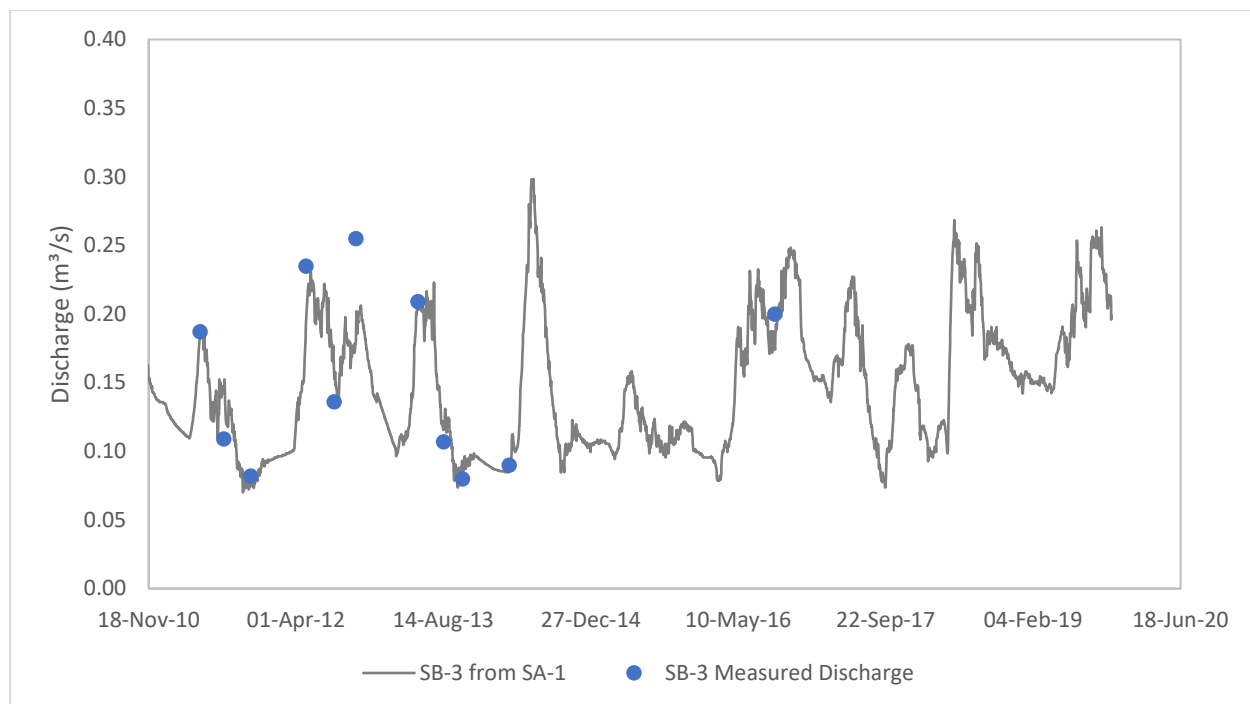
Attachment IR-102 Figure 5: SA-5 from SA-6



Attachment IR-102 Figure 6: SA-6 from SA-1



Attachment IR-102 Figure 7: SB-3 from SA-1



Attachment: IR-108

| | |
|---|--|
| Number | IR-108 |
| Dept. | ECCC |
| Project effects link | Fish and fish habitat |
| Reference to EIS, appendices, or supporting documentation | Section 8.2.3.3 Aquatic Environment |
| Context and Rationale | <p>Context: Tables 8.2-2 and 8.2-3 provide summaries of the baseline surface water quality in the LSA. No justifications for the selection of water quality guidelines have been provided. COPCs that require calculations based on other parameters such as hardness, pH, or temperature to derive guidelines (i.e., ammonia, cobalt, zinc, etc.) should be indicated within the table, with a note specifying the parameter values used in the calculations, so that thresholds may be confirmed. No baseline data for un-ionized ammonia has been provided, which is a Schedule 4 substance requiring monitoring under the MDMER. For cobalt, manganese, and vanadium, Federal Environmental Quality Guidelines (FEQGs) and/or CCME Canadian Water Quality Guidelines (CWQGs) for the Protection of Aquatic Life have not been included. A guideline of 26 mg/L has been provided for molybdenum as a Saskatchewan Environmental Quality Guidelines (SEQG), however the actual SEQG is 31 mg/L and the CCME CWQG is 0.073 mg/L.</p> <p><u>Rationale:</u> In order to assess potential changes to surface water quality from Project related activities, ECCC requires that data on all parameters that require MDMER effluent and receiving environment monitoring be provided for assessment, including accurate water quality guidelines where available.</p> |
| Information Requirement | <p>1. Update Tables 8.2-2 and 8.2-3 to include all COPCs that require effluent characterization and receiving environment monitoring under the MDMER.</p> <p>2. Update Tables 8.2-2 and 8.2-3 to include missing or corrected water quality guidance thresholds, and information on values used to derive thresholds for COPCs that are dependent on general parameters.</p> |

Response:

Tables 8.2-2 and 8.2-3 will be updated in the final EIS to include 1) all COPCs that require effluent characterization and receiving environment monitoring under the MDMER and 2) missing or corrected water quality guidance thresholds, and information on values used to derive thresholds for COPCs that are dependent on general parameters. The updated EIS tables are provided below for completeness.

Table 8.2-2: Baseline Surface Water Quality in Local Study Area Lakes and Russell Lake (Updated)

| Parameter | Units | Benchmark | | McGowan Lake (LA-1) | | | Whitefish Lake South (LA-5) | | | Whitefish Lake North (LA-6) | | |
|---------------------|-------|-----------|-----------|---------------------|---------------|----------|-----------------------------|---------------|---------------|-----------------------------|---------------|---------------|
| | | Value | Reference | Minimum | Maximum | Mean | Minimum | Maximum | Mean | Minimum | Maximum | Mean |
| Alkalinity | mg/L | | | 2 | 10 | 6 | 3 | 13 | 7.7 | 3 | 38 | 15 |
| Aluminum | mg/L | 0.005 | SEQG | 0.001 | 0.0051 | 0.0034 | 0.0048 | 0.0078 | 0.0061 | 0.005 | 0.073 | 0.0201 |
| Ammonia as N | mg/L | 5.7 | SEQG | <0.01 | 0.09 | 0.0266 | <0.01 | 0.07 | 0.043 | <0.01 | 0.05 | 0.026 |
| Ammonia, *unionized | ug/L | 19 | CWQG | 0.008 | 0.072 | 0.0229 | 0.013 | 0.105 | 0.0543 | 0.005 | 0.036 | 0.0164 |
| Antimony | mg/L | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0003 | 0.000233 | <0.0002 | <0.0002 | <0.0002 |
| Arsenic | mg/L | 0.005 | SEQG | <0.0001 | <0.0001 | <0.0001 | 0.0001 | 0.0001 | <0.0001 | 0.0001 | 0.0001 | <0.0001 |
| Barium | mg/L | | | 0.0023 | 0.0038 | 0.003 | 0.0021 | 0.0032 | 0.0027 | 0.0024 | 0.0051 | 0.00328 |
| Beryllium | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Bicarbonate | mg/L | | | 2 | 12 | 7.8 | 4 | 16 | 9.3 | 4 | 46 | 13.4 |
| Boron | mg/L | 1.5 | CWQG | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Cadmium | mg/L | 0.00004 | CWQG | <0.00001 | 0.00003 | 0.000015 | <0.00001 | 0.00002 | 0.000013 | <0.00001 | 0.00004 | 0.000016 |
| Calcium | mg/L | | | 1.1 | 1.7 | 1.35 | 1.2 | 1.6 | 1.4 | 1.1 | 1.5 | 1.24 |
| Carbonate | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Chloride | mg/L | 120 | CWQG | 0.4 | 0.5 | 0.43 | 0.3 | 0.4 | 0.33 | 0.3 | 0.4 | 0.32 |
| Chromium | mg/L | 0.001 | CWQG | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Cobalt | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Copper | mg/L | 0.002 | CWQG | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0004 | 0.00024 |
| DOC | mg/L | | | 2 | 2.6 | 2.23 | 2 | 2.5 | 2.2 | 2 | 2.5 | 2.22 |
| Diss. Phosphorus | mg/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Fluoride | mg/L | 0.12 | CWQG | <0.01 | 0.08 | 0.03166 | 0.02 | 0.07 | 0.037 | 0.02 | 0.08 | 0.042 |
| Hardness | mg/L | | | 5 | 6 | 5.5 | 5 | 6 | 5.3 | 5 | 5 | 5 |
| Hydroxide | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Iron | mg/L | 0.3 | SEQG | 0.037 | 0.27 | 0.12 | 0.04 | 0.19 | 0.11 | 0.031 | 0.21 | 0.1064 |
| Lead | mg/L | 0.001 | CWQG | <0.0001 | 0.0004 | 0.00015 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0012 | 0.00032 |
| Lead-210 | Bq/L | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Magnesium | mg/L | | | 0.3 | 0.5 | 0.42 | 0.4 | 0.4 | 0.4 | 0.2 | 0.4 | 0.36 |

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| Parameter | Units | Benchmark | | McGowan Lake (LA-1) | | | Whitefish Lake South (LA-5) | | | Whitefish Lake North (LA-6) | | |
|---------------|-------|-----------|-----------|---------------------|----------|----------|-----------------------------|----------|-----------|-----------------------------|----------|----------|
| | | Value | Reference | Minimum | Maximum | Mean | Minimum | Maximum | Mean | Minimum | Maximum | Mean |
| Manganese | mg/L | | | 0.0039 | 0.029 | 0.016 | 0.0046 | 0.02 | 0.0142 | 0.0024 | 0.019 | 0.01232 |
| Mercury | mg/L | 2.60E-05 | CWQG | 1.00E-07 | 1.00E-05 | 6.00E-06 | 1.00E-06 | 1.00E-05 | 7.00E-06 | 1.00E-07 | 1.00E-05 | 6.00E-06 |
| Molybdenum | mg/L | 26 | SEQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Nickel | mg/L | 0.025 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0004 | 0.00016 |
| Nitrate | mg/L | 13.29 | SEQG | <0.04 | 0.49 | 0.18 | <0.04 | 0.26 | 0.15 | <0.04 | 0.31 | 0.1725 |
| P. Alkalinity | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| pH | units | 6.5–9 | CWQG | 6.52 | 6.94 | 6.77 | 6.6 | 7 | 6.8 | 5.71 | 6.79 | 6.502 |
| Phosphorus | mg/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Polonium-210 | Bq/L | | | <0.005 | <0.005 | <0.005 | <0.005 | 0.008 | 0.006 | <0.005 | <0.005 | <0.005 |
| Potassium | mg/L | | | 0.2 | 0.5 | 0.37 | 0.2 | 0.4 | 0.33 | 0.2 | 0.4 | 0.32 |
| Radium-226 | Bq/L | 0.11 | SSWQO | <0.005 | <0.005 | <0.005 | <0.005 | 0.01 | 0.0076667 | <0.005 | <0.005 | <0.005 |
| Selenium | mg/L | 0.001 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Silver | mg/L | 0.0001 | CWQG | <0.00005 | <0.00005 | <0.00005 | 0.00005 | 0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Sodium | mg/L | | | 1.4 | 1.8 | 1.5 | 1.4 | 1.7 | 1.5 | 1.4 | 1.8 | 1.52 |
| Conductivity | µS/cm | | | 9 | 24 | 16.8 | 16 | 22 | 19 | 9 | 21 | 15.2 |
| Strontium | mg/L | | | 0.012 | 0.016 | 0.014 | 0.012 | 0.015 | 0.013 | 0.011 | 0.014 | 0.0126 |
| Sulphate | mg/L | 128 | SEQG | 0.7 | 0.8 | 0.75 | 0.6 | 0.7 | 0.63 | 0.5 | 0.7 | 0.64 |
| Sum of Ions | | | | 6 | 18 | 12.5 | 8 | 22 | 14 | 8 | 51 | 18 |
| Thallium | mg/L | 0.0008 | CWQG | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Thorium-228 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-230 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | 0.0133 | <0.01 | <0.01 | <0.01 |
| Thorium-232 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tin | mg/L | | | <0.0001 | 0.0013 | 0.0004 | <0.0001 | 0.0008 | 0.00033 | <0.0001 | 0.0011 | 0.0003 |
| Titanium | mg/L | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| TDS | mg/L | | | 18 | 26 | 22.167 | 22 | 29 | 24 | 14 | 29 | 22.2 |
| TKN | mg/L | | | 0.17 | 0.38 | 0.27333 | 0.14 | 0.34 | 0.22 | 0.24 | 0.43 | 0.306 |
| TOC | mg/L | | | 2.2 | 2.6 | 2.3667 | 1.9 | 4.3 | 2.8 | 2.2 | 2.9 | 2.36 |
| TSS | mg/L | | | <1 | 4 | 2.5 | <1 | 4 | 2.66 | <1 | 4 | 2 |

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| Parameter | Units | Benchmark | | McGowan Lake (LA-1) | | | Whitefish Lake South (LA-5) | | | Whitefish Lake North (LA-6) | | |
|-----------|-------|-----------|-----------|---------------------|---------|---------|-----------------------------|---------|---------|-----------------------------|---------|---------|
| | | Value | Reference | Minimum | Maximum | Mean | Minimum | Maximum | Mean | Minimum | Maximum | Mean |
| Uranium | mg/L | 0.015 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Vanadium | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Zinc | mg/L | 0.03 | CWQG | <0.0005 | 0.001 | 0.00058 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.02 | 0.00474 |

Table 8.2-2 (Continued)

| Parameter | Units | Benchmark | | Russell Lake (LAB-1) | | | Russell Lake (LAB-2) | | | LB-2 | | |
|---------------------|-------|-----------|-----------|----------------------|----------|-----------|----------------------|----------|----------|---------------|---------------|---------------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean | Min | Max | Mean |
| Alkalinity | mg/L | | | 2 | 14 | 7.7 | 8 | 8 | 8 | 7 | 12 | 9.5 |
| Aluminum | mg/L | 0.005 | SEQG | 0.0023 | 0.0025 | 0.0024 | 0.0029 | 0.0029 | 0.0029 | 0.0067 | 0.0096 | 0.0082 |
| Ammonia as N | mg/L | 5.7 | SEQG | <0.01 | 0.05 | 0.0233 | <0.01 | <0.01 | <0.01 | <0.01 | 0.04 | 0.025 |
| Ammonia, *unionized | ug/L | | | 0.016 | 0.055 | 0.0303 | 0.033 | 0.033 | 0.033 | 0.011 | 0.028 | 0.0195 |
| Antimony | mg/L | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Arsenic | mg/L | 0.005 | SEQG | 0.0001 | 0.0001 | <0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Barium | mg/L | | | 0.0033 | 0.0039 | 0.0036 | 0.0034 | 0.0034 | 0.0034 | 0.0033 | 0.0046 | 0.004 |
| Beryllium | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Bicarbonate | mg/L | | | 2 | 17 | 9 | 10 | 10 | 10 | 8 | 15 | 12 |
| Boron | mg/L | 1.5 | CWQG | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Cadmium | mg/L | 0.00004 | CWQG | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 |
| Calcium | mg/L | | | 2.7 | 3.9 | 3.5 | 3.5 | 3.5 | 3.5 | 1.3 | 1.8 | 1.6 |
| Carbonate | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Chloride | mg/L | 120 | CWQG | <0.1 | 0.5 | 0.3333333 | 0.4 | 0.4 | 0.4 | 0.2 | 0.2 | 0.2 |
| Chromium | mg/L | 0.001 | CWQG | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Cobalt | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Copper | mg/L | 0.002 | CWQG | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| DOC | mg/L | | | 2.1 | 2.5 | 2.3 | 2.2 | 2.2 | 2.2 | 2.6 | 3.5 | 3.1 |
| Diss. Phosphorus | mg/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.03 | 0.02 |
| Fluoride | mg/L | 0.12 | CWQG | 0.02 | 0.07 | 0.04 | 0.03 | 0.03 | 0.03 | <0.01 | 0.07 | 0.04 |

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| Parameter | Units | Benchmark | | Russell Lake (LAB-1) | | | Russell Lake (LAB-2) | | | LB-2 | | |
|---------------|-------|-----------|-----------|----------------------|----------|-----------|----------------------|----------|----------|----------|----------|----------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean | Min | Max | Mean |
| Hardness | mg/L | | | 9 | 13 | 11 | 12 | 12 | 12 | 5 | 6 | 5.5 |
| Hydroxide | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Iron | mg/L | 0.3 | SEQG | 0.056 | 0.08 | 0.070667 | 0.039 | 0.039 | 0.039 | 0.15 | 0.15 | 0.15 |
| Lead | mg/L | 0.001 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Lead-210 | Bq/L | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Magnesium | mg/L | | | 0.5 | 0.7 | 0.6 | 0.7 | 0.7 | 0.7 | 0.4 | 0.4 | 0.4 |
| Manganese | mg/L | | | 0.029 | 0.064 | 0.045 | 0.019 | 0.019 | 0.019 | 0.0094 | 0.037 | 0.0232 |
| Mercury | mg/L | 2.60E-05 | CWQG | 1.00E-06 | 1.00E-05 | 7.00E-06 | 1.00E-07 | 1.00E-07 | 1.00E-07 | 1.00E-06 | 1.00E-05 | 5.50E-06 |
| Molybdenum | mg/L | 26 | SEQG | 0.0003 | 0.0013 | 0.00077 | 0.0011 | 0.0011 | 0.0011 | <0.0001 | <0.0001 | <0.0001 |
| Nickel | mg/L | 0.025 | CWQG | 0.0001 | 0.0001 | <0.0001 | 0.0003 | 0.0003 | 0.0003 | 0.0001 | 0.0002 | 0.00015 |
| Nitrate | mg/L | 13.29 | SEQG | 0.05 | 0.44 | 0.25 | 0.05 | 0.05 | 0.05 | <0.04 | 0.66 | 0.35 |
| P. Alkalinity | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| pH | units | 6.5–9 | CWQG | 6.7 | 7 | 6.9 | 7.2 | 7.2 | 7.2 | 6.7 | 6.8 | 6.8 |
| Phosphorus | mg/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Polonium-210 | Bq/L | | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Potassium | mg/L | | | 0.3 | 0.6 | 0.5 | 0.8 | 0.8 | 0.8 | 0.2 | 0.4 | 0.3 |
| Radium-226 | Bq/L | 0.11 | SSWQO | <0.005 | 0.006 | 0.0053333 | 0.007 | 0.007 | 0.007 | <0.005 | 0.008 | 0.0065 |
| Selenium | mg/L | 0.001 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Silver | mg/L | 0.0001 | CWQG | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Sodium | mg/L | | | 1.7 | 2 | 1.8 | 1.7 | 1.7 | 1.7 | 1.4 | 1.6 | 1.5 |
| Conductivity | µS/cm | | | 30 | 47 | 38 | 42 | 42 | 42 | 20 | 22 | 21 |
| Strontium | mg/L | | | 0.017 | 0.018 | 0.017 | 0.016 | 0.016 | 0.016 | 0.013 | 0.016 | 0.0145 |
| Sulphate | mg/L | 128 | SEQG | 3.7 | 8.1 | 6.5 | 8.3 | 8.3 | 8.3 | 0.5 | 0.8 | 0.65 |
| Sum of Ions | | | | 18 | 28 | 23 | 25 | 25 | 25 | 12 | 21 | 16.5 |
| Thallium | mg/L | 0.0008 | CWQG | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Thorium-228 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-230 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-232 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |

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| Parameter | Units | Benchmark | | Russell Lake (LAB-1) | | | Russell Lake (LAB-2) | | | LB-2 | | |
|-----------|-------|-----------|-----------|----------------------|---------|---------|----------------------|---------|---------|---------|---------|---------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean | Min | Max | Mean |
| Tin | mg/L | | | <0.0001 | 0.001 | 0.0004 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0008 | 0.00045 |
| Titanium | mg/L | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| TDS | mg/L | | | 30 | 35 | 32 | 35 | 35 | 35 | 19 | 30 | 24.5 |
| TKN | mg/L | | | 0.14 | 0.22 | 0.17 | 0.29 | 0.29 | 0.29 | 0.13 | 0.35 | 0.24 |
| TOC | mg/L | | | 2.2 | 2.6 | 2.4 | 2.2 | 2.2 | 2.2 | 2.7 | 3.6 | 3.2 |
| TSS | mg/L | | | 1 | 1 | <1.0 | 4 | 4 | 4 | <1 | <1 | <1 |
| Uranium | mg/L | 0.015 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Vanadium | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Zinc | mg/L | 0.03 | CWQG | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0018 | 0.00115 |

Notes:

Green-highlighted cells indicate values that fall below the analysis detection limit.

Bold values indicate metrics that exceed benchmark values.

Italicized values include a temperature point estimated from an adjacent water body taken in the same season

Blank cells in the "benchmark" column indicate parameters without a prescribed benchmark at this time

SEQG – Saskatchewan Environmental Quality Guidelines – Water Quality Guidelines for Freshwater Aquatic Life.

CWQG – Canadian Council of Ministers of the Environment – Canadian Water Quality Guidelines for the Protection of Aquatic Life.

SSWQO – Saskatchewan Surface Water Quality Objectives.

DOC – Dissolved organic carbon.

TDS – Total dissolved solids.

TKN – Total Kjeldahl Nitrogen.

TOC – Total organic carbon.

TSS – Total suspended solids.

Table 8.2-3: Baseline Surface Water Quality in Local Study Area Watercourses (Updated)

| Parameter | Units | Benchmark | | Icelander River (SA-1) | | | SA-2 | | | SA-3 | |
|---------------------|-------|-----------|-----------|------------------------|---------------|----------|----------|--------------|--------------|----------|--------------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean | Min | Max |
| Alkalinity | mg/L | | | 2 | 13 | 5.5 | 2 | 11 | 6.75 | 1 | 23 |
| Aluminum | mg/L | 0.005 | SEQG | 0.0022 | 0.0056 | 0.0037 | 0.0039 | 0.081 | 0.015 | 0.0013 | 0.006 |
| Ammonia as N | mg/L | 5.7 | SEQG | <0.01 | 0.04 | 0.014 | <0.01 | 0.04 | 0.01375 | <0.01 | 0.04 |
| Ammonia, *unionized | ug/L | 19 | CWQG | 0.005 | 0.036 | 0.0143 | 0.006 | 0.024 | 0.013 | 0.004 | 0.036 |
| Antimony | mg/L | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Arsenic | mg/L | 0.005 | SEQG | <0.0001 | <0.0001 | <0.0001 | 0.0001 | 0.0001 | <0.0001 | 0.0001 | 0.0001 |
| Barium | mg/L | | | 0.0022 | 0.0035 | 0.00267 | 0.0019 | 0.0041 | 0.0026625 | 0.0025 | 0.004 |
| Beryllium | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Bicarbonate | mg/L | | | 2 | 16 | 6.7 | 2 | 13 | 8.125 | 1 | 28 |
| Boron | mg/L | 1.5 | CWQG | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Cadmium | mg/L | 0.00004 | CWQG | <1.0E-05 | 0.00002 | 0.000012 | <1.0E-05 | 0.00002 | 0.0000125 | 1.00E-05 | 0.00002 |
| Calcium | mg/L | | | 1.3 | 1.7 | 1.4 | 1.2 | 1.7 | 1.3375 | 1.5 | 1.9 |
| Carbonate | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Chloride | mg/L | 120 | CWQG | 0.4 | 0.6 | 0.45 | 0.2 | 0.4 | 0.3125 | 0.5 | 0.7 |
| Chromium | mg/L | 0.001 | CWQG | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Cobalt | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Copper | mg/L | 0.002 | CWQG | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0008 | 0.000275 | <0.0002 | <0.0002 |
| DOC | mg/L | | | 1.7 | 2.4 | 2.13 | 1.9 | 2.5 | 2.225 | 1.7 | 2.6 |
| Diss. Phosphorus | mg/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Fluoride | mg/L | 0.12 | CWQG | 0.01 | 0.07 | 0.026 | 0.01 | 0.03 | 0.01625 | <0.01 | 0.07 |
| Hardness | mg/L | | | 5 | 6 | 5.3 | 4 | 6 | 4.75 | 5 | 7 |
| Hydroxide | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Iron | mg/L | 0.3 | SEQG | 0.031 | 0.31 | 0.1215 | 0.041 | 0.11 | 0.073875 | 0.036 | 0.13 |
| Lead | mg/L | 0.001 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0003 | 0.000125 | <0.0001 | <0.0001 |
| Lead-210 | Bq/L | | | <0.02 | <0.02 | <0.02 | <0.02 | 0.05 | 0.02375 | <0.02 | 0.03 |
| Magnesium | mg/L | | | 0.3 | 0.7 | 0.43 | 0.3 | 0.6 | 0.375 | 0.4 | 0.5 |

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| Parameter | Units | Benchmark | | Icelander River (SA-1) | | | SA-2 | | | SA-3 | |
|---------------|-------|-----------|-----------|------------------------|----------|-----------|----------|----------|----------|-------------|----------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean | Min | Max |
| Manganese | mg/L | | | 0.0041 | 0.025 | 0.01467 | 0.0044 | 0.017 | 0.010325 | 0.0066 | 0.023 |
| Mercury | mg/L | 2.60E-05 | CWQG | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 |
| Molybdenum | mg/L | 26 | SEQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Nickel | mg/L | 0.025 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Nitrate | mg/L | 13.29 | SEQG | <0.04 | 0.26 | 0.0714286 | <0.04 | 0.31 | 0.094 | <0.04 | 0.26 |
| P. Alkalinity | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| pH | units | 6.5–9 | CWQG | 6.34 | 6.99 | 6.75 | 6.58 | 7.01 | 6.7775 | 6.42 | 7.02 |
| Phosphorus | mg/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Polonium-210 | Bq/L | | | <0.005 | 0.01 | 0.0054999 | <0.005 | <0.005 | <0.005 | <0.005 | 0.01 |
| Potassium | mg/L | | | 0.2 | 0.5 | 0.36 | 0.1 | 0.4 | 0.3375 | 0.3 | 0.5 |
| Radium-226 | Bq/L | 0.11 | SEQG | <0.005 | 0.009 | 0.0061 | <0.005 | 0.01 | 0.006125 | <0.005 | 0.01 |
| Selenium | mg/L | 0.001 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Silver | mg/L | 0.0001 | CWQG | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Sodium | mg/L | | | 1.4 | 1.7 | 1.53 | 1.2 | 1.8 | 1.45 | 1.4 | 1.8 |
| Conductivity | µS/cm | | | 16 | 22 | 18.2 | 14 | 22 | 17 | 18 | 24 |
| Strontium | mg/L | | | 0.011 | 0.015 | 0.0127 | 0.011 | 0.015 | 0.012125 | 0.013 | 0.018 |
| Sulphate | mg/L | 128 | SSWQO | 0.4 | 0.9 | 0.71 | <0.2 | 0.7 | 0.5875 | 0.4 | 0.8 |
| Sum of Ions | | | | 6 | 22 | 11.5 | 6 | 19 | 12.5 | 6 | 33 |
| Thallium | mg/L | 0.0008 | CWQG | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Thorium-228 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-230 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | 0.01125 | <0.01 | <0.01 |
| Thorium-232 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tin | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Titanium | mg/L | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0015 | 0.000375 | <0.0002 | <0.0002 |
| TDS | mg/L | | | 18 | 25 | 21.7 | 13 | 30 | 21.25 | 17 | 26 |
| TKN | mg/L | | | 0.11 | 0.3 | 0.241 | <0.05 | 0.31 | <0.195 | 0.13 | 0.3 |
| TOC | mg/L | | | 1.8 | 2.6 | 2.25 | 2.1 | 2.4 | 2.2875 | 1.8 | 2.6 |
| TSS | mg/L | | | <1 | 3 | 2.2 | 1 | 3 | 1.5 | <1 | 2 |

| Parameter | Units | Benchmark | | Icelander River (SA-1) | | | SA-2 | | | SA-3 | |
|-----------|-------|-----------|-----------|------------------------|---------|---------|---------|---------|----------|---------|---------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean | Min | Max |
| Uranium | mg/L | 0.015 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Vanadium | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Zinc | mg/L | 0.03 | CWQG | <0.0005 | 0.0028 | 0.00074 | <0.0005 | 0.0096 | 0.001675 | <0.0005 | 0.0011 |

Table 8.2-3 (Continued)

| Parameter | Units | Benchmark | | SA-4 | | | SA-5 | | | SA-6 | |
|---------------------|-------|-----------|-----------|----------|----------------|---------------|----------|--------------|---------------|----------|----------------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean | Min | Max |
| Alkalinity | mg/L | | | 2 | 15 | 7.5 | 2 | 8 | 5.2222 | 3 | 13 |
| Aluminum | mg/L | 0.005 | SEQG | 0.0025 | 0.0099 | 0.0053 | 0.004 | 0.014 | 0.0065 | 0.0032 | 0.02 |
| Ammonia as N | mg/L | 5.7 | SEQG | <0.01 | 0.05 | 0.015 | <0.01 | 0.05 | 0.01444 | <0.01 | 0.04 |
| Ammonia, *unionized | ug/L | 19 | CWQG | 0.007 | 0.065 | 0.0194 | 0.002 | 0.04 | 0.0137 | 0.006 | 0.04 |
| Antimony | mg/L | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Arsenic | mg/L | 0.005 | SEQG | 0.0001 | 0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0001 | 0.0001 |
| Barium | mg/L | | | 0.0021 | 0.0032 | 0.0025625 | 0.0021 | 0.0031 | 0.0025556 | 0.0023 | 0.0032 |
| Beryllium | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Bicarbonate | mg/L | | | 2 | 18 | 9.125 | 2 | 10 | 6.2222 | 4 | 16 |
| Boron | mg/L | 1.5 | CWQG | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Cadmium | mg/L | 0.00004 | CWQG | 1.00E-05 | 0.00007 | 0.0000175 | 1.00E-05 | 0.00004 | 1.44E-05 | 1.00E-05 | 0.00005 |
| Calcium | mg/L | | | 1.3 | 2 | 1.5625 | 1.2 | 1.4 | 1.2444 | 1.2 | 1.8 |
| Carbonate | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Chloride | mg/L | 120 | CWQG | 0.4 | 0.6 | 0.45 | 0.2 | 0.3 | 0.23333 | 0.3 | 0.5 |
| Chromium | mg/L | 0.001 | CWQG | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Cobalt | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Copper | mg/L | 0.002 | CWQG | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| DOC | mg/L | | | 2 | 2.4 | 2.275 | 1.8 | 2.5 | 2.2667 | 1.9 | 2.5 |
| Diss. Phosphorus | mg/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Fluoride | mg/L | 0.12 | CWQG | 0.01 | 0.07 | 0.02625 | 0.01 | 0.08 | 0.0233 | <0.01 | 0.07 |

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| Parameter | Units | Benchmark | | SA-4 | | | SA-5 | | | SA-6 | |
|---------------|-------|-----------|-----------|----------|----------|----------|-------------|----------|-----------|-------------|----------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean | Min | Max |
| Hardness | mg/L | | | 5 | 7 | 5.625 | 4 | 5 | 4.56 | 4 | 6 |
| Hydroxide | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Iron | mg/L | 0.3 | SEQG | 0.034 | 0.13 | 0.077375 | 0.03 | 0.11 | 0.071222 | 0.036 | 0.16 |
| Lead | mg/L | 0.001 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Lead-210 | Bq/L | | | <0.02 | 0.03 | 0.02125 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Magnesium | mg/L | | | 0.4 | 0.6 | 0.4375 | 0.2 | 0.4 | 0.33333 | 0.3 | 0.5 |
| Manganese | mg/L | | | 0.0029 | 0.019 | 0.010625 | 0.0025 | 0.018 | 0.0083333 | 0.0037 | 0.029 |
| Mercury | mg/L | 2.60E-05 | CWQG | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 |
| Molybdenum | mg/L | 26 | SEQG | <0.0001 | 0.0002 | 0.00011 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Nickel | mg/L | 0.025 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Nitrate | mg/L | 13.29 | SEQG | <0.04 | 0.35 | 0.112 | <0.04 | 0.31 | 0.093 | <0.04 | 0.35 |
| P. Alkalinity | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| pH | units | 6.5–9 | CWQG | 6.58 | 7.16 | 6.8488 | 6.17 | 6.97 | 6.7233 | 6.48 | 7.07 |
| Phosphorus | mg/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Polonium-210 | Bq/L | | | <0.005 | 0.007 | 0.0052 | <0.005 | <0.005 | <0.005 | <0.005 | 0.006 |
| Potassium | mg/L | | | 0.2 | 0.6 | 0.375 | 0.2 | 0.4 | 0.32222 | 0.2 | 0.4 |
| Radium-226 | Bq/L | 0.11 | SEQG | <0.005 | 0.009 | 0.00625 | <0.005 | 0.007 | 0.00544 | <0.005 | <0.005 |
| Selenium | mg/L | 0.001 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Silver | mg/L | 0.0001 | CWQG | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Sodium | mg/L | | | 1.4 | 2.1 | 1.63 | 1.3 | 1.6 | 1.41 | 1.3 | 1.9 |
| Conductivity | µS/cm | | | 17 | 25 | 19.375 | 14 | 20 | 16.111 | 14 | 23 |
| Strontium | mg/L | | | 0.012 | 0.018 | 0.0141 | 0.011 | 0.013 | 0.0113 | 0.011 | 0.016 |
| Sulphate | mg/L | 128 | SSWQO | 0.4 | 0.7 | 0.525 | 0.4 | 0.8 | 0.63333 | 0.3 | 0.8 |
| Sum of Ions | | | | 7 | 25 | 14.125 | 6 | 14 | 10.667 | 8 | 22 |
| Thallium | mg/L | 0.0008 | CWQG | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Thorium-228 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-230 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-232 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |

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| Parameter | Units | Benchmark | | SA-4 | | | SA-5 | | | SA-6 | |
|-----------|-------|-----------|-----------|---------|---------|-----------|---------|---------|-----------|---------|---------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean | Min | Max |
| Tin | mg/L | | | <0.0001 | 0.0002 | 0.0001125 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Titanium | mg/L | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0003 |
| TDS | mg/L | | | 21 | 32 | 25 | 13 | 28 | 20 | 15 | 28 |
| TKN | mg/L | | | 0.13 | 0.3 | 0.215 | 0.11 | 0.29 | 0.213 | 0.15 | 0.41 |
| TOC | mg/L | | | 2 | 2.6 | 2.325 | 1.9 | 2.7 | 2.3111 | 1.9 | 2.6 |
| TSS | mg/L | | | 1 | 3 | 2 | <1 | 3 | 1.89 | 1 | 6 |
| Uranium | mg/L | 0.015 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Vanadium | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Zinc | mg/L | 0.03 | CWQG | <0.0005 | 0.0012 | 0.0006 | <0.0005 | 0.0017 | 0.0007445 | <0.0005 | 0.0006 |

Table 8.2-3 (Continued)

| Parameter | Units | Benchmark | | SB-3 | | | SB-5 | | |
|---------------------|-------|-----------|-----------|---------------|--------------|---------------|----------|---------------|---------------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean |
| Alkalinity | mg/L | | | <1 | 24 | <6.7778 | 3 | 13 | 7.375 |
| Aluminum | mg/L | 0.005 | SEQG | 0.0052 | 0.012 | 0.0089 | 0.0016 | 0.0086 | 0.0054 |
| Ammonia as N | mg/L | 5.7 | SEQG | <0.01 | 0.04 | 0.01333 | <0.01 | 0.04 | 0.0138 |
| Ammonia, *unionized | ug/L | | | 0.003 | 0.024 | 0.012 | 0.005 | 0.032 | 0.0134 |
| Antimony | mg/L | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Arsenic | mg/L | 0.005 | SEQG | <0.0001 | <0.0001 | <0.0001 | 0.0001 | 0.0001 | <0.0001 |
| Barium | mg/L | | | 0.0025 | 0.0041 | 0.0031111 | 0.0026 | 0.004 | 0.0030625 |
| Beryllium | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Bicarbonate | mg/L | | | <1 | 29 | <8.3333 | 4 | 16 | 9 |
| Boron | mg/L | 1.5 | CWQG | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Cadmium | mg/L | 0.00004 | CWQG | <1.0E-05 | 0.00002 | 1.11E-05 | <1.0E-05 | 0.00004 | 0.000016 |
| Calcium | mg/L | | | 1.1 | 1.7 | 1.3778 | 1.2 | 1.7 | 1.3625 |
| Carbonate | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 |
| Chloride | mg/L | 120 | CWQG | 0.1 | 0.2 | 0.17778 | <0.1 | 0.2 | <0.175 |

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| Parameter | Units | Benchmark | | SB-3 | | | SB-5 | | |
|------------------|-------|-----------|-----------|-------------|----------|----------|-------------|----------|----------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean |
| Chromium | mg/L | 0.001 | CWQG | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Cobalt | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Copper | mg/L | 0.002 | CWQG | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| DOC | mg/L | | | 2.2 | 3.4 | 3.0222 | 2.6 | 3.2 | 2.975 |
| Diss. Phosphorus | mg/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Fluoride | mg/L | 0.12 | CWQG | 0.01 | 0.07 | 0.023333 | 0.01 | 0.07 | 0.02375 |
| Hardness | mg/L | | | 4 | 6 | 5.11 | 4 | 6 | 4.88 |
| Hydroxide | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 |
| Iron | mg/L | 0.3 | SEQG | 0.042 | 0.22 | 0.095111 | 0.036 | 0.16 | 0.098375 |
| Lead | mg/L | 0.001 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Lead-210 | Bq/L | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Magnesium | mg/L | | | 0.3 | 0.5 | 0.38889 | 0.2 | 0.5 | 0.375 |
| Manganese | mg/L | | | 0.0053 | 0.02 | 0.010633 | 0.0071 | 0.016 | 0.010325 |
| Mercury | mg/L | 2.60E-05 | CWQG | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 |
| Molybdenum | mg/L | 26 | SEQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Nickel | mg/L | 0.025 | CWQG | 0.0001 | 0.0002 | 0.00011 | <0.0001 | <0.0001 | <0.0001 |
| Nitrate | mg/L | 13.29 | SEQG | <0.04 | 0.4 | 0.115 | <0.04 | 0.4 | 0.13 |
| P. Alkalinity | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 |
| pH | units | 6.5–9 | CWQG | 6.18 | 6.99 | 6.7044 | 6.47 | 6.99 | 6.7288 |
| Phosphorus | mg/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Polonium-210 | Bq/L | | | <0.005 | 0.008 | 0.0058 | <0.005 | <0.005 | <0.005 |
| Potassium | mg/L | | | 0.2 | 0.5 | 0.33333 | 0.2 | 0.5 | 0.3625 |
| Radium-226 | Bq/L | 0.11 | SEQG | <0.005 | 0.01 | 0.0059 | <0.005 | 0.006 | 0.0051 |
| Selenium | mg/L | 0.001 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Silver | mg/L | 0.0001 | CWQG | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Sodium | mg/L | | | 1.2 | 1.7 | 1.4 | 1.3 | 1.7 | 1.44 |
| Conductivity | µS/cm | | | 15 | 22 | 16.778 | 15 | 23 | 17.25 |
| Strontium | mg/L | | | 0.011 | 0.015 | 0.0124 | 0.011 | 0.015 | 0.0119 |

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| Parameter | Units | Benchmark | | SB-3 | | | SB-5 | | |
|-------------|-------|-----------|-----------|---------|---------|---------|---------|---------|---------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean |
| Sulphate | mg/L | 128 | SSWQO | 0.3 | 0.9 | 0.68889 | 0.5 | 1 | 0.725 |
| Sum of Ions | | | | 4 | 34 | 12.667 | 8 | 22 | 13.375 |
| Thallium | mg/L | 0.0008 | CWQG | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Thorium-228 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-230 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-232 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tin | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Titanium | mg/L | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| TDS | mg/L | | | 14 | 26 | 20.556 | 16 | 26 | 20.125 |
| TKN | mg/L | | | 0.16 | 0.34 | 0.256 | 0.18 | 0.33 | 0.27 |
| TOC | mg/L | | | 2.4 | 3.6 | 3.1111 | 2.7 | 3.2 | 3 |
| TSS | mg/L | | | <1 | 4 | 2.56 | <1 | 3 | 1.875 |
| Uranium | mg/L | 0.015 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Vanadium | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Zinc | mg/L | 0.03 | CWQG | <0.0005 | 0.0012 | 0.00059 | <0.0005 | 0.0016 | 0.00065 |

Notes:

Green-highlighted cells indicate values that fall below the analysis detection limit.

Bold values indicate metrics that exceed benchmark values.

Italicized values include a temperature point estimated from an adjacent water body taken in the same season

Blank cells in the "benchmark" column indicate parameters without a prescribed benchmark at this time

SEQG – Saskatchewan Environmental Quality Guidelines – Water Quality Guidelines for Freshwater Aquatic Life.

CWQG – Canadian Council of Ministers of the Environment – Canadian Water Quality Guidelines for the Protection of Aquatic Life.

SSWQO – Saskatchewan Surface Water Quality Objectives.

DOC – Dissolved organic carbon.

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TDS – Total dissolved solids.

TKN – Total Kjeldahl Nitrogen.

TOC – Total organic carbon.

TSS – Total suspended solids.

Attachment: IR-114

| | |
|---|--|
| Number | IR-114 |
| Dept. | ECCC, CNSC |
| Project effects link | Fish and Fish Habitat |
| Reference to EIS, appendices, or supporting documentation | Section 8.2.4.2.3 and Section 8.2.4.2.4 |
| Context and Rationale | <p>Context: Tables 8.2-9, 8.2-10 and 8.2-13 demonstrate predicted maximum effluent concentrations of COPCs and maximum predicted receiving environment concentrations in the near- and far-field.</p> <p>General parameters such as temperature, pH, conductivity, etc. that would require Project thresholds and monitoring under the MDMER have not been provided in this table. Lead, nickel, TSS and un-ionized ammonia were not provided, despite all being Schedule 4 substances with maximum monthly concentrations under the MDMER. Aluminum, iron, nitrate, thallium, and manganese have not been provided despite being required parameters under Schedule 5 Section 4 of the MDMER for effluent characterization.</p> <p>For zinc, it is unclear how guidelines have been calculated when CCME thresholds can only be derived with hardness values <250 mg/L. Additionally, water quality thresholds appear to have been calculated using estimated effluent concentrations rather than receiving environment baseline concentrations.</p> <p>Mercury has been identified as a COPC of interest to Indigenous groups for the proposed Project. Table 8.2-8 indicates that background concentrations of mercury in LA-5 are low, and predicted effluent concentrations are also low. However, no information has been provided on background methylmercury concentrations or expected atmospheric deposition of mercury from Project related emissions. Predicted effluent concentrations of 3915 mg/L of sulphate are quite high, and sulphate is known to increase mercury methylation rates in aquatic environments.</p> <p>Rationale: A review of all modelling results for all COPCs under the MDMER will assist ECCC in understanding the potential risks to the receiving environment. ECCC recommends the use of the most stringent guidelines for the protection of aquatic biota. All water quality thresholds should be derived from receiving environment parameters to determine any baseline receiving environment and effluent COPC exceedances of water quality thresholds.</p> |

| | |
|-------------------------|---|
| | <p>Increased sulphate availability can lead to increased methylation rates of mercury and methylmercury in sediment and surface water.</p> <p>Methylmercury is a toxin that can bioaccumulate within the food chain and present risks to aquatic biota and wildlife consuming aquatic biota. Potential changes to methylmercury concentrations in water quality, sediment and fish tissues should be assessed due to the proposed sulphate loadings in effluent.</p> <p>Additionally, in accordance with the MDMERs, Denison will be required to demonstrate that their effluent quality meets the limits in the MDMER. Denison is expected to provide the predicted effluent quality for lead, nickel, and un-ionized ammonia to demonstrate compliance with the MDMERs.</p> |
| Information Requirement | <ol style="list-style-type: none"> 1. Update all tables to include all COPCs with required monitoring under the MDMER including acute and chronic thresholds. 2. Ensure all selected water quality thresholds are derived using baseline receiving environment concentrations and use water quality guidelines that are protective of aquatic biota. 3. Provide baseline data on the concentrations of methylmercury in surface water, sediment and fish tissues (i.e., large-bodied sports fish and small-bodied forage fish) in the LSA and RSA receiving environment to establish a baseline prior to potential Project impacts. 4. Provide an assessment of risk from methylmercury to ecological receptors due to changes in sulphate concentrations in effluent, and potential deposition of mercury from Project related atmospheric emissions in the receiving environment. |

Response:

1) Please see updated Tables 8.2-9 and 8.2-10 from the draft EIS below. Water quality predictions for the well mixed portion of LA-5 for each of the three flow scenarios (described in Section 8.2.4.2.3 and Table 8.2-7 of the draft EIS) are provided in the updated Table 8.2-10 below. Predicted site discharge concentrations that exceed respective receiver WQOs are bolded. Chloride, sulphate, TDS, arsenic, cadmium, chromium, cobalt, copper, selenium, and uranium, thorium-230, radium-226, lead-210, and polonium-210 predicted discharge concentrations are above receiver WQOs. However, under all three flow scenarios, the predicted water quality for all constituents is below respective WQOs within the well mixed portion of LA-5, indicating that sufficient dilution is present within LA-5 to meet objectives. Updated Table 8.2-13 is provided below. Water quality predictions have been added for MDMER constituents listed under Schedule 4 and Schedule 5. There are no predicted exceedances of water quality guidelines for any of the COPCs during Construction, Operation, or Decommissioning

2) The predictive water quality analysis considered the effects of toxicity modifying factors, such as hardness, on water quality. Specifically, the analysis considered induced hardness - that is hardness that is derived from or includes contributions from on site sources and in this case discharge from the IWWTP. It is reasonable in this case to utilize induced hardness since the water quality assessment directly considers the potential effect of IWWTP discharge on the receiving environment. The hardness added to the receiver from the discharge represents a constant source during periods of discharge. The

effluent hardness value used in the analysis was derived from bench scale testing and is considered to be a reasonable estimate of expected hardness in effluent. With that in mind, the predictive water quality analysis reflects the water quality conditions that are anticipated to prevail in the receiver and therefore presents an appropriate platform on which to base the effects assessment.

3) The table below (IR-114 Table 1) shows a summary of baseline concentrations of total mercury in surface water within the LSA. Sediment was not analyzed for mercury during previous baseline surveys. Baseline water quality in the LSA and RSA showed no indication of total mercury present above detectable limits and as such, the potential for methyl-mercury to be detected was unlikely. Generally, 60 to 95% of total mercury concentrations in fish muscle tissues are present in the form of methyl-mercury. Table 8.5-2 of Section 8.5 of the EIS provides a full summary of tissue constituent concentrations for key species from the Icelander River and Russell Lake. A conservative approach of assuming 95% of mercury in the tissues is present in the methylated form could be used for comparative purposes. These data supplemented with more current baseline data for water, sediment and fish tissues specific to total and methyl-mercury prior to the onset of site development will provide a robust database for comparative purposes during the subsequent development and operation on site.

4) Consistent with CSA N288.1-20, Clause 5.1.5, atmospheric depositions to large water bodies such as lakes, are considered negligible; therefore, the air to surface water pathway has been excluded for the ecological risk assessment. The rationale for exclusion of atmospheric deposition to lakes and rivers is explained in detail in Section G9, Appendix G of the COG DRL Guidance Document (Hart, 2019). Typical transfer parameters from source to air and source to water are on a similar magnitude to each other. The transfer parameter from air to water is orders of magnitude lower indicating that atmospheric deposition to the lake would have a negligible effect. Rationale on the exclusion of the air to water pathway can be included in the ERA in Appendix 10-A. The following statement will be added to Section 2.2 in Appendix A to Appendix 10-A "Atmospheric deposition to Whitefish Lake is considered negligible. This is consistent with the COG DRL guidance (COG, 2019) which shows (assuming a modest flow rate for a lake of 0.1 m/s and an assumed water depth of 10 m) that the transfer of constituents from the atmosphere to large bodies of water (including lakes and rivers) is considered negligible."

As baseline surface water did not identify measurable concentrations of total mercury in the LSA or RSA (See IR-114 Table 1 below) and deposition to large water bodies such as lakes is not likely to contribute to the methyl mercury concentration in the Wheeler River receiving waters, it is most reasonable to conclude that changes in total and methyl mercury can be adequately monitored in relation to sulphate inputs. Denison will undertake monitoring of total and methyl mercury as it relates to the discharge of sulphate to Whitefish Lake.

References:

Hart, D. 2019. Derived Release Limits Guidance. COG-06-3090R4-I

Table 8.2-9: Predicted Effluent Water Quality (Updated to include MDMER Constituents)

| Constituent | Unit | Discharge Concentration |
|---------------------|------|----------------------------|
| | | (max predicted) |
| Chloride | mg/L | 600 |
| Sulphate (Hardness) | mg/L | 3915 |
| Sulphate | mg/L | 3915 |
| TDS | mg/L | 6420 |
| TSS | mg/L | 6 |
| Arsenic | mg/L | 0.006 |
| Cadmium | mg/L | 0.0018 |
| Chromium | mg/L | 0.025 |
| Cobalt | mg/L | 0.0030 |
| Copper | mg/L | 0.022 |
| Lead | mg/L | 0.0003 |
| Molybdenum | mg/L | 2.5 |
| Nickel | mg/L | 0.014 |
| Selenium | mg/L | 0.042 |
| Uranium | mg/L | 0.057 |
| Vanadium | mg/L | 0.059 |
| Zinc | mg/L | 0.042 |
| Mercury | mg/L | 0.000001 |
| Ammonia (as N) | mg/L | 3.9 |
| Un-ionized Ammonia* | mg/L | 0.0078 |
| Phosphorus | mg/L | N/A |
| Thorium-230 | Bq/L | 0.9 |
| Radium-226 | Bq/L | 0.15 |
| Lead-210 | Bq/L | 0.419 |
| Polonium-210 | Bq/L | 0.15 |

Note:

* - Calculated value

Table 8.2-10: Near-field Receiving Water Quality Results (Updated to include MDMER Constituents)

| Constituent | Unit | Screening Concentration | Source of Screening Concentration | Predicted Site Discharge Concentration | LA-5 Well Mixed | LA-5 Well Mixed | LA-5 Well Mixed |
|---------------------|------|-------------------------|-----------------------------------|--|-----------------|-----------------|-----------------|
| | | | | | (7Q10) | (Monthly Low) | (Average) |
| Chloride | mg/L | 120 | SEQG/CCME | 600 | 10.06 | 6.18 | 4.69 |
| Sulphate (Hardness) | mg/L | 429 | BC MOE* | 3915 | 63.83 | 38.51 | 28.76 |
| Sulphate | mg/L | 128 | BC MOE | 3915 | 63.83 | 38.51 | 28.76 |
| TDS | mg/L | 500 | SEQG | 6420 | 131.41 | 90.06 | 74.13 |
| TSS | mg/L | 15 | Schd 4 - MDMER | 6 | 3.9 | 3.9 | 3.9 |
| Arsenic | mg/L | 0.01 | SEQG/CCME | 0.006 | 0.00020 | 0.00016 | 0.00014 |
| Cadmium | mg/L | 0.0003 | SEQG/CCME* | 0.0018 | 0.00005 | 0.00004 | 0.00003 |
| Chromium | mg/L | 0.001 | SEQG/CCME | 0.025 | 0.00090 | 0.001 | 0.00068 |
| Cobalt | mg/L | 0.0003 | FEQG | 0.0030 | 0.00015 | 0.00013 | 0.00012 |
| Copper | mg/L | 0.004 | SEQG/CCME* | 0.022 | 0.00055 | 0.00041 | 0.00036 |
| Lead | mg/L | 0.005 | CCME | 0.0003 | 0.0001 | 0.0001 | 0.0001 |
| Molybdenum | mg/L | 0.07 | WHO | 2.5 | 0.040 | 0.024 | 0.018 |
| Nickel | mg/L | 0.07 | WHO | 0.014 | 0.0003 | 0.0002 | 0.0002 |
| Selenium | mg/L | 0.001 | SEQG/CCME | 0.042 | 0.0008 | 0.001 | 0.0004 |
| Uranium | mg/L | 0.02 | SEQG/CCME | 0.057 | 0.0010 | 0.0006 | 0.0005 |
| Vanadium | mg/L | 0.12 | FEQG | 0.059 | 0.0011 | 0.0007 | 0.0005 |
| Zinc | mg/L | 0.1 | FEQG** | 0.042 | 0.0018 | 0.0015 | 0.0014 |
| Mercury | mg/L | 0.000026 | SEQG/CCME | 0.000001 | 0.00001 | 0.00001 | 0.00001 |
| Ammonia (as N) | mg/L | 5.74 | SEQG/CCME | 3.9 | 0.13 | 0.11 | 0.10 |
| Un-ionized Ammonia | mg/L | 1.00 | MDMER Sched 4 | 0.0078 | 0.00008 | 0.00006 | 0.00006 |
| Phosphorus | mg/L | 0.015 | BC MOE | N/A | 0.01 | 0.01 | 0.01 |
| Thorium-230 | Bq/L | 0.6 | HC | 0.9 | 0.024 | 0.019 | 0.016 |
| Radium-226 | Bq/L | 0.11 | SEQG | 0.15 | 0.008 | 0.007 | 0.007 |
| Lead-210 | Bq/L | 0.2 | HC | 0.419 | 0.026 | 0.024 | 0.023 |
| Polonium-210 | Bq/L | 0.1 | HC | 0.15 | 0.007 | 0.006 | 0.006 |
| Notes | | | | | | | |

Annex 1 – FIRT IR Table – Technical Review of the **Wheeler River Project** draft EIS
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| Constituent | Unit | Screening Concentration | Source of Screening Concentration | Predicted Site Discharge Concentration | LA-5 Well Mixed | LA-5 Well Mixed | LA-5 Well Mixed |
|---|------|-------------------------|-----------------------------------|--|-----------------|-----------------|-----------------|
| | | | | | (7Q10) | (Monthly Low) | (Average) |
| <p>(1) Bolded values are those that exceed the screening concentrations</p> <p>Un-ionized ammonia calculated value</p> <p>* Hardness induced guideline, assuming hardness >250 mg/L</p> <p>** Hardness induced guideline, assuming hardness >250 mg/L, pH=7.0, DOC = 5.26 mg/L</p> | | | | | | | |

Table 8.2-13: Maximum Concentration of Surface Water Constituents of Potential Concern in Surface Water (Updated to include available MDMER Constituents)

| Constituent | Unit | Kratchkowsky Lake (LA-7) | Whitefish Lake North (LA-6) | Whitefish Lake Middle (LA-5 North) | Whitefish Lake South (LA-5 South) | McGowan Lake (LA-1) | Iceland River | Russell Lake Inlet | Screening Concentration | Source of Screening Concentration |
|--------------------|------|---|-----------------------------|------------------------------------|-----------------------------------|---------------------|---------------|--------------------|-------------------------|-----------------------------------|
| Chloride | mg/L | 0.32 | 0.32 | 6.14 | 6.11 | 4.20 | 4.16 | 3.26 | 120 | SEQG/CCME |
| Sulphate | mg/L | 0.69 | 0.69 | 38.66 | 38.49 | 26.03 | 25.75 | 19.88 | 128 | BC MOE |
| Arsenic | mg/L | 0.00012 | 0.00011 | 0.00015 | 0.00015 | 0.00013 | 0.00013 | 0.00012 | 0.01 | SEQG/CCME |
| Cadmium | mg/L | 0.000024 | 0.000023 | 0.000040 | 0.000039 | 0.000033 | 0.000033 | 0.000030 | 0.0003 | SEQG/CCME* |
| Chromium | mg/L | 0.000530 | 0.0005 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0006 | 0.001 | SEQG/CCME |
| Cobalt | mg/L | 0.000101 | 0.000101 | 0.000129 | 0.000128 | 0.000119 | 0.000119 | 0.000114 | 0.0003 | FEQG |
| Copper | mg/L | 0.00062 | 0.00062 | 0.00082 | 0.00082 | 0.00075 | 0.00075 | 0.00072 | 0.004 | SEQG/CCME* |
| Lead | mg/L | 0.000124 | 0.000114 | 0.000118 | 0.000130 | 0.000114 | 0.000114 | 0.000116 | 0.005 | CCME |
| Molybdenum | mg/L | 0.0001 | 0.0001 | 0.0243 | 0.0240 | 0.0158 | 0.0156 | 0.0118 | 0.07 | WHO |
| Nickel | mg/L | 0.00039 | 0.00038 | 0.00051 | 0.00050 | 0.00046 | 0.00046 | 0.00044 | 0.07 | WHO |
| Selenium | mg/L | 0.000034 | 0.00003 | 0.00043 | 0.00041 | 0.00026 | 0.00026 | 0.00020 | 0.001 | SEQG/CCME |
| Uranium | mg/L | 0.00003 | 0.00003 | 0.00057 | 0.00055 | 0.00034 | 0.00033 | 0.00025 | 0.02 | SEQG/CCME |
| Vanadium | mg/L | 0.00017 | 0.00015 | 0.00067 | 0.00056 | 0.00033 | 0.00033 | 0.00027 | 0.12 | FEQG |
| Zinc | mg/L | 0.00070 | 0.00069 | 0.00106 | 0.00103 | 0.00090 | 0.00090 | 0.00084 | 0.1 | FEQG** |
| Ammonia (as N) | mg/L | 0.01463 | 0.01463 | 0.05232 | 0.05215 | 0.03978 | 0.03950 | 0.03368 | 5.74 | SEQG/CCME |
| Un-ionized Ammonia | mg/L | 0.0000086 | 0.0000086 | 0.0000309 | 0.0000308 | 0.0000235 | 0.0000233 | 0.0000199 | 1.00 | MDMER Sched 4 |
| Thorium-230 | Bq/L | 0.01014 | 0.01012 | 0.01868 | 0.01854 | 0.01569 | 0.01563 | 0.01430 | 0.6 | HC |
| Radium-226 | Bq/L | 0.0057 | 0.0056 | 0.0069 | 0.0067 | 0.0063 | 0.0063 | 0.0061 | 0.11 | SEQG |
| Lead-210 | Bq/L | 0.0062 | 0.0057 | 0.0084 | 0.0083 | 0.0067 | 0.0067 | 0.0064 | 0.2 | HC |
| Polonium-210 | Bq/L | 0.0063 | 0.0058 | 0.0067 | 0.0072 | 0.0062 | 0.0062 | 0.0062 | 0.1 | HC |
| Mercury | mg/L | No background information or effluent concentration to model | | | | | | | | |
| Aluminum | | Monitoring required under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | MDMER Sched 5 |

Annex 1 – FIRT IR Table – Technical Review of the **Wheeler River Project** draft EIS
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| Constituent | Unit | Kratchkowsky Lake (LA-7) | Whitefish Lake North (LA-6) | Whitefish Lake Middle (LA-5 North) | Whitefish Lake South (LA-5 South) | McGowan Lake (LA-1) | Iceland River | Russell Lake Inlet | Screening Concentration | Source of Screening Concentration |
|---|------|--|-----------------------------|------------------------------------|-----------------------------------|---------------------|---------------|--------------------|-------------------------|-----------------------------------|
| TSS | | Will be mitigated through design and treatment and monitored as per CCME and MDMER Sched 4 criterion | | | | | | | | MDMER Sched 4 |
| Iron | | Monitoring required under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | MDMER Sched 5 |
| Thallium | | Monitoring required under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | MDMER Sched 5 |
| Manganese | | Monitoring required under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | MDMER Sched 5 |
| Phosphorus | | Monitoring required under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | MDMER Sched 5 |
| Notes (1) Bolded values are those that exceed the screening concentrations * Hardness induced guideline, assuming hardness >250 mg/L ** Hardness induced guideline, assuming hardness >250 mg/L, pH=7.0, DOC = 5.26 mg/L Un-ionized ammonia represented by calculated values | | | | | | | | | | |

IR-114 Table 1: Total and Dissolved Mercury Concentrations in the LSA and RSA

| Parameter | Total Mercury, Dissolved | Total Mercury |
|------------------|-----------------------------|---------------|
| Units | mg/L | mg/L |
| Total Count | 40 | 59 |
| Count (<RDL) | 39 | 46 |
| Minimum | <1.00E-05 | <1.00E-07 |
| 5th Percentile | <1.00E-05 | <8.20E-07 |
| 50th Percentile | <1.00E-05 | <1.00E-05 |
| 95th Percentile | <1.00E-05 | <1.00E-05 |
| Maximum | <1.00E-05 | <1.00E-05 |
| Arithmetic Mean | <1.00E-05 | <7.63E-06 |
| StdDev | 2.76E-12 | 3.70E-06 |
| Std Error | 0 | 4.81E-07 |
| Geometric Mean | <1.00E-05 | <5.38E-06 |
| Geometric StdDev | 1. | 3.281 |

Notes:

1. The summary time is between 01-Jan-2010 and 31-Dec-2021.
2. The reporting locations are: "LA-1", "LA-1-Bottom", "LA-5", "LA-6", "LAB-1", "LAB-2", "SA-1", "SA-2", "SA-3", "SA-6".

Attachment: IR-115

| | |
|---|---|
| Number | IR-115 |
| Dept. | ECCC |
| Project effects link | Fish and Fish Habitat |
| Reference to EIS, appendices, or supporting documentation | Section 8.2.4.2.3 Aquatic Environment Appendix 10-A (ERA), Section 3.1.1.1 |
| Context and Rationale | <p>Context: Table 8.2-8 demonstrates baseline concentrations of COPCs in LA-5 South Whitefish Lake, their respective water quality guidelines from applicable sources, and proposed Project thresholds. General parameters such as temperature, pH, conductivity, etc. that would require Project thresholds and monitoring under the MDMER have not been provided in this table. Lead, nickel, Total Suspended Solids (TSS) and un-ionized ammonia were not provided, despite all being Schedule 4 substances with maximum monthly concentrations under the MDMER. Aluminum, iron, nitrate, thallium, and manganese have not been provided despite being required parameters under Schedule 5 Section 4 of the MDMER for effluent characterization. Water quality thresholds appear to have been calculated using estimated effluent concentrations rather than receiving environment baseline concentrations. The water quality objective selected for molybdenum is the 31 mg/L SEQG rather than the CCME guideline of 0.073 mg/L.</p> <p>Rationale: ECCC recommends the use of guidelines that will ensure the protection of aquatic biota. All water quality thresholds should be derived from receiving environment parameters to determine any baseline receiving environment and effluent COPC exceedances of water quality thresholds.</p> |
| Information Requirement | <ol style="list-style-type: none"> 1. Update Table 8.2-8 to include all COPCs with required monitoring under the MDMER. 2. Ensure all selected water quality thresholds are derived using baseline receiving environment concentrations and are at levels protective of aquatic life. 3. Provide additional information to justify the use of the selected water quality guideline for molybdenum. |

Table to support response:

Table 8.2-8 has been updated and provided below.

| Constituent | Unit | LA-5 Background Concentration (95th percentile) | Screening Concentration | Source of Screening Concentration |
|---------------------|------|---|-------------------------|-----------------------------------|
| Chloride | mg/L | 0.39 | 120 | SEQG/CCME |
| Sulphate (Hardness) | mg/L | 0.69 | 429 | BC MOE* |
| Sulphate | mg/L | 0.69 | 128 | BC MOE |
| TDS | mg/L | 28.3 | 500 | SEQG |
| TSS | mg/L | 3.9 | 15 | Schd 4 - MDMER |
| Arsenic | mg/L | 0.0001 | 0.01 | SEQG/CCME |
| Cadmium | mg/L | 0.000019 | 0.0003 | SEQG/CCME* |
| Chromium | mg/L | <0.0005 | 0.001 | SEQG/CCME |
| Cobalt | mg/L | <0.0001 | 0.0003 | FEQG |
| Copper | mg/L | <0.0002 | 0.004 | SEQG/CCME* |
| Lead | mg/L | <0.0001 | 0.005 | CCME |
| Molybdenum | mg/L | <0.0001 | 0.07 | WHO |
| Nickel | mg/L | <0.0001 | 0.07 | WHO |
| Selenium | mg/L | <0.0001 | 0.001 | SEQG/CCME |
| Uranium | mg/L | <0.0001 | 0.02 | SEQG/CCME |
| Vanadium | mg/L | <0.0001 | 0.12 | FEQG |
| Zinc | mg/L | 0.0011 | 0.1 | FEQG** |
| Mercury | mg/L | <0.00001 | 0.000026 | SEQG/CCME |
| Ammonia (as N) | mg/L | 0.068 | 5.74 | SEQG/CCME |
| Phosphorus | mg/L | <0.01 | 0.015 | BC MOE |
| Thorium-230 | Bq/L | <0.01 | 0.6 | HC |
| Radium-226 | Bq/L | <0.0059 | 0.11 | SEQG |
| Lead-210 | Bq/L | <0.02 | 0.2 | HC |
| Polonium-210 | Bq/L | <0.005 | 0.1 | HC |

Notes

* Hardness induced guideline, assuming hardness >250 mg/L

** Hardness induced guideline, assuming hardness >250 mg/L, pH=7.0, DOC = 5.26 mg/L

Attachment: IR-116

| | |
|---|--|
| Number | IR-116 |
| Dept. | ECCC |
| Project effects link | Change to an environmental component due to hazardous contaminants |
| Reference to EIS, appendices, or supporting documentation | Section 8.2.4.2.5, Section 8.4.4.2.5 and Section 8.5.4.2.3 |
| Context and Rationale | <p>Context: Tables 8.2-14, 8.4-9 and 8.5-5 demonstrate predicted mass flux (in mg/s) of COPCs in groundwater during the future centuries scenario. The table does not provide any information on actual surface water concentrations of COPCs or accumulation in concentrations over time. It is not possible to determine what the COPC concentrations in surface water and sediment will be during the future centuries scenario with the current information.</p> <p>Additionally, only a subset of parameters have been provided in this table based on parameters that were elevated in effluent after treatment. Groundwater may have a variety of different COPCs with elevated concentrations as it will migrate directly from the ore body area and not receive treatment.</p> <p>Rationale: It is not possible for ECCC to assess the predicted concentrations of COPCs in surface water and sediment, and therefore risk to aquatic biota during the future centuries scenario with the provided information.</p> |
| Information Requirement | <p>Information Requirement:</p> <ol style="list-style-type: none"> 1. Provide the predicted water and sediment quality concentrations of COPCs in the receiving environment for the future centuries scenario. 2. Include data for a greater suite of COPCs that were assessed as having potential to be at elevated concentrations in groundwater. |

Response:

- 1) The maximum concentrations of COPCs in surface water and sediment during the Future Centuries period are provided in IR-116 Table 1 and IR-116 Table 2, respectively.
- 2) The suite of COPCs that are provided in IR-116 Table 1 and IR-116 Table 2 are generally inclusive of those that have the potential for elevated concentrations in groundwater. However, estimates for pH, iron and manganese have not currently been modelled. These three parameters were identified in

Section 7.6.2.2.3 and Appendix 7-C as having the potential to be present in groundwater above the groundwater quality screening criteria (see Table 7.6-1 in the EIS and Table 3-4 in Appendix 7-C [existing conditions groundwater quality]).

During future centuries, groundwater that may reach Whitefish Lake is estimated to have a pH ranging from 6.39 to 6.47, which is slightly below the screening criteria of 6.5 to 9. However, the range predicted is within the range of the local groundwater flow system of 5.9 to 7.5 (median of 6.5, as provided in Table 3-4 of Appendix 7-C). Therefore, no change from the current existing conditions is expected during future centuries.

During future centuries, groundwater that may reach Whitefish Lake is estimated to have an iron concentration ranging from 0.0065 mg/L and 2.91 mg/L. The upper range of concentrations will exceed the Groundwater quality guideline of 0.3 mg/L. However, the range predicted is within the range of dissolved iron concentrations measured for groundwater in the local groundwater flow system, of 0.01 mg/L to 4.8 mg/L (median of 0.41). Therefore, no change from the current existing conditions is expected.

During future centuries, groundwater that may reach Whitefish Lake is estimated to have a manganese concentration ranging from 0.279 mg/L and 0.289 mg/L. The range of predicted concentrations will exceed the Groundwater quality guideline of 0.230 mg/L. However, the range predicted is only marginally above that of the local groundwater flow system of 0.04 mg/L and 0.2 mg/L (median of 0.1) and within a similar magnitude.

Arsenic concentrations in sediment have also been predicted based on mass-flux in a conservative manner and indicate potential exceedance of the CCME ISQG.

The modelled predictions of the future centuries groundwater are highly conservative. Continued monitoring of groundwater through the period of construction and initial operation will allow for refinement of the predictions for the future centuries scenario, thereby providing information for adaptive management.

IR-116 Table 1: Maximum Concentration of Surface Water Constituents of Potential Concern in Surface Water During Future Centuries

| Constituent | Unit | Kratchkowsky Lake (LA-7) | Whitefish Lake North (LA-6) | Whitefish Lake Middle (LA-5 North) | Whitefish Lake South (LA-5 South) | McGowan Lake (LA-1) | Icelander River | Russell Lake Inlet | Screening Concentration | Source of Screening Concentration |
|--------------------|------|--|-----------------------------|------------------------------------|-----------------------------------|---------------------|-----------------|--------------------|-------------------------|-----------------------------------|
| Chloride | mg/L | 0.32 | 0.32 | 0.41 | 0.41 | 0.39 | 0.39 | 0.38 | 120 | SEQG/CCME |
| Sulphate | mg/L | 0.69 | 0.69 | 0.72 | 0.72 | 0.71 | 0.71 | 0.71 | 128 | BC MOE |
| Arsenic | mg/L | 0.000103 | 0.000103 | 0.000107 | 0.000107 | 0.000105 | 0.000105 | 0.000104 | 0.01 | SEQG/CCME |
| Cadmium | mg/L | 0.0000232 | 0.0000232 | 0.0000233 | 0.0000233 | 0.0000233 | 0.0000233 | 0.0000232 | 0.0003 | SEQG/CCME* |
| Chromium | mg/L | 0.00052 | 0.00052 | 0.00053 | 0.00053 | 0.00052 | 0.00052 | 0.00052 | 0.001 | SEQG/CCME |
| Cobalt | mg/L | 0.00010 | 0.00010 | 0.00011 | 0.00011 | 0.00011 | 0.00010 | 0.00010 | 0.0003 | FEQG |
| Copper | mg/L | 0.00062 | 0.00062 | 0.00063 | 0.00063 | 0.00062 | 0.00062 | 0.00062 | 0.004 | SEQG/CCME* |
| Lead | mg/L | 0.00011 | 0.00011 | 0.00011 | 0.00011 | 0.00011 | 0.00011 | 0.00011 | 0.005 | CCME |
| Molybdenum | mg/L | 0.00011 | 0.00011 | 0.00012 | 0.00012 | 0.00011 | 0.00011 | 0.00011 | 0.07 | WHO |
| Nickel | mg/L | 0.00038 | 0.00038 | 0.00041 | 0.00041 | 0.00040 | 0.00040 | 0.00039 | 0.07 | WHO |
| Selenium | mg/L | 0.00003 | 0.00003 | 0.00004 | 0.00004 | 0.00004 | 0.00004 | 0.00004 | 0.001 | SEQG/CCME |
| Uranium | mg/L | 0.00003 | 0.00003 | 0.00004 | 0.00004 | 0.00003 | 0.00003 | 0.00003 | 0.02 | SEQG/CCME |
| Vanadium | mg/L | 0.00015 | 0.00015 | 0.00015 | 0.00015 | 0.00015 | 0.00015 | 0.00015 | 0.12 | FEQG |
| Zinc | mg/L | 0.00068 | 0.00068 | 0.00074 | 0.00074 | 0.00072 | 0.00072 | 0.00071 | 0.1 | FEQG** |
| Ammonia (as N) | mg/L | 0.01463 | 0.01463 | 0.01463 | 0.01463 | 0.01463 | 0.01463 | 0.01463 | 5.74 | SEQG/CCME |
| Un-ionized Ammonia | mg/L | 0.000035 | 0.000035 | 0.000035 | 0.000035 | 0.000035 | 0.000035 | 0.000035 | 1.00 | MDMER Sched 4 |
| Thorium-230 | Bq/L | 0.01010 | 0.01010 | 0.01036 | 0.01036 | 0.01030 | 0.01030 | 0.01025 | 0.6 | HC |
| Radium-226 | Bq/L | 0.00557 | 0.00557 | 0.00639 | 0.00637 | 0.00615 | 0.00614 | 0.00600 | 0.11 | SEQG |
| Lead-210 | Bq/L | 0.00527 | 0.00527 | 0.00605 | 0.00592 | 0.00557 | 0.00556 | 0.00545 | 0.2 | HC |
| Polonium-210 | Bq/L | 0.00536 | 0.00536 | 0.00615 | 0.00602 | 0.00566 | 0.00564 | 0.00553 | 0.1 | HC |
| Mercury | mg/L | No background information or effluent concentration to model | | | | | | | | |
| Aluminum | | Monitoring required under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | MDMER Sched 5 |
| TSS | | Will be mitigated through design and treatment and monitored as per CCME and MDMER Sched 4 criterion | | | | | | | | MDMER Sched 4 |
| Iron | | Monitoring required under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | MDMER Sched 5 |
| Thallium | | Monitoring required under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | MDMER Sched 5 |

Annex 1 – FIRT IR Table – Technical Review of the **Wheeler River Project** draft EIS
Denison Response – August 18th, 2023

| Constituent | Unit | Kratchkowsky Lake (LA-7) | Whitefish Lake North (LA-6) | Whitefish Lake Middle (LA-5 North) | Whitefish Lake South (LA-5 South) | McGowan Lake (LA-1) | Icelander River | Russell Lake Inlet | Screening Concentration | Source of Screening Concentration |
|--|------|---|-----------------------------|------------------------------------|-----------------------------------|---------------------|-----------------|--------------------|-------------------------|-----------------------------------|
| Manganese | | Monitoring required under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | MDMER Sched 5 |
| Phosphorus | | Monitoring required under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | MDMER Sched 5 |
| Notes (1) Bolded values are those that exceed the screening concentrations * Hardness induced guideline, assuming hardness >250 mg/L ** Hardness induced guideline, assuming hardness >250 mg/L, pH=7.0, DOC = 5.26 mg/L | | | | | | | | | | |

IR-116 Table 2: Predicted Maximum Sediment Quality during Future Centuries

| Constituent | Unit | Kratchkowsky Lake (LA-7) | Whitefish Lake North (LA-6) | Whitefish Lake Middle (LA-5 North) | Whitefish Lake South (LA-5 South) | McGowan Lake (LA-1) | Russell Lake Inlet | Sediment Quality Guidelines | | | | | |
|-------------|-----------|--------------------------|-----------------------------|------------------------------------|-----------------------------------|---------------------|--------------------|-----------------------------|------|-----------------|-------|------|------|
| | | | | | | | | Burnett-Seidel and Liber | | Thompson et al. | | CCME | |
| | | | | | | | | REF | NE2 | LEL | SEL | ISQG | PEL |
| Chloride | mg/kg(dw) | 2.81 | 2.81 | 3.62 | 3.61 | 3.43 | 3.29 | -- | -- | -- | -- | -- | -- |
| Sulphate | mg/kg(dw) | 6.00 | 6.00 | 6.29 | 6.29 | 6.22 | 6.17 | -- | -- | -- | -- | -- | -- |
| Arsenic | mg/kg(dw) | 8.35 | 8.35 | 8.66 | 8.62 | 8.48 | 8.43 | 21 | 522 | 9.8 | 346.4 | 5.9 | 17 |
| Cadmium | mg/kg(dw) | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | -- | -- | -- | -- | 0.6 | 3.5 |
| Chromium | mg/kg(dw) | 5.86 | 5.86 | 5.94 | 5.93 | 5.91 | 5.90 | 31.5 | 26.2 | 47.6 | 115.4 | 37.3 | 90 |
| Cobalt | mg/kg(dw) | 0.25 | 0.25 | 0.27 | 0.26 | 0.26 | 0.26 | -- | -- | -- | -- | -- | -- |
| Copper | mg/kg(dw) | 1.85 | 1.85 | 1.87 | 1.87 | 1.87 | 1.86 | 9.1 | 11.3 | 22.2 | 268.8 | 35.7 | 197 |
| Lead | mg/kg(dw) | 10.21 | 10.21 | 10.34 | 10.31 | 10.26 | 10.24 | 16.3 | 19.7 | 36.7 | 412.4 | 35 | 91.3 |
| Molybdenum | mg/kg(dw) | 0.34 | 0.34 | 0.37 | 0.37 | 0.36 | 0.35 | 23 | 245 | 13.8 | 1,239 | -- | -- |
| Nickel | mg/kg(dw) | 3.32 | 3.32 | 3.53 | 3.52 | 3.47 | 3.43 | 21 | 326 | 23.4 | 484 | -- | -- |

Annex 1 – FIRT IR Table – Technical Review of the **Wheeler River Project** draft EIS
Denison Response – August 18th, 2023

| Constituent | Unit | Kratchkowsky Lake (LA-7) | Whitefish Lake North (LA-6) | Whitefish Lake Middle (LA-5 North) | Whitefish Lake South (LA-5 South) | McGowan Lake (LA-1) | Russell Lake InLet | Sediment Quality Guidelines | | | | | |
|-------------------|-----------|---|-----------------------------|------------------------------------|-----------------------------------|---------------------|--------------------|-----------------------------|-------|-----------------|--------|------|-----|
| | | | | | | | | Burnett-Seidel and Liber | | Thompson et al. | | CCME | |
| | | | | | | | | REF | NE2 | LEL | SEL | ISQG | PEL |
| Selenium | mg/kg(dw) | 0.62 | 0.62 | 0.83 | 0.82 | 0.76 | 0.72 | 3.6 | 30 | 1.9 | 16.1 | -- | -- |
| Uranium | mg/kg(dw) | 0.58 | 0.58 | 0.71 | 0.70 | 0.66 | 0.64 | 97 | 2,296 | 104.4 | 5,874 | -- | -- |
| Zinc | mg/kg(dw) | 9.93 | 9.93 | 10.79 | 10.76 | 10.52 | 10.37 | -- | -- | -- | -- | 123 | 315 |
| Total Ammonia (N) | mg/kg(dw) | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | -- | -- | -- | -- | -- | -- |
| Thorium-230 | Bq/kg(dw) | 23.19 | 23.19 | 23.80 | 23.79 | 23.64 | 23.54 | -- | -- | -- | -- | -- | -- |
| Radium-226 | Bq/kg(dw) | 65.14 | 65.14 | 74.67 | 74.39 | 71.82 | 70.13 | -- | -- | 600 | 14,400 | -- | -- |
| Lead-210 | Bq/kg(dw) | 373.84 | 373.84 | 428.83 | 419.39 | 394.66 | 386.43 | -- | -- | 900 | 20,800 | -- | -- |
| Polonium-210 | Bq/kg(dw) | 380.31 | 380.31 | 436.25 | 426.65 | 401.49 | 393.07 | -- | -- | 800 | 12,100 | -- | -- |
| Mercury | mg/kg(dw) | No background information or effluent concentration to model | | | | | | | | | | | |
| Aluminum | mg/kg(dw) | Monitoring required in effluent under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | | | | |
| Iron | mg/kg(dw) | Monitoring required in effluent under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | | | | |
| Thallium | mg/kg(dw) | Monitoring required in effluent under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | | | | |
| Manganese | mg/kg(dw) | Monitoring required in effluent under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | | | | |
| Phosphorus | mg/kg(dw) | Monitoring required in effluent under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | | | | |

Note:

bolded values indicate exceedance of the CCME ISQG

Attachment: IR-123

| | |
|---|--|
| Number | IR-123 |
| Dept. | ECCC |
| Project effects link | Change to an environmental component due to radiological contaminants |
| Reference to EIS, appendices, or supporting documentation | Section 8.4.3.2.3, Aquatic Environment Appendix 8-D, Table 3-5 |
| Context and Rationale | <p>Context: Table 8.4-3 provides a summary of the baseline concentrations of COPCs in sediments in the LSA. Sediment quality thresholds and justification for the selection of those thresholds have not been provided. Table 3-5 in Appendix 8-D does provide benchmarks but the selection of benchmarks is not discussed, and the most stringent guidelines are not used for some COPCs. Additionally, there is no data provided for sediment concentrations of mercury, which is a COPC that requires surface water quality monitoring and effluent characterization under the MDMER.</p> <p>Rationale: Further information should be provided regarding any exceedances of sediment quality thresholds in baseline concentrations of COPCs, which should be recommended for further assessment of risk due to effluent discharges.</p> |
| Information Requirement | <ol style="list-style-type: none"> 1. Provide sediment quality thresholds and justification for the selection of those thresholds for comparison against measured baseline COPC concentrations in the LSA. 2. Provide data on baseline concentrations of mercury in sediment. 3. Identify any COPCs with baseline concentrations that exceed sediment quality thresholds in the LSA. |

Table 1 is provided below to support the text response to IR-123 in the IR table:

Table 1: Baseline Sediment Quality Summary

| Category | Parameter | Units | Total Count | Count (<RDL) | Min | 5th Percentile | 50th Percentile | 95th Percentile | Max | Arithmetic Mean | StdDev | Std Error | Geometric Mean | Geometric StdDev | Sediment Quality Guidelines | | | | | |
|----------------|------------|-------|-------------|--------------|-------|----------------|-----------------|-----------------|-------|-----------------|----------|-----------|----------------|------------------|-----------------------------|------|-----------------|-------|------|------|
| | | | | | | | | | | | | | | | Burnett-Seidel and Liber | | Thompson et al. | | CCME | |
| | | | | | | | | | | | | | | | REF | NE2 | LEL | SEL | ISQG | PEL |
| Physical Tests | Moisture | % | 22 | 0 | 24.59 | 28.934 | 94.81 | 96.858 | 97.24 | 74.715 | 31.256 | 6.6637 | 66.042 | 1.7444 | | | | | | |
| Total Metals | Aluminum | ug/g | 22 | 0 | 920 | 1144 | 4645 | 9110. | 9300 | 4391.82 | 2321.67 | 494.98 | 3723.16 | 1.8908 | n/d | n/d | n/d | n/d | n/d | n/d |
| | Antimony | ug/g | 22 | 17 | <0.2 | 0.2 | 0.2 | 0.295 | 0.3 | <0.20909 | 0.029425 | 0.0062733 | <0.20751 | 1.1267 | n/d | n/d | n/d | n/d | n/d | n/d |
| | Arsenic | ug/g | 22 | 0 | 0.4 | 0.505 | 3.35 | 5.695 | 7.2 | 3.1909 | 2.0128 | 0.42913 | 2.3379 | 2.5249 | 21 | 522 | 9.8 | 346.4 | 5.9 | 17 |
| | Barium | ug/g | 22 | 0 | 19 | 21.25 | 42.5 | 70.45 | 100 | 43.727 | 17.694 | 3.7723 | 40.761 | 1.4647 | n/d | n/d | n/d | n/d | n/d | n/d |
| | Beryllium | ug/g | 22 | 7 | <0.1 | <0.1 | 0.3 | 0.395 | 0.5 | <0.24545 | 0.11434 | 0.024377 | <0.21531 | 1.747 | n/d | n/d | n/d | n/d | n/d | n/d |
| | Boron | ug/g | 22 | 7 | <1 | <1 | 5.5 | 11 | 12 | <5.0455 | 3.5787 | 0.76299 | <3.5672 | 2.5755 | n/d | n/d | n/d | n/d | n/d | n/d |
| | Cadmium | ug/g | 22 | 2 | <0.1 | <0.1 | 0.4 | 0.595 | 0.7 | <0.35909 | 0.16521 | 0.035223 | <0.31108 | 1.8383 | n/d | n/d | n/d | n/d | 0.6 | 3.5 |
| | Chromium | ug/g | 22 | 3 | <0.5 | <0.5 | 8.15 | 14.9 | 16 | <7.55 | 4.7699 | 1.017 | <5.0365 | 3.1656 | 31.5 | 26.2 | 47.6 | 115.4 | 37.3 | 90 |
| | Cobalt | ug/g | 22 | 5 | <0.2 | 0.2 | 1.65 | 2.68 | 3.8 | <1.4591 | 1.0051 | 0.21428 | <0.96852 | 2.9677 | n/d | n/d | n/d | n/d | n/d | n/d |
| | Copper | ug/g | 22 | 7 | <0.5 | <0.5 | 1.65 | 4.565 | 5 | <1.9136 | 1.3981 | 0.29807 | <1.4281 | 2.2783 | 9.1 | 11.3 | 22.2 | 268.8 | 35.7 | 197 |
| | Iron | ug/g | 22 | 0 | 1410 | 1590.5 | 12650 | 32699.99 | 91300 | 16020 | 18960.23 | 4042.33 | 9545.32 | 3.0244 | n/d | n/d | n/d | n/d | n/d | n/d |
| | Lead | ug/g | 22 | 0 | 1 | 1 | 7.3 | 10 | 13 | 6.0545 | 3.6694 | 0.78232 | 4.4383 | 2.5369 | 16.3 | 19.7 | 36.7 | 412.4 | 35 | 91.3 |
| | Manganese | ug/g | 22 | 0 | 22 | 22.55 | 195 | 388.5 | 1270 | 237.41 | 253.54 | 54.056 | 159.75 | 2.6446 | n/d | n/d | n/d | n/d | n/d | n/d |
| | Molybdenum | ug/g | 22 | 2 | <0.1 | 0.1 | 0.65 | 11.95 | 13 | <2.4455 | 4.1007 | 0.87428 | <0.83873 | 4.1956 | 23 | 245 | 13.8 | 1,239 | n/d | n/d |
| | Nickel | ug/g | 22 | 3 | <0.1 | <0.1 | 5.6 | 11.895 | 12 | <5.1 | 3.6738 | 0.78327 | <2.7847 | 4.651 | 21 | 326 | 23.4 | 484 | n/d | n/d |
| | Selenium | ug/g | 22 | 7 | <0.1 | <0.1 | 0.8 | 1.49 | 1.6 | <0.73182 | 0.49989 | 0.10658 | <0.4781 | 3.0508 | 3.6 | 30 | 1.9 | 16.1 | n/d | n/d |
| | Silver | ug/g | 22 | 11 | <0.1 | <0.1 | <0.1 | 0.68 | 2 | <0.25455 | 0.41142 | 0.087714 | <0.16407 | 2.1254 | n/d | n/d | n/d | n/d | n/d | n/d |
| | Strontium | ug/g | 22 | 0 | 16 | 17 | 26.5 | 39.75 | 42 | 26.545 | 7.076 | 1.5086 | 25.66 | 1.3072 | n/d | n/d | n/d | n/d | n/d | n/d |
| | Thallium | ug/g | 22 | 22 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | 0 | 0 | <0.2 | 1 | n/d | n/d | n/d | n/d | n/d | n/d |

Annex 1 – FIRT IR Table – Technical Review of the **Wheeler River Project** draft EIS
Denison Response – August 18th, 2023

| | | | | | | | | | | | | | | | | | | | | |
|---------------|--------------|------|----|----|-------|-------|-------|--------|-------|-----------|----------|------------|-----------|--------|------|-------|-------|-------|-----|-----|
| Radionuclides | Tin | ug/g | 22 | 7 | <0.1 | <0.1 | 0.2 | 0.4 | 0.4 | <0.19091 | 0.10193 | 0.021731 | <0.16863 | 1.6518 | n/d | n/d | n/d | n/d | n/d | n/d |
| | Titanium | ug/g | 22 | 0 | 31 | 31.25 | 200 | 446.5 | 480 | 205.36 | 139.5 | 29.741 | 147.31 | 2.5607 | n/d | n/d | n/d | n/d | n/d | n/d |
| | Uranium | ug/g | 22 | 0 | 0.2 | 0.2 | 0.7 | 1.395 | 1.5 | 0.67727 | 0.38537 | 0.08216 | 0.56276 | 1.9464 | 97 | 2,296 | 104.4 | 5,874 | n/d | n/d |
| | Vanadium | ug/g | 22 | 0 | 1.2 | 1.3 | 18 | 26.75 | 30 | 14.223 | 9.3994 | 2.004 | 8.7761 | 3.4375 | 35.1 | 31.8 | 35.2 | 160 | n/d | n/d |
| | Zinc | ug/g | 22 | 5 | <0.5 | <0.5 | 24 | 43.3 | 62 | <19.85 | 16.079 | 3.4281 | <8.2122 | 6.2729 | n/d | n/d | n/d | n/d | 123 | 315 |
| | Lead-210 | Bq/g | 22 | 7 | <0.04 | <0.04 | 0.415 | 0.725 | 0.75 | <0.35273 | 0.24914 | 0.053116 | <0.21687 | 3.3521 | n/d | n/d | 0.9 | 20.8 | n/d | n/d |
| | Polonium-210 | Bq/g | 22 | 1 | <0.01 | 0.02 | 0.41 | 0.678 | 0.76 | <0.35136 | 0.25533 | 0.054436 | <0.17468 | 4.8038 | n/d | n/d | 0.8 | 12.1 | n/d | n/d |
| | Radium-226 | Bq/g | 22 | 6 | <0.01 | <0.01 | 0.03 | 0.0495 | 0.05 | <0.025909 | 0.012968 | 0.0027649 | <0.0225 | 1.7702 | n/d | n/d | 0.6 | 14.4 | n/d | n/d |
| | Thorium-228 | Bq/g | 22 | 20 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 3.81E-09 | 8.13E-10 | <0.02 | 1 | n/d | n/d | n/d | n/d | n/d | n/d |
| | Thorium-230 | Bq/g | 22 | 20 | <0.02 | <0.02 | <0.02 | <0.02 | 0.03 | <0.020455 | 0.002132 | 0.00045455 | <0.020372 | 1.0903 | n/d | n/d | n/d | n/d | n/d | n/d |
| | Thorium-232 | Bq/g | 22 | 22 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 3.81E-09 | 8.13E-10 | <0.02 | 1 | n/d | n/d | n/d | n/d | n/d | n/d |

Notes:

1. The summary time is between 01-Jan-2010 and 31-Dec-2021.

2. The reporting locations are: "LA-1-1", "LA-1-2", "LA-1-3", "LA-5-1", "LA-5-2", "LA-5-3", "LA-5-4", "LA-5-5", "LA-6-1", "LA-6-2", "LA-6-3", "LA-6-4", "LA-6-5", "LAB-1-1", "LAB-1-2", "LAB-1-3", "LAB-2-1", "LAB-2-2", "LAB-2-3", "LAB-2-CORE".

0.7

indicates exceedance of CCME ISQG

Attachment: IR-131

| | |
|---|--|
| Number | IR-131 |
| Dept. | CNSC |
| Project effects link | Migratory birds, Wildlife and Wildlife Habitat |
| Reference to EIS, appendices, or supporting documentation | Section 9, Terrestrial Environment |
| Context and Rationale | <p>Context and Rationale: As per the requirement outlined in Section 79 of the Species at Risk Act (SARA): The person must identify the adverse effects of the project on the listed wildlife species and its critical habitat and, if the project is carried out, must ensure that measures are taken to avoid or lessen those effects and to monitor them. The measures must be taken in a way that is consistent with any applicable recovery strategy and action plans. This is accomplished by ensuring that the Proponent has identified, avoided, lessened and will monitor effects to species at risk.</p> <p>As per the CNSC's Generic Guidelines for the Preparation of an EIS pursuant to the Canadian Environmental Assessment Act, 2012: "The EIS will then describe mitigation measures that are specific to each environmental effect identified. Measures will be written as specific commitments that clearly describe how the proponent intends to implement them and the environmental outcome the mitigation is designed to address. The EIS will describe mitigation measures in relation to species and/or critical habitat listed under the Species at Risk Act (SARA). These mitigation measures will be consistent with any SARA permit, applicable recovery strategy and/or action plan".</p> <p>The draft EIS neither lists the adverse effects to all listed schedule 1 SARA species, nor outlines the measures that will be taken to avoid or lessen these effects. The Proponent references that additional species-specific mitigations will be detailed in environmental management plans but has not provided those plans for review.</p> |
| Information Requirement | Identify all species at risk listed on Schedule 1 of the Species at Risk Act and their critical habitat that are likely to be affected by the Project and describe how they may be adversely affected by the Project. Describe what measures will be taken to avoid or lessen the effects of each Project activity and stage, and how these effects will be monitored to ensure they are avoided or minimized. |

Response:

A new appendix to the final EIS (Appendix 9-D Species At Risk) is included below.



 Denison Mines

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Denison Mines Corp.

Appendix 9-D Wildlife Species At Risk

New Appendix to final EIS, Section 9

Version 1

July 2023

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Acronyms and Abbreviations

| Term | Definition |
|---------|--|
| BBS | Breeding Bird Survey |
| BC | British Columbia |
| CEA | Cumulative effects assessment |
| COSEWIC | Committee on the Status of Endangered Wildlife in Canada |
| ECCC | Environment and Climate Change Canada |
| EIS | Environmental Impact Statement |
| EMS | Environmental Management System |
| FIRT | Federal-Indigenous Review Team |
| IRs | Information requests |
| ISR | In situ recovery |
| KI | Key Indicator |
| LSA | Local Study Area |
| Project | Wheeler River Project |
| QP | Qualified Professional |
| RSA | Regional Study Area |
| SAR | Species at risk |
| SARA | <i>Species at Risk Act</i> |
| SARGSS | Saskatchewan Activity Restriction Guidelines for Sensitive Species |
| SKCDC | Saskatchewan Conservation Data Centre |
| VC | Valued Component |

1 Introduction

1.1 Background

On October 21, 2022, Denison Mines Corp. (Denison) submitted a draft Environmental Impact Statement (EIS) for the proposed Wheeler River Project (the Project). Based on their initial review, the Canadian Nuclear Safety Commission indicated that the submission contained the required information to proceed with the Federal-Indigenous Review Team (FIRT) technical review of the draft EIS. On March 20, 2023, the FIRT provided Denison with a list of information requests (IRs) for Denison to respond to and eventually submit a final EIS document.

This Appendix provides additional information to address several IRs provided by Environment and Climate Change Canada (ECCC) as part of the initial round of Federal Indigenous Review Team (FIRT) comments. These IRs were related to 16 wildlife species at risk (SAR) listed under Schedule 1 of the federal *Species at Risk Act* (SARA). The draft EIS approach was conservative in that it considered appropriate representative species as Valued Components (VCs) and Key Indicators (KIs) in sections 9.3 Ungulates, Furbearers, and Woodland Caribou and 9.4 Raptors, Migratory Breeding Birds, and Bird SAR. Of the 16 wildlife SAR listed in Table 1.1, seven had been included as VCs or KIs in the EIS after a thorough scoping process (refer to Section 1.2 for additional information).

Nine of the sixteen were not included as individual VCs or KIs but are considered important from a regulatory perspective. The SARA-listed species identified by ECCC are listed in Table 1.1. Those noted in bold font indicate those for which further assessment is provided in this appendix.

Table 1.1 Wildlife Species at Risk Listed by Environment and Climate Change Canada

| Common Name | Scientific Name | Discussed in the draft EIS |
|--------------------------|-------------------------------------|----------------------------|
| Nine-spotted lady beetle | <i>Coccinella overnotata</i> | No |
| Transverse lady beetle | <i>Coccinella transversoguttata</i> | No |
| Yellow-banded bumble bee | <i>Bombus terricola</i> | No |
| Northern leopard frog | <i>Lithobates pipiens</i> | No |
| Little brown myotis | <i>Myotis lucifugus</i> | No |
| Northern myotis | <i>Myotis septentrionalis</i> | No |
| Wolverine | <i>Gulo gulo</i> | Yes |
| Woodland caribou | <i>Rangifer tarandus caribou</i> | Yes |
| Bank Swallow | <i>Riparia riparia</i> | No |
| Barn Swallow | <i>Hirundo rustica</i> | No |
| Common Nighthawk | <i>Chordeiles minor</i> | Yes |
| Horned Grebe | <i>Podiceps auritus</i> | No |
| Olive-sided Flycatcher | <i>Contopus cooperi</i> | Yes |
| Rusty Blackbird | <i>Euphagus carolinus</i> | Yes |

| Common Name | Scientific Name | Discussed in the draft EIS |
|-----------------|-----------------------------------|----------------------------|
| Short-eared Owl | <i>Asio flammeus</i> | Yes |
| Yellow Rail | <i>Coturnicops noveboracensis</i> | Yes |

Of the 16 species listed in Table 1.1, seven had been included as VCs or KIs in the EIS after a thorough scoping process, as summarized below.

1.2 Valued Component Selection

The VCs considered in the effects assessment for the Project are aspects of the biophysical and human environments that were considered to be likely to be affected (adversely or positively) by the Project. The VCs reflect identified scientific, local knowledge, and Indigenous Knowledge, and community interests regarding the Project and its potential effects. The potential effects are typically identified early in the environmental assessment process as a result of questions and concerns raised through engagement with Indigenous and community groups, government departments and agencies, and the general public.

Denison reviewed and considered all received input to develop a VC list that reflects the key environmental, socio-economic, heritage, and human health components and interests to appropriately focus the EA.

The initial VCs selected to represent bird SAR in the habitat-based assessment that were provided in the Terms of Reference (Denison 2019) were evaluated, consolidated, and organized to allow for the logical assessment of Project effects, and are presented in Table 1.2 and Table 1.3, which formed the basis for the subsequent VC-specific assessment.

Table 1.2 Wildlife Species at Risk Valued Component and Rationale for their Inclusion in the Habitat-based Environmental Assessment for the Denison Wheeler River Project

| Valued Component | Rationale |
|---------------------------------------|--|
| Biophysical Environment | |
| <i>Terrestrial Environment</i> | |
| Furbearers | Project activities and infrastructure may affect local furbearer populations, including species at risk (SAR), resulting in non-compliance with permit conditions (e.g., <i>Species at Risk Act</i> [SARA; Government of Canada 2022], <i>The Wildlife Act 1998</i> [Government of Saskatchewan 2020]). |
| Woodland Caribou | Project activities and infrastructure may affect woodland caribou populations, resulting in non-compliance with permit conditions (e.g., SARA [Government of Canada 2022], <i>The Wildlife Act, 1998</i> [Government of Saskatchewan 2020]). |
| Bird Species at Risk | Project activities and infrastructure may affect bird SAR (specifically disturbance and/or destruction of eggs, young, and adults) resulting in non-compliance with regulatory requirements (e.g., SARA [Government of Canada 2022], <i>Migratory Birds Convention Act 1994</i> [Government of Canada 2017], <i>Saskatchewan Activity Restriction Guidelines for</i> |

| Valued Component | Rationale |
|------------------|--|
| | <i>Sensitive Species</i> [Government of Saskatchewan 2017], <i>The Wildlife Act 1998</i> [Government of Saskatchewan 2020]). |

Table 1.3 Valued Components, Key Indicators, and Measurable Parameters for the Wildlife Component included in the Habitat-based Environmental Assessment for Denison Wheeler River Project

| Valued Component | Key Indicator | Measurable Parameter |
|----------------------|------------------------|---|
| Furbearers | Wolverine | Amount of habitat (km ²) (not necessarily occupied) that may be altered or lost relative to its availability in the Regional Study Area (RSA). The number of wolverine mortalities directly or indirectly attributable to the Project. |
| Woodland Caribou | Woodland caribou | Amount of habitat (km ²) (not necessarily occupied) that may be altered or lost relative to its availability in the RSA. The number of woodland caribou mortalities directly or indirectly attributable to the Project. |
| Bird Species at Risk | Common Nighthawk | Percentage of habitat for Common Nighthawk altered/lost directly or indirectly as a result of Project activities. The number of Common Nighthawk mortalities directly or indirectly attributable to the Project. |
| | Rusty Blackbird | Percentage of habitat for Rusty Blackbird altered/lost directly or indirectly as a result of Project activities. The number of rusty blackbird mortalities directly or indirectly attributable to the Project |
| | Olive-sided Flycatcher | Percentage of habitat for Olive-sided Flycatcher altered/lost directly or indirectly as a result of Project activities. The number of Olive-sided Flycatcher mortalities directly or indirectly attributable to the Project |
| | Short-eared Owl | Percentage of habitat for Short-eared Owl altered/lost directly or indirectly as a result of Project activities. The number of Short-eared Owl mortalities directly or indirectly attributable to the Project. |
| | Yellow Rail | Percentage of habitat for Yellow Rail altered/lost directly or indirectly as a result of Project activities. The number of Yellow Rail mortalities directly or indirectly attributable to the Project. |

The five bird species identified in Table 1.3 were selected as SAR VCs for the habitat-based EA in consideration of information/responses received during extensive Indigenous and community engagement completed by Denison, and they represent wildlife species of local importance. For these five species, additional information is not be provided in this Appendix. Rather, the reader is referred to the applicable sections in the EIS where appropriate information on existing conditions (Section 9.4.3.3), potential project-related effects (Section 9.4.4), mitigation measures (Section 9.4.5), residual effects and their significance (Section 9.4.6), and cumulative effects (Section 9.4.7) is provided.

2 Supplemental Information

As requested by ECCC, the following subsections provide supplemental information for the remaining nine species listed in Table 2.1 that were not included as VCs or KIs in the EIS. For these nine species, a brief overview of life history requirements (existing environment), a discussion on the effects assessment and mitigation measures, and a summary of residual and cumulative effects are included.

Table 2.1 Wildlife Species At Risk Considered in the Wheeler River Project Environmental Impact Statement

| Common Name | Scientific Name | Provincial Status | Federal Status ¹ | Preferred Habitat | Documented Occurrence in the Local Study Area ² | Reference in the Environmental Impact Statement (EIS) |
|--------------------------|-------------------------------------|-------------------|-----------------------------|--|--|---|
| Arthropods | | | | | | |
| Nine-spotted lady beetle | <i>Coccinella novemnotata</i> | S4 | Endangered | Habitat generalist – uses a diverse range of habitats and consumes a variety of prey. See Section 2.1.1 for further details. | Unlikely LSA is located within COSEWIC range; no observations in SKCDC and no Project-specific observations to date. | Not included as a Valued Component (VC) in the EIS. A review of life history requirements and discussion on effects assessment are included in this Appendix. |
| Transverse lady beetle | <i>Coccinella transversoguttata</i> | S4 | Special Concern | Habitat generalist – uses a diverse range of habitats and consumes a variety of prey. See Section 2.1.2 for further details. | Unlikely LSA is located within COSEWIC range; no observations in SKCDC and no Project-specific observations to date. | Not included as a VC in the EIS. A review of life history requirements and discussion on effects assessment are included in this Appendix. |
| Yellow-banded bumble bee | <i>Bombus terricola</i> | S4 | Special Concern | Habitat generalist – uses a variety of habitats and consumes nectar and pollen from many different flowering plants. See Section 2.1.3 for further details. | Unlikely LSA is located within COSEWIC range; no observations in SKCDC and no Project-specific observations to date. | Not included as a VC in the EIS. A review of life history requirements and discussion on effects assessment are included in this Appendix. |
| Amphibians | | | | | | |
| Northern leopard frog | <i>Lithobates pipiens</i> | S3 | Special Concern | Three district habitats: (1) overwintering waterbodies that are cold, well oxygenated, and do not freeze to bottom; (2) breeding and larval waterbodies with | LSA is located within COSEWIC range; no observations in SKCDC and no Project-specific | Not included as a VC in the EIS. A review of life history requirements and discussion on effects assessment are included in this Appendix. |

| Common Name | Scientific Name | Provincial Status | Federal Status ¹ | Preferred Habitat | Documented Occurrence in the Local Study Area ² | Reference in the Environmental Impact Statement (EIS) |
|---------------------|-------------------------------|-------------------|-----------------------------|--|--|--|
| | | | | shallow, open habitats, neutral pH, and no fish; and (3) summering areas in shallow marshes, moist upland meadows where grass height is less than 1 m. See Section 2.2.1 for further details. | observations to date. Amphibian nocturnal call and visual search surveys were completed in the LSA and Regional Study Area (RSA) as part of the baseline program; however, only boreal chorus frogs (<i>Pseudacris maculata</i>) were detected (Appendix 9-C). | |
| Bats | | | | | | |
| Little brown myotis | <i>Myotis lucifugus</i> | S4B, S4N | Endangered | Seasonal habitat requirements: (1) overwintering hibernacula that are sufficiently cool and humid and (2) summering areas that provide foraging areas and suitable locations for roosting and maternity colonies. See Section 2.3.1 for further details. | Documented during the acoustic bat surveys as part of the baseline field program as present in the LSA and RSA, and previously observed in the RSA (SKCDC 2023). | Not included as a VC in the EIS. A review of life history requirements and discussion on effects assessment are included in this Appendix. |
| Northern myotis | <i>Myotis septentrionalis</i> | S3 | Endangered | Seasonal habitat requirements: (1) overwintering hibernacula that are sufficiently cool and humid and (2) summering areas that provide foraging areas and suitable locations for roosting and maternity colonies. See Section 2.3.2 for further details. | Documented during the acoustic bat surveys as part of the baseline field program as present in the LSA and RSA (Appendix 9-C). | Not included as a VC in the EIS. A review of life history requirements and discussion on effects assessment are included in this Appendix. |

| Common Name | Scientific Name | Provincial Status | Federal Status ¹ | Preferred Habitat | Documented Occurrence in the Local Study Area ² | Reference in the Environmental Impact Statement (EIS) |
|-------------------------------------|----------------------------------|-------------------|-----------------------------|--|--|---|
| Terrestrial Wildlife Species | | | | | | |
| Wolverine | <i>Gulo gulo</i> | S2 | Special Concern | See Section 9.3.3.2 of the EIS for details. | LSA is located within COSEWIC range; no observations in SKCDC and no Project-specific observations to date. | Included as a Key Indicator (KI) of the Furbearer VC in the EIS. A review of life history requirements and discussion on effects assessment are included in the EIS (Section 9.3). Additional information for this species is not provided in this Appendix. |
| Woodland caribou | <i>Rangifer tarandus caribou</i> | S3 | Threatened | See Section 9.3.3.3 of the EIS for details. | Documented within the RSA during the baseline field program (Appendix 9-C) | Included as a VC in the EIS. A review of life history requirements and discussion on effects assessment are included in the EIS (Section 9.3). Additional information for this species is not provided in this Appendix. |
| Avian Species | | | | | | |
| Bank Swallow | <i>Riparia riparia</i> | S4B, S5M | Threatened | Nesting colonies are typically characterized by steep embankments with a sand, silt, or clay substrate that can be easily excavated for burrows. They are often adjacent to slow-moving or still waterbodies and may occur in natural habitats or in anthropogenic features. Bank Swallows are aerial insectivores that forage over a variety of open habitats. See Section 2.4.1 for further details. | LSA is located within COSEWIC range; no historical observations documented by the SKCDC (2023) and no Project-specific observations to date. | Not included as a KI of the Bird Species at Risk (SAR) VC in the EIS (Common Nighthawk was used as a surrogate species). A review of life history requirements and discussion on effects assessment are included in this Appendix. Any new species-specific mitigation measures identified in this appendix will be added to the final EIS (Section 9.4.5). |
| Barn Swallow | <i>Hirundo rustica</i> | S4B | Threatened | Breeding habitat typically requires a suitable nesting site with a vertical or horizontal surface underneath a roof of | Documented during the breeding bird surveys as part of the baseline field | Not included as a KI of the Bird SAR VC in the EIS (Common Nighthawk was used as a surrogate species). A review of life history |

| Common Name | Scientific Name | Provincial Status | Federal Status ¹ | Preferred Habitat | Documented Occurrence in the Local Study Area ² | Reference in the Environmental Impact Statement (EIS) |
|------------------------|-------------------------|-------------------|-----------------------------|--|--|---|
| | | | | some sort, open areas for foraging, and a waterbody with mud for nest building. Anthropogenic features such as barns, houses, bridges, and culverts are commonly used nesting sites. See Section 2.4.2 for further details. | program as present in the LSA (Appendix 9-C), and previously observed in the RSA (SKCDC 2023) | requirements and discussion on effects assessment are included in this Appendix. Any new species-specific mitigation measures identified in this appendix will be added to the final EIS (Section 9.4.5). |
| Common Nighthawk | <i>Chordeiles minor</i> | S4B | Special Concern | See Section 9.4.3.3 of the EIS for details. | Documented during the baseline field program as present in the LSA (Appendix 9-C), and previously observed in the RSA (SKCDC 2023) | Included as a KI of the Bird SAR VC in the EIS. A review of life history requirements and discussion on effects assessment are included in the EIS (Section 9.3). Additional information for this species is not provided in this Appendix. |
| Horned Grebe | <i>Podiceps auritus</i> | S5B | Special Concern | Breeding habitat consists of small to medium-sized freshwater lakes, ponds, and marshes that are shallow with open water (at least 40%), emergent vegetation, anchorage for nests, and concealment for nests and young. See Section 2.4.3 for further details. | Documented during the baseline field program as present in the LSA (Appendix 9-C). | Not included as a KI of the Bird SAR VC in the EIS (Yellow Rail was used as a surrogate species). A review of life history requirements and discussion on effects assessment are included in this Appendix. Any new species-specific mitigation measures identified in this appendix will be added to the final EIS (Section 9.4.5).. |
| Olive-sided Flycatcher | <i>Contopus cooperi</i> | S4B | Special Concern | See Section 9.4.3.3 of the EIS for details. | Documented during the baseline field program as present in the LSA (Appendix 9-C), and previously observed in the RSA (SKCDC 2023) | Included as a KI of the Bird SAR VC in the EIS. A review of life history requirements and discussion on effects assessment are included in the EIS (Section 9.3). Additional information for this species is not provided in this Appendix. |

| Common Name | Scientific Name | Provincial Status | Federal Status ¹ | Preferred Habitat | Documented Occurrence in the Local Study Area ² | Reference in the Environmental Impact Statement (EIS) |
|-----------------|-----------------------------------|-------------------|-----------------------------|---|--|---|
| Rusty Blackbird | <i>Euphagus carolinus</i> | S3B, SUN | Special Concern | See Section 9.4.3.3 of the EIS for details. | LSA is located within COSEWIC range; no historical observations documented by the SKCDC (2023) and no Project-specific observations to date. | Included as a KI of the Bird SAR VC in the EIS. A review of life history requirements and discussion on effects assessment are included in the EIS (Section 9.3). Additional information for this species is not provided in this Appendix. |
| Short-eared Owl | <i>Asio flammeus</i> | S3B, S2N | Special Concern | See Section 9.4.3.3 of the EIS for details. | LSA is located within COSEWIC range; no historical observations documented by the SKCDC (2023) and no Project-specific observations to date. | Included as a KI of the Bird SAR VC in the EIS. A review of life history requirements and discussion on effects assessment are included in the EIS (Section 9.3). Additional information for this species is not provided in this Appendix. |
| Yellow Rail | <i>Coturnicops noveboracensis</i> | S3B | Special Concern | See Section 9.4.3.3 of the EIS for details. | LSA is located within COSEWIC range; no historical observations documented by the SKCDC (2023) and no Project-specific observations to date. | Included as a KI of the Bird SAR VC in the EIS. A review of life history requirements and discussion on effects assessment are included in the EIS (Section 9.3). Additional information for this species is not provided in this Appendix. |

Note: shaded rows indicate SAR was included as a VC or KI in the draft EIS

- 1 Schedule 1 under the *Species at Risk Act*.
- 2 Potential for Occurrence – based on known species occurrence data from Saskatchewan Conservation Data Centre (2023), Omnia (Appendix 9-C), Birds of Saskatchewan (2019), and Atlas of Saskatchewan Birds (Smith 1996) and/or presence of suitable habitat.

2.1 Arthropods

2.1.1 Nine-Spotted Lady Beetle

The nine-spotted lady beetle is a small beetle species found across southern Canada and the continental United States (COSEWIC 2016a). Its northern range limit in Saskatchewan is reported to occur near Lake Athabasca (COSEWIC 2016a). Based on records provided by the Saskatchewan Conservation Data Centre Hunting, Angling and Biodiversity of Saskatchewan (HABISask) database (SKCDC 2023), there are no historical observations of this species documented in the Regional Study Area (RSA).



Source: COSEWIC (2016a).

The nine-spotted lady beetle is a habitat generalist that uses a diverse range of habitats (e.g., open to semi-open forests, grasslands, riparian areas) and consumes a variety of prey (e.g., many species of arthropods [particularly aphids], sap, nectar and pollen) (COSEWIC 2016a). Being a habitat generalist allows the nine-spotted lady beetle to exploit seasonally available prey sources, with prey availability influencing the species' distribution more than habitat availability (COSEWIC 2016a).

The nine-spotted lady beetle has four life stages (i.e., egg, larva, pupa, and adult) and may produce two generations per year (i.e., spring and fall) depending on regional climate conditions (COSEWIC 2016a). Lady beetles, in general, are highly mobile and may undertake short (few hundred metres) and long-distance (18 to 120 km) movements (COSEWIC 2016a). The nine-spotted lady beetle is not migratory nor does it display strong site fidelity (COSEWIC 2016a). The nine-spotted lady beetle overwinters in aggregations in well-ventilated habitats (e.g., in rock crevices, grass tussocks, or leaf litter, or under stones or tree bark), becoming active in the early spring when temperatures start to increase (COSEWIC 2016a).

The nine-spotted lady beetle is federally listed under Schedule 1 of SARA as Endangered (Government of Canada 2023) and is designated as an S4 species in Saskatchewan (i.e., Apparently Secure) (Saskatchewan Conservation Data Centre 2023). The species has undergone significant population declines in Canada since 1975, going from one of the more common lady beetles collected to being rarely collected relative to other lady beetles, despite comprehensive and targeted surveys (COSEWIC 2016a). Reasons for these population declines are currently unknown but are thought to be driven by competition, predation, and introduced diseases from non-native species (including non-native lady beetles), agricultural pesticide use to control aphids, habitat loss via urban expansion, and other human disturbances (COSEWIC 2016a).

2.1.2 Transverse Lady Beetle

The transverse lady beetle is a small beetle species found across the United States and Canada, including all provinces and territories (COSEWIC 2016b). The species is a habitat generalist and uses similar habitat types and consumes similar prey as the nine-spotted lady beetle, which means it is also able to exploit seasonally available prey sources (COSEWIC 2016b). According to the information from the HABISask database, there are no historical observations of this species documented in the RSA.



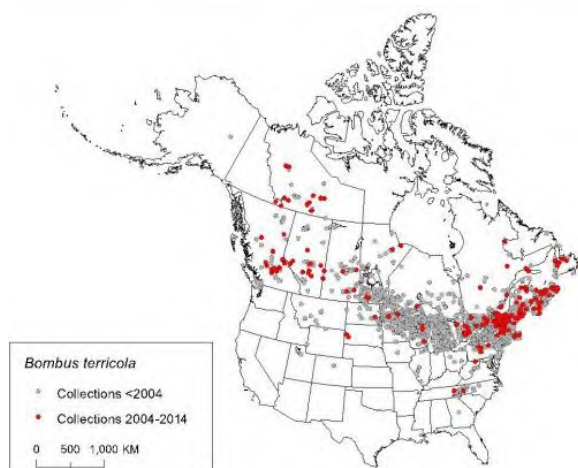
Source: COSEWIC (2016b).

The transverse lady beetle has four life stages (i.e., egg, larva, pupa, and adult) and may produce two generations per year (i.e., spring and fall) depending on regional climate conditions (COSEWIC 2016b). Lady beetles in general are highly mobile and may undertake short (few hundred metres) and long-distance (18 to 120 km) movements (COSEWIC 2016b). The transverse lady beetle is not migratory nor does it display strong site fidelity (COSEWIC 2016b). The transverse lady beetle overwinters in aggregations in well-ventilated habitats (e.g., in rock crevices, grass tussocks, or leaf litter, or under stones or tree bark), becoming active in the early spring when temperatures start to increase (COSEWIC 2016b).

The transverse lady beetle is federally listed under Schedule 1 of SARA as Special Concern (Government of Canada 2023) and is designated as an S4 species in Saskatchewan (i.e., Apparently Secure) (Saskatchewan Conservation Data Centre 2023). The species was once abundant across its range in Canada and was one of the most common lady beetles collected; however, since 1986, the species is now absent, below detection limits, or present in low numbers in many parts of its range (COSEWIC 2016b). The transverse lady beetle has not been detected in Saskatchewan since 2001 (COSEWIC 2016b). Reasons for these population declines are currently unknown but are thought to be driven by the same factors listed for the nine-spotted lady beetle in Section 2.1.1.

2.1.3 Yellow-banded Bumble Bee

The yellow-banded bumble bee is a medium-sized bumble bee species found throughout eastern North America, from eastern British Columbia (BC) to Newfoundland and Labrador and from the northern United States up to the southern portion of the territories (COSEWIC 2015). The species is a habitat generalist (e.g., boreal habitats, mixed woodlands, montane meadows) and consumes nectar and pollen from many different flowering plants (COSEWIC 2015). According to the information from the HABISask database, there are no historical observations of this species documented in the RSA.



Source: COSEWIC (2015).

The yellow-banded bumble bee has four life stages (i.e., egg, larva, pupa, and adult) and produces one generation per year, with mated queens establishing new colonies each year (COSEWIC 2015). After overwintering underground in loose soil or decomposing organic material, the mated queens emerge in the spring and search for potential nest sites, which are typically located underground in existing cavities (e.g., abandoned rodent burrows, rotten logs, openings in dead wood, and grassy hummocks) (COSEWIC 2015). Once a queen has found a suitable nest site, she forages for nectar and pollen and then returns to her nest site to lay eggs, which will develop into her future workers (i.e., unmated daughters that do not typically reproduce) (COSEWIC 2015). After the initial eggs hatch and the larva and pupa develop into adult workers, the workers take over nest and brood care, foraging duties, and colony protection while the queen continues to lay eggs (COSEWIC 2015). Males and potential queens are produced by late summer once the colony reaches maximum worker production, at which point they leave the colony and mate (COSEWIC 2015). All males and workers die by fall while the mated queens hibernate through the winter in suitable overwintering sites (COSEWIC 2015).

The yellow-banded bumble bee is federally listed under Schedule 1 of SARA as Special Concern (Government of Canada 2023) and is designated as an S4 species in Saskatchewan (i.e., Apparently Secure)

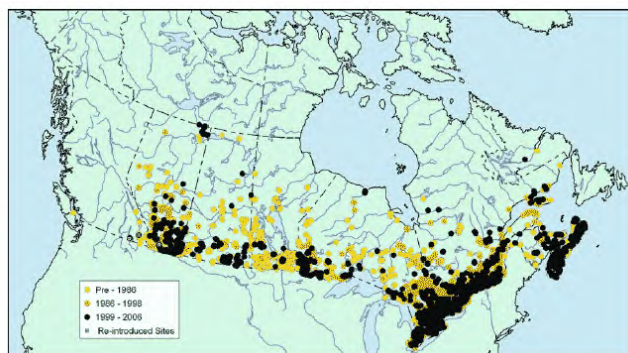
(Saskatchewan Conservation Data Centre 2023). Prior to the 1990s, the yellow-banded bumble bee was one of the more common bumble bees collected in eastern and boreal Canada (COSEWIC 2015, Environment and Climate Change Canada 2022a). Population declines started to occur in the early 1990s, with an average rate of decline of 66.5% in proportional abundance across central and southern Canada between 1992 and 2011 (COSEWIC 2015, Environment and Climate Change Canada 2022a). The species is no longer found at several historical collection sites (COSEWIC 2015).

The status of the yellow-banded bumble bee in boreal habitats and Arctic regions is unknown (COSEWIC 2015, Environment and Climate Change Canada 2022a). Reasons for these population declines are currently unknown but are thought to be driven by introduced diseases from managed bumble bee species, agricultural pesticide use, habitat loss via urban and agricultural expansion, and climate change (COSEWIC 2015). The species' unique type of sex determination, where colonies must reach maximum worker production to produce males and potential queens, has been identified as a limiting factor (COSEWIC 2015, Environment and Climate Change Canada 2022a).

2.2 Amphibians

2.2.1 Northern Leopard Frog

The northern leopard frog is found across most of west-central and northeastern North America (COSEWIC 2009a). The species is widespread in Canada, ranging from southeastern BC to Labrador, and from southcentral Northwest Territories (COSEWIC 2009a, NCC 2023).



Source: COSEWIC (2009a).

Three distinct habitats are used by the northern leopard frog on an annual basis: (1) overwintering waterbodies that are cold, well oxygenated, and do not freeze to bottom (e.g., rivers, streams, deep lake ponds and creeks, and spillways below dams); (2) breeding and larval waterbodies with shallow, open habitats (e.g., ponds, lakeshores, marshes, and slow-moving streams; may be permanent or semi-permanent), neutral pH, well vegetated, and no fish; and (3) summering areas in shallow marshes, moist upland meadows, forests and grasslands where grass height is less than 1 m (COSEWIC 2009a, NCC 2023). These habitats must be in proximity with suitable dispersal corridors interconnecting them (e.g., riparian areas and waterways) as the species is not capable of long-distance movements (COSEWIC 2009a, Environment Canada 2013).

Northern leopard frogs emerge from their overwintering waterbodies in early spring shortly after ice off (COSEWIC 2009a). The breeding season extends from mid-April to June, with exact timing dependent on location and latitude (COSEWIC 2009a). Females lay several thousand eggs, attaching them to submerged vegetation, which develop into tadpoles within two weeks depending on water temperatures (COSEWIC 2009a). The tadpoles in turn develop into small frogs over a two-to-three-month period, after which they migrate to their summering areas and forage on a variety of arthropods, worms, and snails, sometimes preying on small birds and smaller frogs (COSEWIC 2009a).

Three populations are recognized for the northern leopard frog in Canada: the Rocky Mountain, the Western Boreal/Prairie, and the Eastern (COSEWIC 2009a, NCC 2023). The Western Boreal/Prairie population is found in Alberta, Saskatchewan, Manitoba, and the Northwest Territories (COSEWIC 2009a,

NCC 2023). The Western Boreal/Prairie population is federally listed under Schedule 1 of SARA as Special Concern (Government of Canada 2023) and is designated as an S3 species in Saskatchewan (i.e., Vulnerable) (Saskatchewan Conservation Data Centre 2023).

Population data are limited for the northern leopard frog in Canada (COSEWIC 2009a, Environment Canada 2013). Large-scale population declines occurred in the early 1970s, with populations in western Canada (i.e., BC and Alberta) most dramatically affected (COSEWIC 2009a). Information is lacking on the current status of northern leopard frog populations in Saskatchewan (COSEWIC 2009a, Environment Canada 2013).

Threats to the northern leopard frog include emerging diseases (e.g., *Chytridiomycosis*), introduced non-native species, habitat loss and fragmentation, environmental contamination, and increased frequency and severity of droughts (COSEWIC 2009a). The species' specific habitat requirements and vulnerability to diseases and prolonged periods of drought have been identified as limiting factors (Environment Canada 2013).

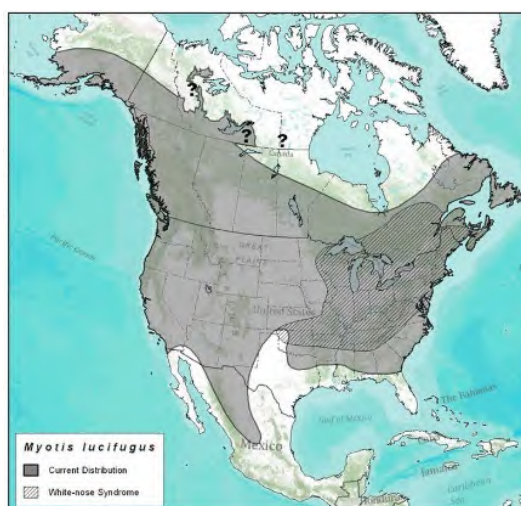
2.3 Bats

2.3.1 Little Brown Myotis

The little brown myotis is a small bat species found across North America, including across Canada south of the treeline (COSEWIC 2013a). The species is considered a short-distance regional migrant between its summer and winter ranges, with the distance travelled dependent on the location of suitable overwintering hibernacula (COSEWIC 2013a).

Habitat for the little brown myotis is composed of (1) overwintering hibernacula that are sufficiently cool and humid and (2) summering areas that provide foraging areas and suitable locations for roosting and maternity colonies (COSEWIC 2013a). Hibernacula and maternity sites are the main limiting habitat features for this species (COSEWIC 2013a). Hibernacula occur in parts of caves, mines, and buildings that have stable and specific temperature (-4 to 13°C) and humidity (>80%) conditions (COSEWIC 2013a). Maternity sites occur in large-diameter trees, rock crevices, buildings, and bat houses that offer warm and relatively stable microclimate conditions that allow females to avoid going into torpor so they can focus on caring for their young (COSEWIC 2013a, Slough and Jung 2020). Males are more versatile in their summer roosting requirements and use tree cavities, raised bark, foliage, rock crevices, buildings, and bridges with a broader range of microclimate conditions (COSEWIC 2013a, Johnson et al. 2019). Foraging areas for the little brown myotis include a variety of habitats situated close to roosting and maternity sites, including over water (e.g., wetlands, lakes, ponds, and rivers), along riparian areas and forest edges, and in forest gaps (COSEWIC 2013a).

The little brown myotis is federally listed under Schedule 1 of SARA as Endangered (Government of Canada 2023) and is designated as an S4B, S4N species in Saskatchewan (i.e., Apparently Secure breeding population, Apparently Secure non-breeding population) (Saskatchewan Conservation Data Centre 2023).



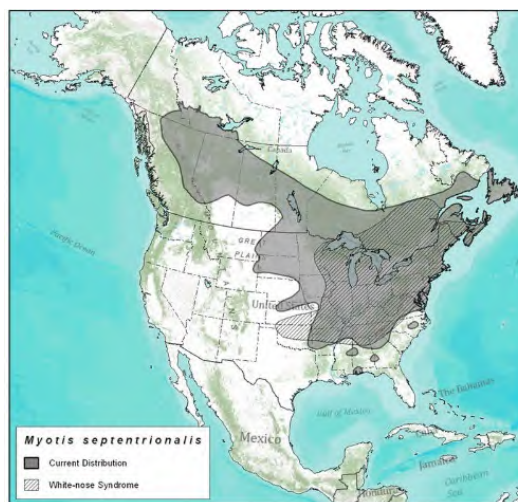
Source: COSEWIC (2013a).

The current size of the little brown myotis population in Canada is unknown. Prior to the arrival of White-nose Syndrome in 2010, the population in Canada was estimated to be over one million individuals (COSEWIC 2013a, Environment and Climate Change Canada 2018). White-nose Syndrome is a disease the causes high rates of mortality among hibernating bats, and it has been identified as the main threat for bat populations in Canada (COSEWIC 2013a). Other threats to the little brown myotis include habitat loss, colony eradication, chemical contamination, and wind turbines (COSEWIC 2013a).

2.3.2 Northern Myotis

The northern myotis is a small bat species found across North America, including across Canada south of the treeline (COSEWIC 2013a). The species is considered a short-distance regional migrant between its summer and winter ranges, with the distance travelled dependent on the location of suitable overwintering hibernacula (COSEWIC 2013a).

Habitat for the northern myotis is composed of (1) overwintering hibernacula that are sufficiently cool and humid and (2) summering areas that provide foraging areas and suitable locations for roosting and maternity colonies (COSEWIC 2013a). Hibernacula and maternity sites are the main limiting habitat features for this species (COSEWIC 2013a). Hibernacula occur in parts of caves, mines, and buildings that have stable and specific temperature (0.6 to 14°C) and humidity (>80%) conditions (COSEWIC 2013a). Summer roosting trees are typically found in mature to old-growth forests, swamps, and riparian areas, although retained older trees and snags in younger forests may occasionally provide suitable roosting habitat (Environment and Climate Change Canada 2018). Females strongly prefer tall, large-diameter trees (both living and dead, typically deciduous) with early- to mid-decay for maternity sites (COSEWIC 2013a, Environment and Climate Change Canada 2018). Anthropogenic features (e.g., barns) may occasionally be used as maternity sites in fragmented landscapes with few potential roost trees (Environment and Climate Change Canada 2018). Maternity sites that maintain warm and relatively stable microclimate conditions are important to reproductive females and young as they allow more energy to be directed toward growth and development (Caceres and Barclay 2000, COSEWIC 2013a). Males are more versatile in their summer roosting requirements; they most frequently roost under exfoliating, raised bark but may also roost in the cavities and crevices of trees and snags with early- to mid-decay (Jung et al. 2004, COSEWIC 2013a).



Source: COSEWIC (2013a).

The northern myotis is well adapted to flying in areas of dense or structurally complex vegetation where it catches flying insects on the wing or feeds by gleaning prey from foliage (Caceres and Barclay 2000, Henderson and Broders 2008). The species typically forages within the interior of mature to old-growth deciduous and mixedwood forests, but may also forage in forest gaps, along forest edges and riparian areas, and over rivers (Henderson and Broders 2008, COSEWIC 2013a).

The northern myotis is federally listed under Schedule 1 of SARA as Endangered (Government of Canada 2023) and is designated as an S3 species in Saskatchewan (i.e., Vulnerable) (Saskatchewan Conservation Data Centre 2023). The current size of the northern myotis population in Canada is unknown. Prior to the arrival of White-nose Syndrome in 2010, the population in Canada was estimated to be over one million individuals (COSEWIC 2013a, Environment and Climate Change Canada 2018). White-nose Syndrome has

been identified as the main threat for northern myotis populations in Canada (COSEWIC 2013a). . Other threats to the northern myotis include habitat loss, colony eradication, chemical contamination, and wind turbines (COSEWIC 2013a)

2.4 Avian Species

2.4.1 Bank Swallow

The Bank Swallow is a small songbird that occurs on every continent (except Antarctica and Australia), breeds throughout Canada, and winters primarily in South America (COSEWIC 2013b). Nesting colonies are typically characterized by steep embankments with a sand, silt, or clay substrate that can be easily excavated for burrows (COSEWIC 2013b, Government of Canada 2019a). These steep sand, silt, or clay embankments are frequently subject to erosion or slumping (COSEWIC 2013b, Garrison and Turner 2020).

Nesting colonies are often adjacent to slow-moving or still waterbodies (e.g., low gradient rivers or lakes) and may occur in natural habitats or in anthropogenic features (e.g., quarries or road cuts) (COSEWIC 2013b, Government of Canada 2019a, Garrison and Turner 2020). Colony size can range from less than half a dozen burrows to hundreds or thousands of burrows (COSEWIC 2013b, Government of Canada 2019a). Individual burrows within colonies may be recolonized in subsequent years if the integrity of the colony remains intact (i.e., does not erode and collapse) (Garrison and Turner 2020). Bank Swallows are aerial insectivores that forage over a variety of open habitats such as lakes, ponds, rivers, wetlands, grasslands, and agricultural areas (COSEWIC 2013b, Garrison and Turner 2020).

The Bank Swallow is federally listed under Schedule 1 of SARA as Threatened (Government of Canada 2023) and is designated as an S4B, S5M species in Saskatchewan (i.e., Apparently Secure breeding population, Secure aggregating transient population [migrants]) (Saskatchewan Conservation Data Centre 2023). The most recent breeding population estimate for Canada is 2.4 million individuals (Environment and Climate Change Canada 2022b). Based on Breeding Bird Survey (BBS) data collected between 1970 and 2019, the Bank Swallow population in Canada has declined at a rate of 5.3% per year, for an overall decline of 98.0% (Environment and Climate Change Canada 2022b). The long-term population decline appears to be driven by several threats acting cumulatively, including loss of nesting and foraging habitats, incidental take during anthropogenic activities (e.g., aggregate extraction and erosion control), large-scale declines in aerial insect populations, and climate change (COSEWIC 2013b). Bank Swallows are also particularly vulnerable to collisions with vehicles partly due to the attraction of individuals to intraspecific carcasses; one swallow hit by a vehicle could attract several individuals to a road, potentially resulting in subsequent collisions and large mortality events (COSEWIC 2013b, Garrison and Turner 2020).

Although colonial nesting may provide advantages (e.g., predation protection and assistance with thermoregulation), it has been identified as a limiting factor for the Bank Swallow, potentially making



Source: COSEWIC (2013b).

them more vulnerable to natural events or anthropogenic activities, which may result in mass mortality events (Environment and Climate Change Canada 2022b).

2.4.2 Barn Swallow

The Barn Swallow is a medium-sized songbird that occurs on every continent (except Antarctica), breeds throughout Canada, and winters in the southern United States, Mexico, and southwards (COSEWIC 2021). Breeding habitat typically requires a suitable nesting site with a vertical or horizontal surface underneath a roof of some sort, open areas for foraging (e.g., grasslands, fields, wetlands, and shorelines), and a waterbody with mud for nest building (Government of Canada 2019b, Brown and Brown 2020, COSEWIC 2021).

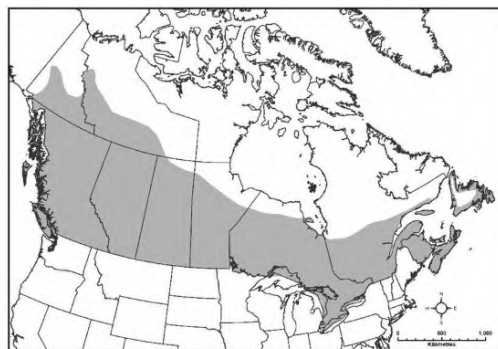
Historically, suitable nesting sites were likely provided by caves, cliff faces, rock ledges, tree branches, and hollow trees (Brown and Brown 2020, COSEWIC 2021). Today, nesting sites are usually located within agricultural and rural areas, and along roads and highways (Brown and Brown 2020, COSEWIC 2021). Anthropogenic features such as barns, houses, bridges, and culverts are commonly used for nesting sites (COSEWIC 2021). Barn Swallows nest in colonies or independently and typically return to the same nesting sites each year and may reuse old nests (Government of Canada 2019b, Brown and Brown 2020, COSEWIC 2021).

The Barn Swallow is federally listed under Schedule 1 of SARA as Threatened (Government of Canada 2023) and is designated as an S4B species in Saskatchewan (i.e., Apparently Secure breeding population) (Saskatchewan Conservation Data Centre 2023). An estimated 6.4 million individuals currently breed in Canada, with over 60% of the population breeding throughout the prairie provinces (COSEWIC 2021). Based on BBS data collected between 1970 and 2019, the Barn Swallow population in Canada has declined at a rate of 2.34% per year, for an overall decline of 68.6% (COSEWIC 2021). Intensification of agriculture, loss of nesting sites, large-scale declines in aerial insect populations, and climate change are cited as the most imminent threats for the Barn Swallow, and its dependence on aerial insects for prey and low post-fledging survival rates are cited as limiting factors for the species (COSEWIC 2021). The repeated use of anthropogenic features for nesting makes Barn Swallows vulnerable to incidental take, especially if the anthropogenic features require routine maintenance. In addition, their frequent use of anthropogenic features for nesting makes Barn Swallows vulnerable to entrapment (e.g., buildings, pipes, vents, other enclosed spaces) as they search for potential locations to build a nest (COSEWIC 2021).

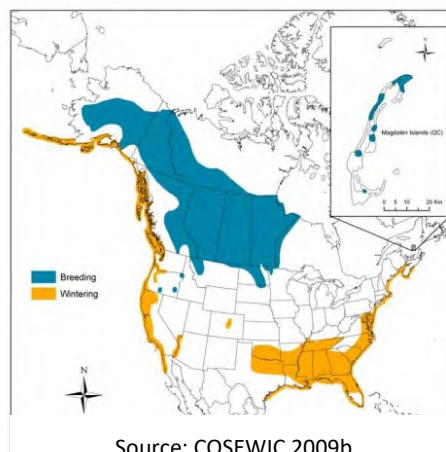
2.4.3 Horned Grebe

The Horned Grebe is a small waterbird that occurs in North America and Eurasia (COSEWIC 2009b). Within North America, the species breeds across western Canada from BC and Yukon across to the Magdalen Islands in Quebec and winters along the Pacific and Atlantic coasts (COSEWIC 2009b).

Breeding habitat for the Horned Grebe consists of small to medium-sized freshwater lakes, ponds, and marshes that are shallow with open water (at least 40%), emergent vegetation,



Source: COSEWIC (2021).



Source: COSEWIC 2009b

anchorage for nests, and concealment for nests and young (COSEWIC 2009b, Stedman 2020). Horned Grebes use a range of waterbody sizes for breeding, but typically prefer waterbodies between 0.3 and 2.0 ha in size (COSEWIC 2009b). Most pairs are solitary, but loose colonies of up to 20 pairs have been found on larger waterbodies with abundant food resources (COSEWIC 2009b, Stedman 2020). Nests are typically located in shallow water near shore on a floating or emerging mass of vegetation (COSEWIC 2009b). Horned Grebes are diving birds that feed on a variety of aquatic arthropods and fish (COSEWIC 2009b, Stedman 2020).

The Western population of the Horned Grebe is federally listed under Schedule 1 of SARA as Special Concern (Government of Canada 2023) and is designated as an S5B species in Saskatchewan (i.e., Secure breeding population) (Saskatchewan Conservation Data Centre 2023). An estimated 200,000 to 500,000 individuals occur in the Western population, with most breeding in southern Alberta and Saskatchewan (COSEWIC 2009b, Environment and Climate Change Canada 2022c). Based on BBS data collected between 1970 and 2019, the Western population of the Horned Grebe in Canada has declined at a rate of 1.7% per year, for an overall decline of 57.0% (Environment and Climate Change Canada 2022c). The reasons for this population decline are unknown. Probable threats include permanent habitat loss, temporary loss of habitat during droughts, eutrophication and degradation of habitat due to fertilizers, predator expansion on the prairies, Type E botulism in the Great Lakes, entanglement in commercial fishing gear, climate change and extreme weather, and oil spills on wintering grounds (COSEWIC 2009b).

3 Mitigation Measures

The Project will require the construction, operation, and decommissioning of several components (as described in Section 2 of the EIS). Expected interactions between these Project components and activities and the wildlife VCs and their associated KIs are summarized by Project phase and activity in Tables 9.3-6 and 9.4-5 of the EIS. Based on the timing and nature of interactions identified in Tables 9.3-6 and 9.4-5 of the EIS, the following adverse effects on the wildlife VCs, including SAR, are likely to occur during the lifetime of the Project:

- alteration and/or loss of habitat; and
- change in mortality.

These potential effects apply to Wildlife SAR as well. The potential effects are described in Sections 9.3.4.2 and 9.4.4.2 of the EIS for each Project phase as they may affect the wildlife VCs and associated KIs.

Mitigation in this EIS is defined as the elimination, reduction, or control of potential adverse effects of the Project on the environment throughout all Project phases. Project-specific mitigation measures include: Project design; implementation of best management practices; development of management plans; implementation of emergency response programs; and provision of training, education and awareness (Denison 2020). Mitigation measures for each potential effect are described in Sections 9.3.5 and 9.4.5 of the EIS. The following subsections summarize mitigation measures that will be implemented to avoid or minimize adverse effects on the Wildlife SAR.

3.1 Project Design Measures

Potential adverse effects on Raptors, Migratory Breeding Birds, and Bird SAR VCs will be avoided or minimized to the extent practical through Project design. All of the Project design measures listed here are consistent with those presented in Section 9 of the EIS (i.e., there are no new Project design measures proposed in this appendix):

- The Project Area (i.e., the area of maximum physical disturbance) has been reduced to the extent practicable resulting in reduced habitat disturbance and noise propagation.
- Much of the proposed footprint will be developed within previously disturbed areas, including roads currently used for exploration activities, thereby minimizing additional habitat disturbance.
- The powerline to the main substation at the site is relatively short (i.e., approximately 7 km) and will be constructed from the existing provincial power line adjacent to Highway 914.
- During Operation, progressive reclamation activities will be completed where possible, and the progress and success of these activities will be assessed annually.
- Cleared brush will be stockpiled when possible, to be used in progressive reclamation.
- Ongoing decommissioning of Project components will be completed when possible.
- Dust deposition on vegetation and waterbodies (including potential deposition of trace metals and radionuclides) will be reduced by:
 - directing processing plant exhaust from drying and packaging areas through a stack prior to release outside of the building;
 - designing the stack height based on results of air dispersion modelling to be an appropriate height for optimal dispersion;

- controlling access to the property with both a north and south security gate (the north gate is on a decommissioned road and the south gate is manned);
 - making a wash bay available to clean items, equipment and vehicles that may have been in contact with potentially contaminated materials. Contaminated water from the wash bay will be collected in a sump tank and routed to the water treatment plant for treatment and discharge;
 - conducting radiological clearance scanning as required for any items, equipment, and vehicles leaving the Project Area; and.
 - watering and traffic controls on roads.
- Battery-powered light vehicles and mobile equipment, and an AC powered dual rotary drill for ISR wellfield development instead of a traditional diesel-powered unit, will be employed, where practical, to reduce air emissions and noise levels and improve energy efficiency.
 - The main sources of noise will be related to transport of people and goods, drilling of holes for the freeze wall and wellfield, operation of the batch plant, operation of the processing plant, and operation of the pumphouses. The use of high-quality, low sound emission equipment and regular maintenance will reduce noise associated with Project activities.
 - Bulk storage tanks for processing chemicals such as sulphuric and/or hydrochloric acid, sodium hydroxide, and hydrogen peroxide will sit inside appropriately designed and sized secondary containment basins, physically separated from the containment basins for other chemical systems.
 - Surface pipelines will be designed to have secondary containment or catchment and have leak detection systems in place at key locations.
 - A freeze wall will be established around the uranium deposit to reduce groundwater disturbance.
 - Mining solution and process water will be reused throughout the mining process, reducing water use requirements to the extent feasible and reducing the volume of treated effluent requiring discharge. Make-up water will be preferentially sourced from site runoff where possible.
 - Double-walled, high-density polyethylene or equivalent piping will be used in the wellfields and will be freeze protected and secured to minimize pipe movement.
 - Contaminated wastes (e.g., mineralized drill cuttings, solid impurities removed from mining solution, dewatered reject solids) will be properly contained on a double lined waste pad with leak detection capabilities and an associated monitoring program. An adjacent pond will be used to collect runoff from the pad and water in the waste pond will be piped to the water treatment plant. Such waste will be disposed of either on site or off site at an approved facility.
 - The ISR wellfield and processing plant will be designed to re-use most of the solutions inside each circuit; any excess water will be released to a surface water body once acceptable water quality is achieved. All treated effluent released to surface water will meet federal and provincial regulatory discharge limits.
 - All contaminated areas, such as waste ponds and pads, and the domestic landfill will be fenced to avoid contact with workers and wildlife. Fences will be monitored and maintained.

3.2 General Mitigation Measures for Wildlife Species at Risk

Mitigation measures specific to the Wildlife SAR, in accordance with the *Migratory Birds Convention Act* and tailored to Project features will be incorporated into various Project management and monitoring plans such as the erosion and sediment controls, soil and vegetation monitoring, wildlife monitoring, the Decommissioning Plan, air quality monitoring, Spill Response Plan, Radiation Protection Plan, surface water and effluent monitoring and Waste Management Plan.

The management plans within the Environmental Management System (EMS) will provide specific mitigation measures based on proven and accepted mitigation measures following standard industry guidelines and best management practices. The EMS will provide guidance to avoid or minimize potential adverse effects of the Project on avian species and their habitat, including monitoring and follow-up programs, as appropriate. It will be in place during all phases of the Project and will be subject to ongoing review and revision as required. If monitoring identifies a need for additional or revised mitigation measures, a process of adaptive management (as described in the plan) will be triggered. The Project management plans provide direction on monitoring and adaptive management so that responses are timely and effective.

The following subsections provides a description of the mitigation measures that will be applicable during all Project phases and expected to be effective immediately following implementation. Additional mitigation measures specific to the Wildlife SAR that were not included or that were revised from what was described in the draft EIS are provided in **bold text**.

3.2.1 Work Timing Windows and Habitat Disturbance

- Site clearing and other works that involve disturbance of vegetation and/or soil will be conducted outside of the nesting season, when practical. **The nesting season for many Wildlife SAR in Saskatchewan spans a period from March 15 to August 31; however, the dates differ for certain species. The Wildlife Management Plans within the EMS will provide details on nesting windows for avian species, as well as other sensitive time periods (e.g., caribou calving periods) occurring in the Terrestrial RSA based on the Saskatchewan Activity Restriction Guidelines for Sensitive Species (SARGSS), which were established to support the avoidance of sensitive species' habitats during sensitive periods (SK MOE 2017).**
- Prior to commencing any site clearing (i.e., vegetation clearing and/or soil disturbance) during the nesting and breeding season, pre-disturbance wildlife clearance surveys will be conducted by a Qualified Professional (QP) at that location within the Project Area to identify sensitive species and habitat features (e.g., nests as well as roosts and hibernacula used by bat species).
- Active and/or suspected breeding and roosting locations identified during the pre-disturbance wildlife clearance surveys will be protected with a no-disturbance setback buffer consistent with regulatory guidelines (e.g., the 2017 SARGSS [SK MOE 2017]) in accordance with the level of the disturbance and species until the young have successfully fledged, the nest is confirmed as no longer active (e.g., abandoned or depredated), or the nesting window has passed (for suspected nest locations). If guidelines cannot be met, due to safety or operational concerns, SK MOE will be contacted for advice on the appropriate response to the situation.

3.2.2 Wildlife Education and Awareness

- Employees and contractors will be provided with wildlife education and awareness training, including education about potential Wildlife SAR issues on site and training on the mitigation measures to avoid or minimize potential adverse Project effects on Wildlife SAR and their habitats.
- Employees and contractors will be educated on waste management policies that limit human-avian interactions.
- Designated employees will be trained in appropriate avian deterrent techniques to minimize avian interactions with the Project.
- **Employees and contractors will be requested to report avian observations on site, injured or dead birds (which will be reported to SK MOE). Avian encounters and outcomes will be monitored, and logbooks will be used to record observations. Logbooks and reports will be available to employees.**

3.2.3 Wildlife and Habitat Protection

- Personal firearms will be prohibited for employees and contractors within the Project Area to prevent hunting activities.
- If any individual were seeking access around the Project area to undertake Aboriginal and/or Treaty Rights, Denison staff would facilitate this, provided it were safe to do so given activities in the area.
- Policies will be implemented prohibiting employees and contractors from feeding, approaching, or harassing avian species within the Project Area.
- To support habitat regeneration, progressive reclamation and ecosystem-based revegetation will be conducted on disturbed areas as soon as practicable in accordance with the Reclamation and Closure Plan.

3.2.4 Wildlife Deterrence and Prevention of Wildlife Entrapment

- **Buildings and other Project infrastructure will be designed and maintained to exclude birds (e.g., barn swallows) and bats as much as possible. This would include installing solid barriers (e.g., corner slope panels, wooden panels) or flexible barriers (e.g., netting, tarps or geotextiles) under roof eaves or other exterior surfaces.**
- **Physical, visual, and/or auditory deterrents will be used to discourage bird and bat use of buildings and other Project infrastructure (e.g., water or waste treatment ponds) for refuge, shelter, breeding, and roosting, and to deter birds and bats from potentially becoming entrapped.**
- **Noise emitting Project activities will be managed to minimize sensory disturbance of wildlife SAR species, especially during sensitive time periods (i.e., breeding and nesting).**
- Low sound emission equipment, regular maintenance of equipment, and the use of silencers or mufflers (whenever practical) will be used to reduce noise associated with Project activities, to the extent practical.
- **Directed lighting or light shielding, rather than broad lighting, will be implemented to minimize sensory disturbance on the wildlife SAR, and lighting will be focused on work sites and not surrounding areas.**

- Dust generation and subsequent deposition on vegetation and in waterbodies (including potential deposition of trace metals and radionuclides) will be limited through dust suppression techniques such as road watering and traffic management.

3.2.5 Road and Traffic Management

- Traffic and access control measures will be implemented will include reducing traffic volume by scheduling truck convoys, using high-volume haul trucks, and restricting public access to the Project site and roads (e.g., private vehicles, snowmobiles, all-terrain vehicles, and foot traffic). It is important to note that if any individual were seeking access around the Project area to undertake Aboriginal and / or Treaty Rights, Denison staff would facilitate this, provided it were safe to do so given activities in the area.
- Appropriate road signage will be installed (e.g., speed limits) along Project roads to raise awareness and minimize the potential for wildlife SAR-vehicle collisions.
- Wildlife will have the right-of-way on Project roads, unless it is unsafe to stop (i.e., if a collision is imminent). Vehicles will not be used to encourage wildlife to move off Project roads.
- Processes will be implemented for employees and contractors to slow down and/or stop vehicles/equipment to allow animals to move away or off the road before resuming normal road speeds for the area.
- Employees and contractors will report and communicate the location and circumstances of any roadkill observed on or alongside Project roads. Large-bodied wildlife carcasses found will be reported to SK MOE and disposed of as directed to discourage avian scavengers.
- **Vegetation management, such as mowing and brush cutting, will be implemented along Project roads to reduce site attractiveness for wildlife SAR and maintain appropriate sightlines for drivers to minimize wildlife-vehicle collisions.**
- Alternative measures on Project roads for de-icing and winter traction (e.g., sand, gravel) or dust suppression (e.g., water) will be implemented, whenever practicable.
- Appropriately sized gaps in the roadside snowbanks during winter will be maintained to facilitate wildlife crossing and escape thereby reducing the risk of wildlife-vehicle collisions.
- New Project site and access roads will be designed to minimize sightlines for predators, whenever practicable, while still maintaining general road safety.
- Ditches and culverts along Project roads will be designed and maintained to minimize pooling of water. Roadside pools that form may attract wildlife.

3.2.6 Waste and Hazardous Materials Management

- A "no littering policy" for employees and contractors will be implemented within the Project Area.
- **Vegetation management will be incorporated in the vicinity of waste ponds to discourage wildlife SAR use of potentially affected vegetation.**
- Waste will be collected and temporarily stored in wildlife-proof containers to avoid attracting scavengers and with that increase the risk for human-wildlife interact.
- The wildlife-proof containers will be inspected regularly for evidence of avian presence (e.g., gull species) or access to waste disposal facilities. If evidence of avian presence or access to waste disposal facilities is detected, modified systems will be implemented and/or off-site waste disposal frequencies will be increased.
- The use of hazardous materials will be limited as much as possible.

- Hazardous materials will be handled, stored, and disposed of appropriately and in accordance with a Waste Management Plan to avoid attracting avian scavengers (e.g., wildlife-proof containers, exclusion fencing).
- Physical deterrents (e.g., fencing) will be employed around contaminated areas (e.g., waste ponds and waste pads), the domestic landfill, or hazardous materials storage areas to discourage wildlife use.
- Appropriate hazardous materials management practices will be implemented in accordance with industry guidelines and a Waste Management Plan to minimize the risk of accidental spills or leakage.
- Appropriate spill response kits will be positioned adjacent to areas where hazardous materials are stored in accordance with the Spill Response Plan.
- A minimum 100 m distance from any waterbody will be maintained for fuel storage, refueling activities, or equipment servicing in accordance with the Spill Response Plan.
- Appropriate fuel, chemical, and materials management practices will be followed in accordance with the Spill Response Plan to minimize the risk of accidental spills or leakage of diesel fuel, other hydrocarbons, and other hazardous materials.
- Air emissions will be reduced to the extent practical through implementation of an air quality monitoring plan within the EMS.
- All vehicles and equipment will be equipped with industry-standard emission control systems; unnecessary idling of vehicles will be prohibited.
- Vehicles and equipment will be maintained in good working condition (e.g., no leaks) and furnished with industry-standard spill response kits.
- Mitigation measures to reduce the potential for dispersion of radiological contaminants of potential concern to vegetation will be implemented in accordance with the Radiation Protection Plan.
- Education on and enforcement of proper waste and hazardous materials management practices will be provided to employees and contractors.

3.3 Species-Specific Mitigation Measures for Wildlife Species at Risk

The following provides a summary of the species-specific mitigation measures that will be implemented during Project activities. Mitigation measures specific to the Wildlife SAR that were not included or that were revised from what was described in the draft EIS are provided in **bold text**. These will be added to the final EIS.

3.3.1 Arthropod Species

- Mitigation measures designed for the Soil and Organic Matter / Peat (Section 9.1.5) and Vegetation and Ecosystems (Section 9.2.5) VCs are expected to mitigate adverse effects on the arthropod species that are considered SAR (i.e., nine-spotted lady beetle, transverse lady beetle, and yellow-banded bumble bee) primarily related to limiting the loss and/or disruption of suitable habitat for these species. These include:
 - The Project Area (i.e., the area of maximum physical disturbance) has been reduced to the extent safely practicable resulting in reduced habitat disturbance and noise propagation.

- Much of the proposed Project Footprint will be developed within previously disturbed areas, including roads currently used for exploration activities, thereby minimizing additional habitat disturbance.
- During Operation, progressive reclamation will be completed where possible, and the progress and success of these activities will be assessed annually.
- **Herbicide use as part of vegetation management will be limited to the immediate Project Footprint and applied by licensed professional applicators, when necessary, to limit the potential for adverse effects on arthropod species.**

3.3.2 Amphibian Species

- Mitigation measures designed for the Wetlands VC (Section 9.2.5) are expected to mitigate adverse effects on the northern leopard frog primarily related to limiting the loss and/or disruption of suitable habitat for these species. These include:
 - The Project Area (i.e., the area of maximum physical disturbance) has been reduced to the extent safely practicable resulting in reduced habitat disturbance and noise propagation.
 - Much of the proposed Project Footprint will be developed within previously disturbed areas, including roads currently used for exploration activities, thereby minimizing additional habitat disturbance.
 - During Operation, progressive reclamation will be completed where possible, and the progress and success of these activities will be assessed annually.
- **Pre- disturbance wildlife clearance surveys will be conducted to identify site-specific habitat features (e.g., amphibian breeding ponds) and implement the setbacks and/or timing windows (that will be defined in the Wildlife Management Plan).**
- **Locations of site-specific habitat features used by amphibians will be communicated to Project personnel and the requirement to limit disturbance in these areas will be implemented.**
- **Appropriate setback and buffer distances from wetland features where amphibians are known to occur will be implemented and maintained under the direction of a wildlife QP.**
- **Vehicle traffic and construction activities will be restricted to the approved access routes and work areas and will not cross or enter a watercourse or wetland.**

3.3.3 Bat Species

- Vegetation clearing activities will occur outside of roosting periods, when practical.
- **Pre- disturbance wildlife clearance surveys will be completed to identify site-specific habitat features such as maternal roosting sites and hibernacula used by bat species. If features are identified in the Project Footprint, appropriate setbacks and/or timing windows will be implemented in accordance with the SARGSS (SK MOE 2017 (that will also be defined in the Wildlife Management Plan).**
- **In the event a maternal roosting site is identified on the Project Footprint, exclusionary methods (e.g., installing a one-way bat exit) will be implemented following the summer maternity roost season. This installation would allow for bats to leave but not the ability to re-enter the roosting site.**

- Locations of these site-specific habitat features used by bats will be communicated to the appropriate Project personnel and the requirement to limit disturbance in these areas will be implemented.
- Specific exclusion methods will be added as mitigation measures (Section 9.4.5 of the final EIS) to prevent access to buildings and other infrastructure.

3.3.4 Avian Species

- Site clearing and other works that involve disturbance of vegetation and/or soil will be conducted outside of the nesting season, when practical. The breeding and nesting season for most avian species in Saskatchewan typically spans a period from March 15 to August 31; however, the dates differ for certain species.
- In the event Project activities such as vegetation clearing and/or soil disturbance are required during the breeding and nesting season, pre-disturbance wildlife clearance surveys will be conducted by a QP at that location within the Project Area before activities commence to identify the presence of avian SAR and/or their nests.
- Active and/or suspected breeding and roosting locations identified during the pre-disturbance wildlife clearance surveys will be protected with a no-disturbance setback buffer consistent with regulatory guidelines (e.g., the 2017 SARGSS [SK MOE 2017]) for other grebe species (as there is currently no activity restriction guidelines for horned grebe in Saskatchewan) in accordance with the level of the disturbance and species until the young have successfully fledged, the nest is confirmed as no longer active (e.g., abandoned or depredated), or the nesting window has passed (for suspected nest locations).
- Locations of nesting sites used by bank swallows, barn swallows, and horned grebe will be communicated to appropriate Project personnel and the requirement to limit disturbance in these areas will be implemented.
- Deterrents designed to discourage or prevent barn swallows from using buildings and other Project infrastructure have been described in Section 3.2.4 of the EIS.
- Buildings and other Project infrastructure will be designed and maintained to exclude birds (e.g., barn swallows) and bats as much as practical. This would include installing solid barriers (e.g., corner slope panels, wooden panels) or flexible barriers (e.g., netting, tarps or geotextiles) under roof eaves or other exterior surfaces.

4 Residual and Cumulative Effects Summary

The approach to assessing residual Project effects on wildlife VCs followed the methodology outlined in Section 5.8 of the EIS, which included a habitat-based approach. For each VC and associated KI, each residual effect was assessed in the context of the Project activities that will occur within each Project phase. Each residual effect was then characterized based on the combined predicted residual effect for all phases. See Sections 9.3.6 and 9.4.6 of the EIS for specific details regarding the residual effects assessment for wildlife VCs (i.e., residual effect characterization and significance determination). A summary of the environmental assessment considerations and determination for predicted residual effects for Wildlife SAR is provided in Table 4.1. Mitigation measures specific to the Wildlife SAR that were not included or that were revised from what was described in the draft EIS are provided in bold text. These will be added to the final EIS.

The cumulative effects assessment (CEA) followed standard methodology as per provincial (e.g., Guidelines for an Environmental Assessment under the [Saskatchewan] *Environmental Assessment Act* 1980) and federal (e.g., Assessing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act 2012*) guidance, and is discussed in detail in Section 5.9 of the EIS. Similar to the residual effects assessment, the CEA included a habitat-based approach. See Sections 9.3.7 and 9.4.7 of the EIS for specific details regarding the CEA for wildlife VCs. A summary of the significance determination of the cumulative effects on Wildlife SAR is provided in Table 4.2.

Table 4.1 Summary of the Environmental Assessment Considerations and Determination for Predicted Residual Effects for Wildlife Species At Risk

| Component | Wildlife SAR | Measurable Parameters | Project Activities Resulting in Primary Interactions | Project Phase | Species-Specific Mitigation Measures ¹ | Predicted Residual Effect | Significance |
|--------------------------------|--|--|--|---------------|---|--|---|
| Terrestrial Environment | Nine-spotted lady beetle Transverse lady beetle Yellow-banded bumble bee | Amount of habitat that is altered or lost relative to its availability in the Terrestrial Regional Study Area (RSA). | <ul style="list-style-type: none"> Development of access roads and air strip. Site preparation and earthworks; clearing, levelling, and grading of the Project Area. Waste management (composting, domestic and industrial landfill operation, recycling). Water management (including treatment). Surface water withdrawal. On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | Construction | <ul style="list-style-type: none"> The proposed mitigation measures outlined in the EIS, particularly those designed for the Valued Components (VCs) Soil and Organic Matter / Peat (Section 9.1.5) and Vegetation and Ecosystems (Section 9.2.5), adequately and appropriately address potential for adverse effects on these species, primarily related to limiting the loss and/or disruption of suitable habitat. These include the following: <ul style="list-style-type: none"> The Project Area (i.e., the area of maximum physical disturbance) has been reduced to the extent safely practicable resulting in reduced habitat disturbance and noise propagation. Much of the proposed Project Footprint will be developed within previously disturbed areas, including | Alteration and/or loss of habitat: predicted to be low magnitude, local geographical extent, long-term duration, frequent, and fully reversible. | Not Significant: the predicted residual effect of alteration and/or loss of habitat is not expected to alter the integrity of the habitat for the arthropod SAR within the Terrestrial RSA to the point where it is not sustainable or available to contribute to ecological functions. |
| | | | <ul style="list-style-type: none"> Water withdrawal from groundwater or surface water body. Management of surface water (including seepage and site runoff). Water release to groundwater and/or surface water body. On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | Operation | | | |

¹ Mitigation measures specific to the Wildlife SAR that were not included or that were revised from what was described in the draft EIS are provided in bold text.

| Component | Wildlife SAR | Measurable Parameters | Project Activities Resulting in Primary Interactions | Project Phase | Species-Specific Mitigation Measures ¹ | Predicted Residual Effect | Significance |
|-----------|--------------|---|--|-----------------|---|---|--|
| | | | <ul style="list-style-type: none">• Site water management, treatment, and release• Process water treatment and release.• Demolition and disposal of non-salvageable surface infrastructure and materials.• On-site and off-site operation of vehicles and transport of materials.• Reclamation of disturbed areas. | Decommissioning | <p>roads currently used for exploration activities, thereby minimizing additional habitat disturbance.</p> <p>- During Operation, progressive reclamation will be completed where possible, and the progress and success of these activities will be assessed annually.</p> | | |
| | | Mortalities directly or indirectly attributable to the Project. | <ul style="list-style-type: none">• Development of access roads and air strip.• Site preparation and earthworks; clearing, levelling, and grading of the Project Area.• On-site and off-site operation of vehicles and transport of materials.• Air transportation for workers. | Construction | <ul style="list-style-type: none">• Herbicide use as part of vegetation management will be limited to the immediate Project Footprint applied by licensed professional applicators when necessary to limit the potential for adverse effects on arthropod species. | Change in mortality: predicted to be low magnitude, local in geographical extent, long-term duration, infrequent, and fully reversible. | The predicted residual effect of change in mortality is not expected to alter the integrity of the regional populations of the arthropod SAR to the point where they are not sustainable or available to contribute to ecological functions. |
| | | | <ul style="list-style-type: none">• On-site and off-site operation of vehicles and transport of materials.• Air transportation for workers. | Operation | | | |
| | | | <ul style="list-style-type: none">• Demolition and disposal of non-salvageable surface infrastructure and materials.• On-site and off-site operation of vehicles and transport of materials.• Reclamation of disturbed areas. | Decommissioning | | | |

| Component | Wildlife SAR | Measurable Parameters | Project Activities Resulting in Primary Interactions | Project Phase | Species-Specific Mitigation Measures ¹ | Predicted Residual Effect | Significance |
|-------------------------|-----------------------|--|--|-----------------|--|--|---|
| Terrestrial Environment | Northern leopard frog | Amount of habitat that is altered or lost relative to its availability in the Terrestrial RSA. | <ul style="list-style-type: none"> Development of access roads and air strip. Site preparation and earthworks; clearing, leveling and grading of the Project Area. Water management (including treatment and site runoff). Surface water withdrawal. On-site and off-site operation of vehicles and transport of materials. | Construction | <ul style="list-style-type: none"> The proposed mitigation measures outlined in the EIS, particularly those designed for the Wetlands VC (Section 9.2.5), adequately and appropriately address potential adverse effects on northern leopard frogs, primarily related to limiting the loss and/or disruption of suitable habitat for this species. These include the following: <ul style="list-style-type: none"> The Project Area (i.e., the area of maximum physical disturbance) has been reduced to the extent safely practicable resulting in reduced habitat disturbance and noise propagation. Much of the proposed Project Footprint will be developed within previously disturbed areas, including roads currently used for exploration activities, thereby minimizing additional habitat disturbance. | Alteration and/or loss of habitat: predicted to be low magnitude, local geographical extent, long-term duration, frequent, fully reversible. | Not Significant: the predicted residual effect of alteration and/or loss of habitat is not expected to alter the integrity of the habitat for northern leopard frog within the Terrestrial RSA to the point where it is not sustainable or available to contribute to ecological functions. |
| | | | <ul style="list-style-type: none"> Water withdrawal from groundwater or surface water body. Management of surface water (including seepage and site runoff). Water release to surface water body. On-site and off-site operation of vehicles and transport of materials. | Operation | | | |
| | | | <ul style="list-style-type: none"> Site water management, treatment, and release. Process water treatment and release. Demolition and disposal of non-salvageable surface infrastructure and materials. On-site and off-site operation of vehicles and transport of materials. Reclamation of disturbed areas. | Decommissioning | | | |

| Component | Wildlife SAR | Measurable Parameters | Project Activities Resulting in Primary Interactions | Project Phase | Species-Specific Mitigation Measures ¹ | Predicted Residual Effect | Significance |
|-----------|--------------|---|--|-----------------|--|---|---|
| | | Mortalities directly or indirectly attributable to the Project. | <ul style="list-style-type: none"> Development of access roads and air strip. Site preparation and earthworks; clearing, leveling and grading of the Project Area. On-site and off-site operation of vehicles and transport of materials. | Construction | <ul style="list-style-type: none"> - During Operation, progressive reclamation will be completed where possible, and the progress and success of these activities will be assessed annually. | Change in mortality: predicted to be low magnitude, local in geographical extent, long-term duration, infrequent, and fully reversible. | The predicted residual effect of change in mortality is not expected to alter the integrity of the regional populations of northern leopard frog to the point where they are not sustainable or available to contribute to ecological functions |
| | | | <ul style="list-style-type: none"> Water withdrawal from groundwater or surface water body. Management of surface water (including seepage and site runoff). Water release to surface water body. On-site and off-site operation of vehicles and transport of materials | Operation | <ul style="list-style-type: none"> • Pre- disturbance wildlife clearance surveys will be conducted to identify site-specific habitat features (e.g., amphibian breeding ponds) and implement the setbacks and/or timing windows (that will be defined in the Wildlife Management Plan). | | |
| | | | <ul style="list-style-type: none"> Site water management, treatment, and release. Demolition and disposal of non-salvageable surface infrastructure and materials. Reclamation of disturbed areas). On-site and off-site operation of vehicles and transport of materials. | Decommissioning | <ul style="list-style-type: none"> • Locations of site-specific habitat features used by amphibians will be communicated to Project personnel and the requirement to limit disturbance in these areas will be implemented. • Appropriate setback and buffer distances from wetland features where amphibians are known to occur will be implemented and maintained under the direction of a wildlife QP. | | |

| Component | Wildlife SAR | Measurable Parameters | Project Activities Resulting in Primary Interactions | Project Phase | Species-Specific Mitigation Measures ¹ | Predicted Residual Effect | Significance |
|-------------------------|--|--|---|-----------------|--|--|---|
| | | | | | <ul style="list-style-type: none"> Vehicle traffic and construction activities will be restricted to the approved access routes and work areas and will not cross or enter a watercourse or wetland. | | |
| Terrestrial Environment | Little brown myotis Northern myotis | Amount of habitat that is altered or lost relative to its availability in the Terrestrial RSA. | <ul style="list-style-type: none"> Development of access roads and air strip. Site preparation and earthworks; clearing, leveling and grading of the Project Area. On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | Construction | <ul style="list-style-type: none"> Vegetation clearing activities will occur outside of roosting periods, when practical. Pre- disturbance wildlife clearance surveys will be completed to identify site-specific habitat features such as maternal roosting sites and hibernacula used by bat species. If features are identified in the Project Footprint, appropriate setbacks and/or timing windows will be implemented in accordance with the SARGSS (SK MOE 2017 (that will also be defined in the Wildlife Management Plan). In the event a maternal roosting site is identified on the Project Footprint, exclusionary methods (e.g., installing a one-way bat | Alteration and/or loss of habitat: predicted to be low magnitude, local geographical extent, long-term duration, frequent, fully reversible. | Not Significant: the predicted residual effect of alteration and/or loss of habitat is not expected to alter the integrity of the habitat for bat species within the Terrestrial RSA to the point where it is not sustainable or available to contribute to ecological functions. |
| | | | <ul style="list-style-type: none"> On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | Operation | | | |
| | | | <ul style="list-style-type: none"> Demolition and disposal of non-salvageable surface infrastructure and materials. On-site and off-site operation of vehicles and transport of materials. Reclamation of disturbed areas. | Decommissioning | | | |
| | | Mortalities directly or indirectly | <ul style="list-style-type: none"> Development of access roads and air strip. | Construction | | Change in mortality: predicted to be low | The predicted residual effect of |

| Component | Wildlife SAR | Measurable Parameters | Project Activities Resulting in Primary Interactions | Project Phase | Species-Specific Mitigation Measures ¹ | Predicted Residual Effect | Significance |
|--------------------------------|---|--|---|-----------------|--|--|--|
| | | attributable to the Project. | <ul style="list-style-type: none"> Site preparation and earthworks; clearing, leveling and grading of the Project Area. On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | | <p>exit) will be implemented following the summer maternity roost season. This installation would allow for bats to leave but not the ability to re-enter the roosting site.</p> <ul style="list-style-type: none"> Locations of these site-specific habitat features used by bats will be communicated to appropriate Project personnel and the requirement to limit disturbance in these areas will be implemented. Specific exclusion methods will be added as mitigation measures (Section 9.4.5 of the final EIS) to prevent access to buildings and other infrastructure. | magnitude, local in geographical extent, long-term duration, infrequent, and fully reversible. | change in mortality is not expected to alter the integrity of the regional populations of the bat species to the point where they are not sustainable or available to contribute to ecological functions |
| | | | <ul style="list-style-type: none"> On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | Operation | | | |
| | | | <ul style="list-style-type: none"> Demolition and disposal of non-salvageable surface infrastructure and materials. On-site and off-site operation of vehicles and transport of materials. Reclamation of disturbed areas. | Decommissioning | | | |
| Terrestrial Environment | Bank Swallow Barn Swallow Common Nighthawk Horned Grebe Olive-sided Flycatcher Rusty Blackbird | Amount of habitat that is altered or lost relative to its availability in the Terrestrial RSA. | <ul style="list-style-type: none"> Development of access roads and air strip. Site preparation an earthworks; clearing, leveling and grading of the Project Area. Water management (including treatment and site runoff). Surface water withdrawal. On-site and off-site operation of vehicles and transport of materials. | Construction | <ul style="list-style-type: none"> Site clearing and other works that involve disturbance of vegetation and/or soil will be conducted outside of the nesting season, when practical. The breeding and nesting season for most avian species in Saskatchewan typically spans a period from March 15 to | Alteration and/or loss of habitat: predicted to be low magnitude, local geographical extent, long-term duration, frequent, fully reversible. | Not Significant: the predicted residual effect of alteration and/or loss of habitat is not expected to alter the integrity of the habitat for the avian SAR within the Terrestrial RSA to the |

| Component | Wildlife SAR | Measurable Parameters | Project Activities Resulting in Primary Interactions | Project Phase | Species-Specific Mitigation Measures ¹ | Predicted Residual Effect | Significance |
|-----------|--------------------------------|---|---|-----------------|---|--|--|
| | Short-eared Owl Yellow Rail | | <ul style="list-style-type: none"> Air transportation for workers. | | <p>August 31; however, the dates differ for certain species.</p> <ul style="list-style-type: none"> In the event Project activities such as vegetation clearing and/or soil disturbance are required during the breeding and nesting season, pre-disturbance wildlife clearance surveys will be conducted by a QP at that location within the Project Area before activities commence to identify the presence of avian SAR and/or their nests. Active and/or suspected breeding and roosting locations identified during the pre-disturbance wildlife clearance surveys will be protected with a no-disturbance setback buffer consistent with regulatory guidelines (e.g., the 2017 SARGSS [SK MOE 2017]) for other grebe species (as there is currently no activity restriction guidelines for horned grebe in Saskatchewan) in accordance with the level of the disturbance | | point where it is not sustainable or available to contribute to ecological functions. |
| | | | <ul style="list-style-type: none"> Management of surface water (including seepage and site runoff). Water release to surface water body. On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | Operation | | | |
| | | Mortalities directly or indirectly attributable to the Project. | <ul style="list-style-type: none"> Site water management, treatment, and release. Process water treatment and release. Demolition and disposal of non-salvageable surface infrastructure and materials. On-site and off-site operation of vehicles and transport of materials. Reclamation of disturbed areas. | Decommissioning | | Change in mortality: predicted to be low magnitude, regional in geographical extent, long-term duration, infrequent, and fully reversible. | The predicted residual effect of change in mortality is not expected to alter the integrity of the regional populations of the avian SAR to the point where they are not sustainable or available to |
| | | | <ul style="list-style-type: none"> Development of access roads and air strip. Site preparation an earthworks; clearing, leveling and grading of the Project Area. On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | Construction | | | |
| | | | <ul style="list-style-type: none"> On-site and off-site operation of vehicles and transport of materials. | Operation | | | |

| Component | Wildlife SAR | Measurable Parameters | Project Activities Resulting in Primary Interactions | Project Phase | Species-Specific Mitigation Measures ¹ | Predicted Residual Effect | Significance |
|-----------|--------------|-----------------------|--|-----------------|--|---------------------------|-------------------------------------|
| | | | <ul style="list-style-type: none"> Air transportation for workers. Demolition and disposal of non-salvageable surface infrastructure and materials. On-site and off-site operation of vehicles and transport of materials. Reclamation of disturbed areas. | Decommissioning | <p>and species until the young have successfully fledged, the nest is confirmed as no longer active (e.g., abandoned or depredated), or the nesting window has passed (for suspected nest locations).</p> <ul style="list-style-type: none"> Locations of nesting sites used by bank swallows, barn swallows, and horned grebe will be communicated to appropriate Project personnel and the requirement to limit disturbance in these areas will be implemented. Deterrents designed to discourage or prevent barn swallows from using buildings and other Project infrastructure have been previously described in Section 3.2.4 of the EIS. Buildings and other Project infrastructure will be designed and maintained to exclude birds (e.g., barn swallows) and bats as much as practical. This would include installing solid barriers (e.g., corner slope panels, wooden panels) or flexible | | contribute to ecological functions. |

| Component | Wildlife SAR | Measurable Parameters | Project Activities Resulting in Primary Interactions | Project Phase | Species-Specific Mitigation Measures ¹ | Predicted Residual Effect | Significance |
|-----------|--------------|-----------------------|--|---------------|--|---------------------------|--------------|
| | | | | | <div>barriers (e.g., netting, tarps or geotextiles) under roof eaves or other exterior surfaces</div> <ul style="list-style-type: none">Minimize height of salvaged soil stockpiles and avoid vertical slopes to deter bank swallows from creating nesting cavities. | | |

Table 4.2 **Summary of Significance of the Cumulative Effects on Wildlife Species At Risk**

| Component | Valued Component | Key Indicator | Cumulative Effects | Summary of Significance of the Cumulative Effects |
|-------------------------|--------------------------|---|------------------------------------|---|
| Terrestrial Environment | Wildlife Species at Risk | <ul style="list-style-type: none"> Nine-spotted lady beetle Transverse lady beetle Yellow-banded bumble bee Northern leopard frog Little brown myotis Northern myotis Bank Swallow Barn Swallow | Alteration and/or loss of habitat. | Not significant: The cumulative effect of alteration and/or loss of habitat is not expected to alter the integrity of the Wildlife Species at Risk habitat within the Terrestrial RSA to the point where it is not sustainable or available to contribute to ecological functions. |
| | | <ul style="list-style-type: none"> Common Nighthawk Horned Grebe Olive-sided Flycatcher Rusty Blackbird Short-eared Owl Yellow Rail | Change in mortality. | Not significant: The cumulative effect of change in mortality is not expected to alter the integrity of the regional populations to the point where they are not sustainable or available to contribute to ecological functions. |

5 References

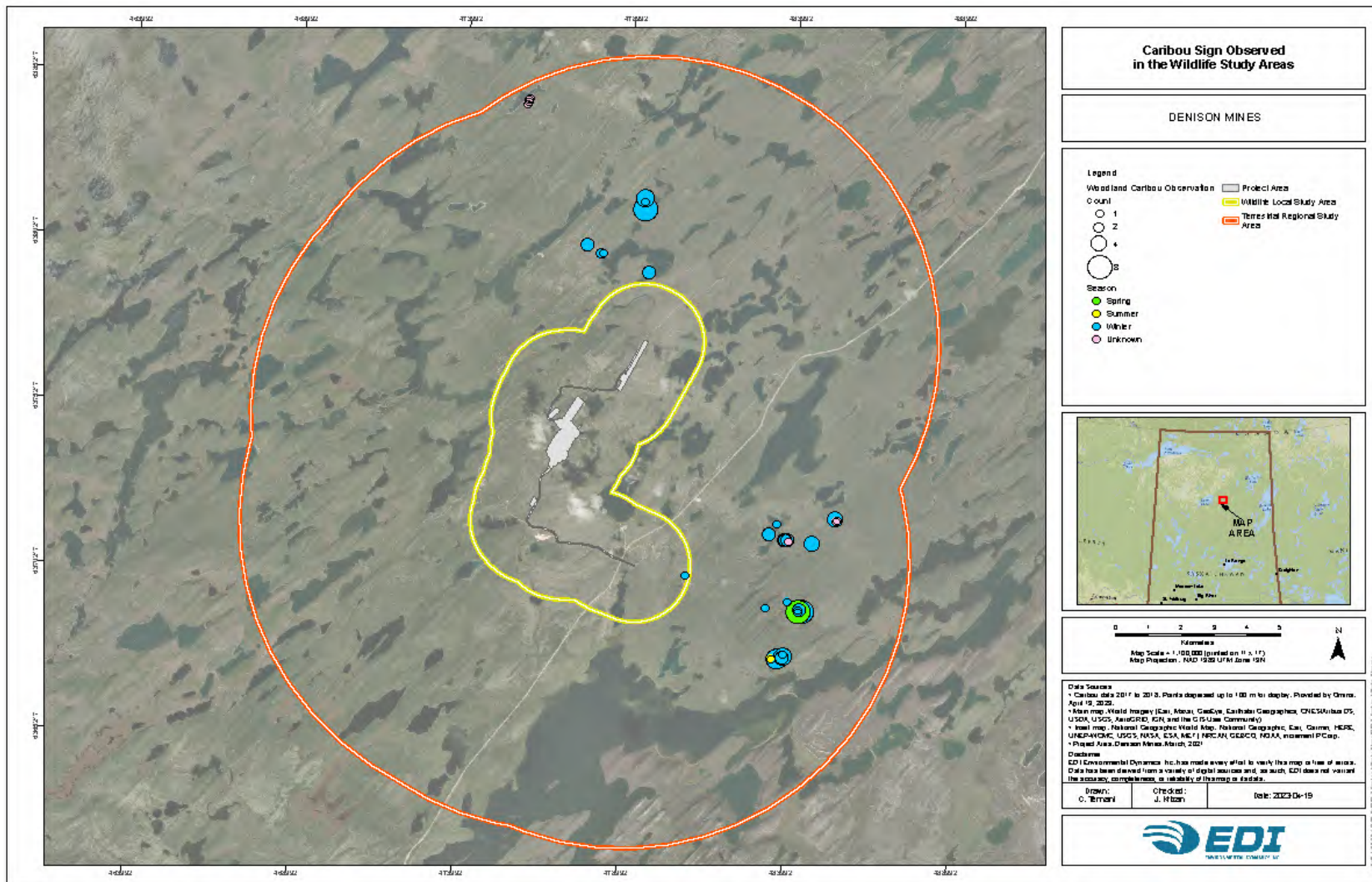
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- COSEWIC. 2009b. COSEWIC assessment and status report on the Horned Grebe, *Podiceps auritus*, Western population and Magdalen Islands population, in Canada. Committee on the Status of Endangered Wildlife in Canada, Ottawa. vii + 42 pp.
- COSEWIC. 2013a. COSEWIC assessment and status report on the Little Brown Myotis *Myotis lucifugus*, Northern Myotis *Myotis septentrionalis*, and Tri-colored Bat *Perimyotis subflavus* in Canada. Committee on the Status of Endangered Wildlife in Canada, Ottawa. xxiv + 93 pp.
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- COSEWIC. 2016b. COSEWIC assessment and status report on the Transverse Lady Beetle *Coccinella transversoguttata* in Canada. Committee on the Status of Endangered Wildlife in Canada, Ottawa. xi + 57 pp.
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- Environment and Climate Change Canada. 2022a. Management Plan for the Yellow-banded Bumble Bee (*Bombus terricola*) in Canada [Proposed]. *Species at Risk Act* Management Plan Series. Environment and Climate Change Canada, Ottawa. iv + 46 pp.
- Environment and Climate Change Canada. 2022b. Recovery Strategy for the Bank Swallow (*Riparia riparia*) in Canada. *Species at Risk Act* Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. ix + 125 pp.

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Attachment: IR-143

| | |
|---|--|
| Number | IR-143 |
| Dept. | ECCC |
| Project effects link | Wildlife and Wildlife habitat |
| Reference to EIS, appendices, or supporting documentation | Section 9.3.3.3, Baseline Studies |
| Context and Rationale | <p>Context and Rationale: The baseline caribou data is insufficient to understand potential Project impacts to this species. Presence/absence detection was provided by camera traps, incidental observations, winter track and pellet survey.</p> <p>Additional information and analyses on caribou use of the landscape during all life stages of the Project area is required to assess impacts and to determine significance of impact from the Project to caribou.</p> |
| Information Requirement | <p>Provide details on the baseline caribou data including:</p> <ul style="list-style-type: none"> • Revision of map 9.3-8 to include all observations, categorized by type, season and year (see also IR-145); and • Description of seasonal use of the LSA, RSA and caribou range. • Description of Project areas used by caribou. • Description of future studies planned to assess habitat use by caribou. Include specific details on how many additional years of aerial surveys will be completed to assess the caribou baseline conditions. <p>Utilizing additional data noted above and specified in IR-145, explain how caribou use of the area could be affected by the Project throughout all seasons and life stages (e.g., calving, post-calving, rutting, wintering).</p> <p>See also related: IR-152.</p> |

Supporting figure to the response provided in table: revised Figure 9.3-8



Attachment IR-143 Figure 9.3-8 Caribou Sign Observations in the Wildlife Study Areas (updated)

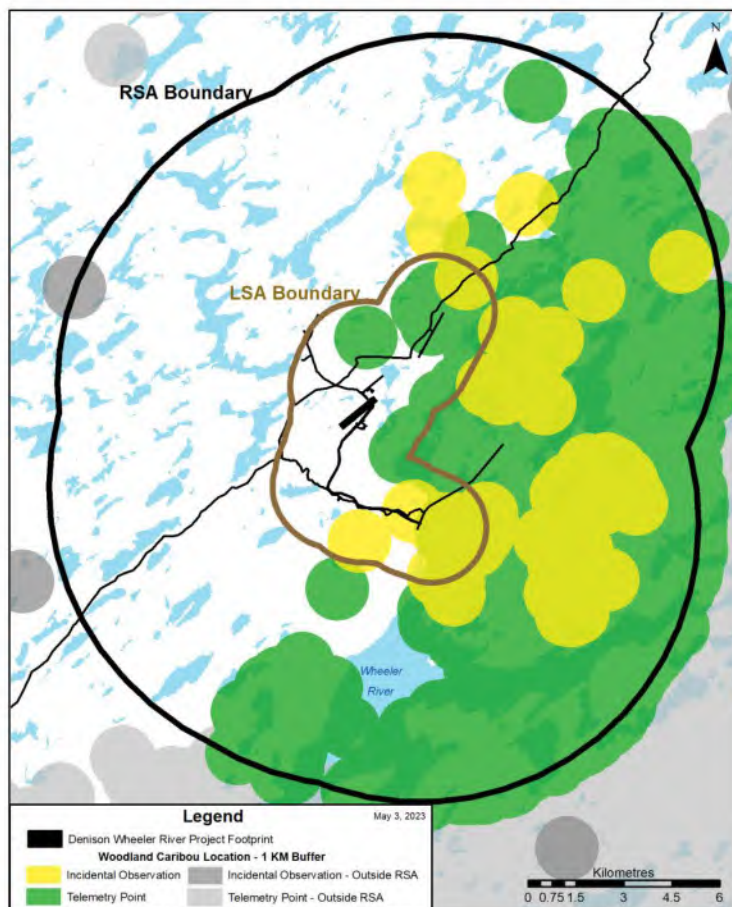
Attachment: IR-145

| | |
|---|---|
| Number | IR-145 |
| Dept. | ECCC |
| Project effects link | Wildlife and Wildlife habitat |
| Reference to EIS, appendices, or supporting documentation | Section 9.3.3.3, Woodland Caribou |
| Context and Rationale | <p>Context and Rationale: The Proponent has not provided sufficient information on how caribou use the landscape, including identification of areas for different life stages of caribou (calving, post-calving, rutting and wintering).</p> <p>The University of Saskatchewan published a report entitled Population and habitat ecology of boreal caribou and their predators in the Saskatchewan Boreal Shield. This report contains information on habitat types that are used during different life stages. Additionally, Appendix H of the Amended Recovery Strategy for the Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada 20202 [1] details habitat characteristics required by boreal caribou to carry out life processes necessary for survival and recovery.</p> <p>The scientific literature review (Section 9.3.3.3.1) on Woodland Caribou states: “While calving areas have not been documented within the SK1 range, it is recognized that caribou may use open fen and treed bog habitat types for calving during the spring/summer period. In Saskatchewan, caribou habitat used during the calving season in the SK2 range demonstrated a strong selection for treed muskegs, but avoidance of jack pine, mixed hardwood stands, and roads (Dyke 2008).”</p> <p>ECCC is not able to verify the Proponent’s effects assessment without sufficient information on important habitat or biophysical attributes for caribou within the study areas.</p> <p>[1] https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/recovery-strategies/woodland-caribou-boreal-2020.html#toc0</p> |

| | |
|-------------------------|--|
| Information Requirement | <p>1. Provide, based off existing literature or available data and the Amended Recovery Strategy for Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada:</p> <ul style="list-style-type: none">• information on known important habitat features or biophysical attributes in Project areas for different caribou life stages (calving, post-calving, rutting, wintering),• a map(s) of the type and spatial extent of important caribou habitat features or biophysical attributes of the study areas as defined in Appendix H of the Recovery Strategy,• mapping should be at the RSA/LSA level as well as larger-scale mapping at the scale of the Project footprint. <p>2. Assess the potential direct and indirect effects based on additional information on caribou from bullet A above.</p> <p>See also related IRs: IR-143 and IR-152.</p> |
|-------------------------|--|

Supporting figure to the response provided in table:

Denison-Wheeler Study Area - Woodland Caribou Location Data



| RSA Boundary | | |
|------------------------|-------------------|---------------------|
| Data Type | Years | Number of Locations |
| Incidental Observation | 1987, 2017 – 2022 | 89 |
| Telemetry Point* | 2013 – 2016 | 3,848 |

*Data from 15 individual woodland caribou cows

| LSA Boundary | | |
|------------------------|-------------------|---------------------|
| Data Type | Years | Number of Locations |
| Incidental Observation | 2017 – 2022 | 19 |
| Telemetry Point* | 2013, 2015 – 2016 | 62 |

*Data from 4 individual woodland caribou cows

NOTE: Absence of data does not mean absence of woodland caribou.

Attachment: IR-149

| | |
|---|---|
| Number | IR-149 |
| Dept. | ECCC CNSC |
| Project effects link | Wildlife and Wildlife habitat |
| Reference to EIS, appendices, or supporting documentation | Section 9.3.5.2, Additional Wildlife- specific Mitigation Measures |
| Context and Rationale | <p>Context: The EIS describes that ongoing research is performed to inform the development of a Woodland Caribou Management Plan. This includes studies on the effectiveness of linear disruption features on predator/prey movements, and a field program for long-term reclamation planning. Moreover, it is stated that the Plan will include a detailed assessment of the need for habitat offsets.</p> <p>The draft EIS Section 9.3.5.2 states: “A wildlife monitoring plan and a Woodland Caribou Management Plan will be developed to address wildlife-specific mitigation measures based on proven and accepted mitigation following standard industry guidelines and BMPs. The plans will provide guidance to avoid or minimize potential adverse effects of the Project on wildlife and wildlife habitat, including monitoring and follow-up programs, as appropriate. It will be in place during all phases of the Project and will be subject to ongoing review and revision as required. If monitoring identifies a need for additional or revised mitigation measures, a process of adaptive management (as described in the plan) will be triggered.”</p> <p>Rationale: The draft EIS does not present sufficient species-specific mitigation measures for boreal caribou. ECCC is not able to assess potential residual impacts to caribou without specific mitigations.</p> <p>Since the Woodland Caribou Management Plan is still under development, it is difficult to judge whether the measures will be adequate to mitigate and/or offset potential project effects on Woodland caribou and its critical habitat.</p> |
| Information Requirement | <p>Provide the Woodland Caribou Management Plan, to demonstrate effective mitigation of potential project effects, along with wildlife-specific mitigation measures for review.</p> <p>The Plan should be informed by and consistent with the Boreal Caribou Recovery Strategy and demonstrate that avoidance and minimization measures will be applied to mitigate for predicted Project effects to boreal caribou and its critical</p> |

| | |
|--|--|
| | <p>habitat prior to considering offsetting measures. That is, the Plan should follow the mitigation hierarchy and information should be provided as outlined below:</p> <ol style="list-style-type: none"> 1. AVOID: Describe all measures that will be taken to avoid effects to boreal caribou and avoid the destruction or alteration boreal caribou critical habitat. 2. MINIMIZE: Describe all measures that will be taken to minimize the effects to boreal caribou and minimize the destruction of boreal caribou critical habitat. 3. RESTORE ON-SITE: describe the measures that will be taken to restore disturbed areas of the project, related to construction, operation and maintenance, on boreal caribou critical habitat, remaining after considering the avoidance and minimization measures. 4. Characterize the risk of the adverse effects that are likely to result from the project on boreal caribou and its critical habitat after avoidance minimization, and onsite restoration measures have been considered. 5. OFFSET: Describe the measures that will be implemented outside the Designated Project area to mitigate adverse effects, destruction or alteration of boreal caribou critical habitat by the Designated Project during construction and operation. 6. Characterize the risk of the adverse effects that are likely to result from the project on boreal caribou and its critical habitat after avoidance, minimization, onsite restoration, and offset measures have been considered. <p>Describe all relevant uncertainties on the effectiveness of the measures to address adverse effects on boreal caribou and the rationale for the selected measure, in light of the mitigation hierarchy.</p> <p>See also related IRs: IR-149 and IR-157.</p> |
|--|--|

Response:

Conceptual Caribou Mitigation Plan is included below.



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Denison Mines Corp.

Conceptual Caribou Mitigation Plan

Version 1

June 2023

Revision History

| Version | Date | Description of Revision |
|---------|---------------|--|
| 1 | June 30, 2023 | Conceptual plan to support provincial and federal review of the draft environmental impact statement |
| | | |
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Acronyms and Abbreviations

| Term | Definition |
|--|--|
| Anthropogenic | Caused or produced by humans |
| BSCs | biological soil crusts |
| Boreal Caribou | The boreal ecotype of woodland caribou occurs within the boreal forest of Canada. These non-migratory caribou form small aggregations throughout the year and disperse for solitary calving. |
| Committee on the Status of Endangered Wildlife in Canada (COSEWIC) | A committee made up of experts from academic, government and non-government organizations that assess the conservation status of wildlife species that may be at risk of extinction in Canada. |
| Critical Habitat | The habitat that is necessary for the survival of a listed wildlife species and is identified as the species critical habitat in the recovery strategy or action plans for the species. |
| DERT Project | Developing Eco-Restoration Together Project |
| Disturbed habitat (per ECCC 2020) | Habitat showing: i) anthropogenic disturbance visible on Landsat at a scale of 1:50,000, including habitat within a 500 m buffer of the anthropogenic disturbance; and/or ii) fire disturbance in the last 40 years, as identified in data from each provincial and territorial jurisdiction (without buffer). |
| ECCC | Environment and Climate Change Canada |
| EA | environmental assessment |
| EIS | environmental impact statement |
| EMS | environmental management system |
| ENV | Saskatchewan Ministry of Environment |
| ha | hectare |
| Local Populations (ECCC 2020) | Group of boreal caribou occupying a defined area distinguished spatially from areas occupied by other groups of boreal caribou. Local population dynamics are driven primarily by local factors affecting birth and death rates, rather than immigration or emigration among groups. In this recovery strategy, “local population” refers to a group of boreal caribou occupying any of the three types of boreal caribou ranges (i.e., conservation unit, improved conservation unit, local population unit). |

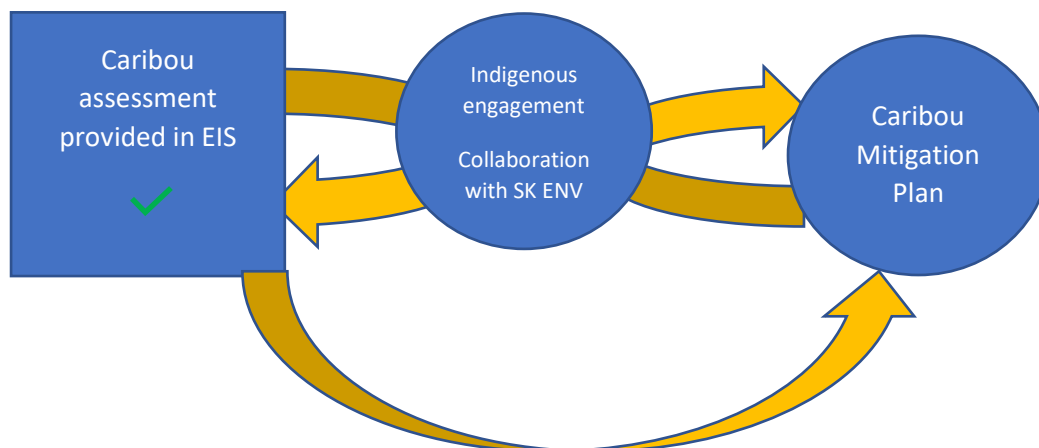
| | |
|--|--|
| Plan | Conceptual Caribou Mitigation Plan |
| Project | Wheeler River Project |
| Range (per ECCC 2020) | <p>The geographic area occupied by a group of individuals that are subject to similar factors affecting their demography and used to satisfy their life history processes (e.g., calving, rutting, wintering) over a defined time frame.</p> <p>Environment and Climate Change Canada (2011) identified three types of boreal caribou ranges categorized based on the degree of certainty in the delineated range boundaries (i.e., conservation unit, improved conservation unit, local population unit).</p> |
| Recovery strategy | A planning document that identifies what needs to be done to stop or reverse the decline of a species. |
| SARA | Species at Risk Act |
| Self-sustaining local population (ECCC 2020) | A local population of boreal caribou that on average demonstrates stable or positive population growth over the short-term (≤ 20 years) and is large enough to withstand stochastic events and persist over the long-term (≥ 50 years), without the need for ongoing active management intervention. |
| Threatened species | A wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction. |
| Undisturbed habitat (per ECCC 2020) | Habitat not showing any: i) anthropogenic disturbance visible on Landsat at a scale of 1:50,000, including habitat within a 500 m buffer of the anthropogenic disturbance; and/or ii) fire disturbance in the last 40 years, as identified in data from each provincial and territorial jurisdiction (without buffer). Disturbance within the 500 m buffer would result in a reduction of the undisturbed habitat. |

1 Introduction

The Wheeler River Project (the Project) environmental impact statement (EIS) evaluates and assesses potential Project-related effects on the Boreal population of woodland caribou (*Rangifer tarandus caribou*; referred to herein as caribou or boreal caribou) following standard environmental assessment (EA) methodology. The assessment of potential effects considered both direct (i.e., habitat loss) and indirect effects (i.e., habitat alteration) on caribou and their habitat, while assuming that caribou were present year-round and during all of their life stages (i.e., calving, rearing, mating, over wintering). In this way, the EIS took a precautionary or conservative approach to understanding/addressing the likely residual effects (i.e., effects remaining after mitigation measures were considered) of the Project on caribou and their habitat and is using this approach as a planning tool to inform/support future Project-related regulatory approvals processes and follow-up monitoring. The EIS has demonstrated that the Project, as proposed and assessed, is predicted to minimize the potential for environmental adverse effects on caribou and their habitat before any Project specific construction occurs. The conclusions of the assessment predicted that the likely residual effects of the Project on caribou were not significant.

This Conceptual Caribou Mitigation Plan (the Plan), developed proactively by Denison, has a different objective than the EIS. The Plan builds on the assessment of potential Project effects and commitments to mitigate such effects made in the EIS and is expected to be advanced with ongoing consultation with the Saskatchewan Ministry of Environment (ENV), as ENV finalize the caribou range plan for SK1. The EIS is a conservative planning tool, whereas the Plan is a practical, living document designed to define management works associated with caribou. The Plan is not a requirement for EA determination but is provided as a guidance document to help Denison proactively describe and inform the development and implementation of appropriate mitigation measures related to caribou and their habitat.

The Plan is an evergreen document. It will be consistent with the management goals of ENV for the SK-1 caribou conservation unit, and will be developed/refined in consultation with local communities including English River First Nation and Kineepik Métis Local in Pinehouse and regulators (e.g., ENV). As noted above, the boreal caribou range plan for SK-1 is under development and it is understood that this Plan will be updated as more information becomes available. The conceptual nature of the Plan is in part due to the absence of range plan priorities and reflects Denison's commitment to continue to work with the province to meet the management objectives and management strategies for the SK1 range.



2 Guidance and Regulatory Framework

A brief review highlighting federal and provincial considerations of boreal caribou is provided below for reference.

2.1 Federal

Boreal caribou have been designated as *threatened* under the federal *Species at Risk Act* (SARA). Environment and Climate Change Canada (ECCC) released amended recovery strategy for woodland caribou in 2020 (ECCC 2020). A recovery strategy is a planning document that identifies what should be done to stop or reverse the decline of a species.

The Project is located in the Boreal Shield West ecoregion of the Boreal Shield ecozone. The Boreal Shield West ecoregion stretches from Alberta to Ontario (Figure 2-1).

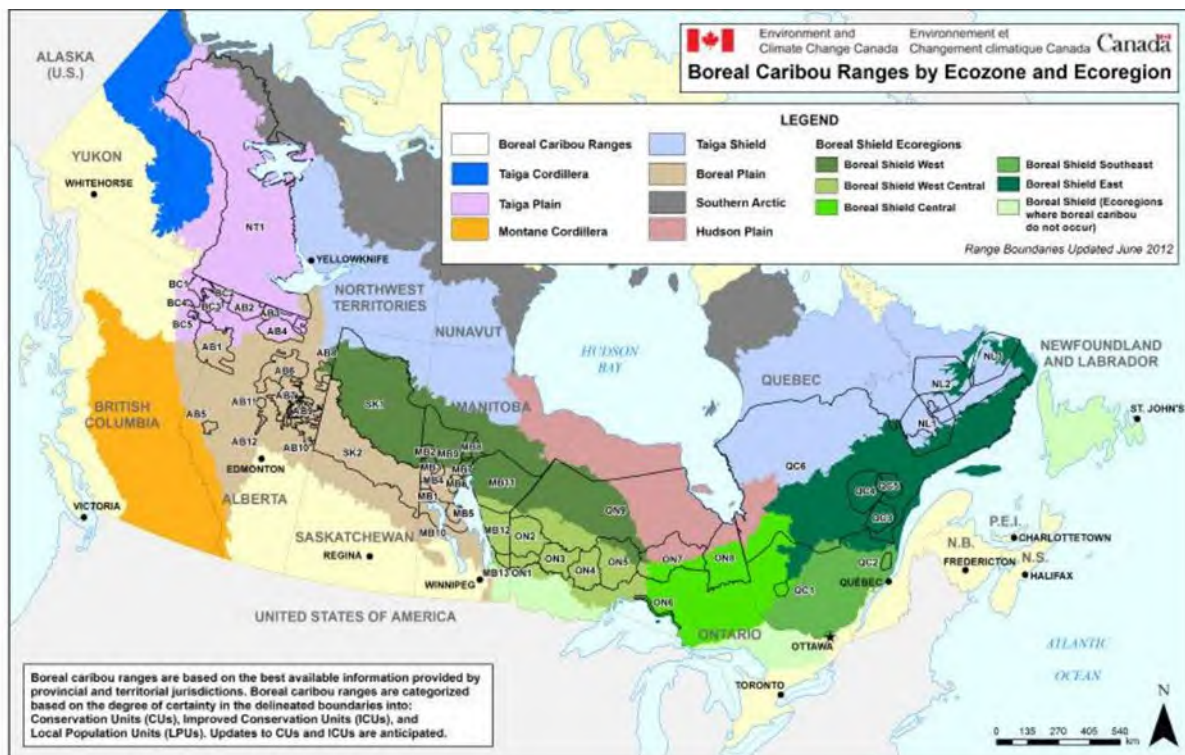


Figure 2-1: Boreal Caribou Distribution Across Ecozones and Ecoregions in Canada (source: ECCC 2020)

The SK1 range comprises more than 18,000,000 hectares (ha) and is characterized by high fire disturbance and low anthropogenic disturbance (ECCC 2020). The likelihood of caribou self-sustainability in the boreal shield range in SK1 is “likely” (ECCC 2020). For SK1, the amended recovery strategy (ECCC 2020) identifies 40% undisturbed habitat in the range as the disturbance management threshold, which provides a measurable probability (71%) for the local population to be self-sustaining. This threshold is considered a minimum threshold because at 40% undisturbed habitat there remains a risk (29%) that the SK1 local population cannot be self-sustaining. Disturbed habitat (ECCC 2020) is habitat showing: i) anthropogenic disturbance visible on Landsat at a scale of 1:50,000, including habitat within a 500 m buffer of the

anthropogenic disturbance; and/or ii) fire disturbance in the last 40 years, as identified in data from each provincial and territorial jurisdiction (without buffer). Undisturbed habitat (ECCC 2020) is habitat not showing any: i) anthropogenic disturbance visible on Landsat at a scale of 1:50,000, including habitat within a 500 m buffer of the anthropogenic disturbance; and/or ii) fire disturbance in the last 40 years, as identified in data from each provincial and territorial jurisdiction (without buffer). Disturbance within the 500 m buffer would result in a reduction of the undisturbed habitat.

Studies (e.g., McLoughlin et al. 2019) indicate that the SK1 local caribou population is likely self-sustaining at current levels of disturbance (60% total disturbance), with a 71% probability of persistence. Environment and Climate Change Canada's analyses also indicate that the SK1 local population is sensitive to small increases anthropogenic disturbance and sensitive to small decreases in adult survival. For these reasons, a higher probability of persistence was selected for critical habitat identification in SK1 (71%) than was selected for the other 50 ranges across Canada (60%) (ECCC 2019).

The precise location of the 40% undisturbed habitat within the range is expected to vary over time. The habitat within the SK1 range should exist in an appropriate spatial configuration such that boreal caribou can move throughout the range and access required habitat when needed. The key to this habitat delineation is achieving and maintaining an overall, ongoing range condition that allows for the dynamic habitat supply system, containing the biophysical attributes upon which caribou depend, to remain sustainable. It is this dynamic habitat supply system within the SK1 range that is the habitat condition considered to be necessary for the caribou.

2.2 Provincial

The responsibility for woodland caribou management lies with the Province of Saskatchewan. Broadly, the province is responsible for developing range plans or management plans which build on the federal recovery strategy by setting goals and objectives for maintaining sustainable population levels.

The Saskatchewan Conservation Data Centre (SK-CDC) is responsible for evaluating and assigning a conservation rank to each taxon, resident or transient, found in the province. Woodland caribou's subnational or S-rank conservation rank is S3. This ranking indicates that, provincially, the species is vulnerable/rare to uncommon which is associated with a moderate risk of extinction or extirpation due to a restricted range, relatively few populations, recent and widespread declines, threats, or other factors. Currently, the caribou population in SK-1 is stable (ENV 2023) and the range plan is under development. Engagement is a key component of the range plan process and will be completed with representatives from First Nation, Métis, industry, non-governmental organizations, and communities.

The provincial goal is to sustain and enhance woodland caribou populations, and maintain the ecosystems they require, throughout their current range (ENV 2013). Through the woodland caribou range assessment and range planning program, the province is:

- Gaining a better understanding of woodland caribou ecology;
- Working toward meeting objectives identified in provincial and federal strategies; and
- Improving how the province manages the species and related habitat.

The province's woodland caribou range assessment and range planning program incorporates two key components:

- Woodland caribou range assessment, which enhances the understanding of woodland caribou populations and their interactions with the environment; and
- Woodland caribou range planning, which provides a framework, strategies and objectives that allow for better decisions involving habitat management and self-sustaining caribou populations.

Although the management objectives and management strategies for caribou in SK1 are not yet defined, Denison is committed to working with ENV as the range plan is developed. The Plan will be updated as the Project advances so that it aligns with the conservation objectives as determined by the province as the primary steward of caribou in the province.

3 SK 1 Caribou Population – Background Information

Background information concerning the condition of the SK 1 caribou population is provided below.

3.1 Population Trends

The SK1 Boreal Shield management unit contains high-quality conifer-dominated caribou habitat with greater than 40-year-old stands of jack pine and black spruce forests suitable for lichen colonization, black spruce swamps, and open muskegs supporting relatively high densities of caribou, at 36.9 caribou/1,000 km² or approximately 4,000 caribou across the SK1 Boreal Shield Woodland Caribou Management Unit (McLoughlin et al. 2019).

Research has shown that up to 70% of the year-round diet of caribou may consist of ground and arboreal lichens. If the quantity of available lichen forage is low, caribou can exist without relying entirely on lichens (McLoughlin et al. 2019). Due to their physiology, lichens are resilient to periods of drought and cold temperatures, but because of their slow growth rate, exhibit a slow recovery time after depletion and fire events. In the SK1 range, McLoughlin et al. (2019) found that stand types with the highest potential for adequate lichen biomass for caribou are jack pine and poorly drained black spruce sites.

McLoughlin et al. (2019) observed that, from 2014 to 2018, the caribou population exhibited a high average adult female survival rate and moderate recruitment (0.192 calves per cow in March), ranging from a low of 0.134 calves/cow in March 2016 to 0.244 calves/cow in March 2018. These demographic parameters led the authors to assess the SK1 Boreal Shield caribou population as being stable at the time of their study (McLoughlin et al. 2019).

While calving areas have not been documented within the SK1 range, it is recognized that caribou may use open fen and treed bog habitat types for calving during the spring/summer period. In Saskatchewan, caribou habitat used during the calving season in the SK2 range demonstrated a strong selection for treed muskegs, but avoidance of jack pine, mixed hardwood stands, and roads (Dyke 2008).

Neufeld et al. (2021) summarized results from aerial surveys over a period of eight years in an 87,193 km² study area in the Athabasca Plain and Churchill River Upland ecoregions in the north, that are inclusive of the Terrestrial RSAs that were used in the EIS. During 11 of 16 aerial caribou surveys conducted between 2008 and 2015, woodland caribou were detected in the surveyed areas. The average density of the 16 surveys was estimated at 36.9 caribou/1,000 km² (95% CI = 26.7 to 47.2 caribou/1,000 km²). Across the Neufeld et al. (2021) study area and all years, estimated caribou densities were higher in comparison to averages reported for most other boreal woodland caribou ranges in Canada (i.e., caribou density reported in other areas ranged 4.3 to 18.7/1,000 km²) indicating that caribou can tolerate natural disturbance. One exception to the relatively high caribou densities in northern Saskatchewan was noted: the 2,285 km aerial the Millennium Project in March 2014, 10 km west of the Terrestrial RSA, resulted in lower woodland caribou densities at 5 caribou/1,000 km² (Neufeld et al. 2021).

Eight of the sixteen caribou surveys reported the ratios of male to female and calf to female in their results with the average male:female ratio calculated at 0.571 (95% CI = 0.444 to 0.699) and calf:female at 0.195 (0.158 to 0.232). Again, the 2014 Millennium survey reported a different male:female ratio, outside the reported range (1.6), concurring with the reported low caribou densities.

3.2 Predation

In addition to relatively low predator densities in their study area, McLoughlin et al. (2019) found some spatial separation between caribou and wolves. Caribou did not seem to avoid existing linear features (such as roads, trails, and transmission lines) in the area, while wolves established their territories away from linear features. Unlike caribou, who preferred mature conifer stands, wolves selected for wetlands and patches of deciduous-mixed forest, avoiding stands of mature conifers. Other prey species, such as moose, also occurred at relatively low densities (i.e., 45.7 moose/1,000 km²) (McLoughlin et al. 2019).

McLoughlin et al. (2019) observed that mortality of adult caribou occurred mostly during the snow-free season and only 1 of 94 collared caribou was harvested by a hunter during the four years of the study.

While predation is believed to be a key limiting factor for woodland caribou (Bergerud 1974; Stuart-Smith et al. 1997, DeMars et al. 2011 from ECCC 2020), Neufeld et al. (2021) suggested that habitat- or disturbance-mediated apparent competition only plays a minor role in the Saskatchewan woodland caribou population. Habitat- or disturbance-mediated apparent competition occurs when natural (e.g., forest fires) and anthropogenic (e.g., human development or activities) disturbances increase the abundance of other ungulates, which in turn may increase predator densities, which then increases predation risk to caribou. Neufeld et al. (2021) concluded that Northern Shield and Taiga ecoregions are of low productivity where caribou may compete with only one ungulate species (i.e., moose) and therefore, caribou and wolf dynamics do not follow general habitat- or disturbance-mediated apparent competition models.

3.3 Harvest

Indigenous peoples in Saskatchewan have an inherent right to harvest woodland caribou for subsistence purposes (ENV 2013). No other harvest of woodland caribou is currently permitted. Under provincial and federal recovery planning and effective species management, self-sustaining caribou populations will support long-term subsistence use of the species and protect treaty rights. Subsistence harvest levels are assumed to be low but actual numbers are not available because most communities or Indigenous groups are not collecting and/or publishing this information.

4 No Net Loss and Mitigation Hierarchy

A generic biodiversity mitigation hierarchy (OECD 2016) to achieve no net loss is provided in Figure 4-1. As shown in the hierarchy, an offset can be used to achieve no net loss if residual effects remain following efforts to avoid, minimize, and restore potential project effects. This generic hierarchy is generally consistent with the approach of ENV to manage effects on caribou and their habitat.

The balance of Section 4 of this Plan outlines Denison's approach to avoid, minimize, and restore caribou habitat per commitments made in the draft EIS associated with the Wheeler River Project.

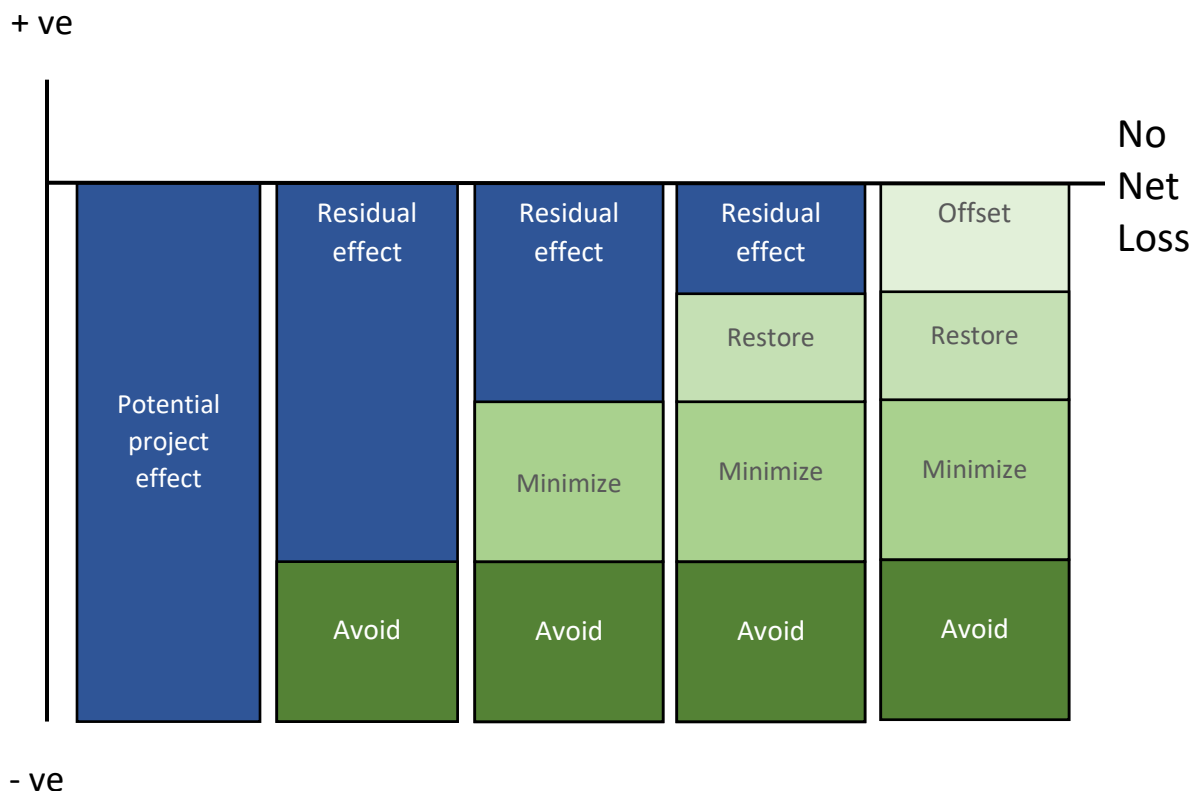


Figure 4-1: Generic No Net Loss and Mitigation Hierarchy (modified from OECD 2016)

4.1 Avoid

Potential adverse effects on the caribou have been avoided to the extent possible through Project design, including:

- Selection of in-situ recovery (ISR) mining avoids some direct and indirect effects compared to conventional underground or open-pit mining methods. ISR mining avoids the need for spatially expansive infrastructure such as waste rock piles and tailings management facilities reducing the Project footprint (i.e., avoids direct effects on caribou and their habitat). ISR mining also reduces the potential for interactions between caribou and Project components / activities as it concerns sensory disturbance as it is inherently a less intensive form of mining with reduced noise/light/vibration generation (i.e., avoids indirect effects on caribou and their habitat).

- Site clearing and other works that involve disturbance of vegetation and/or soil will be completed during least-risk timing windows for caribou (for example, outside of wintering/calving period from April 1-July 31, per ENV 2013), where practical, to avoid disturbance during sensitive time periods.
- Pre-disturbance wildlife surveys will be completed to identify caribou presence and work will be postponed if caribou are present.

4.2 Minimize

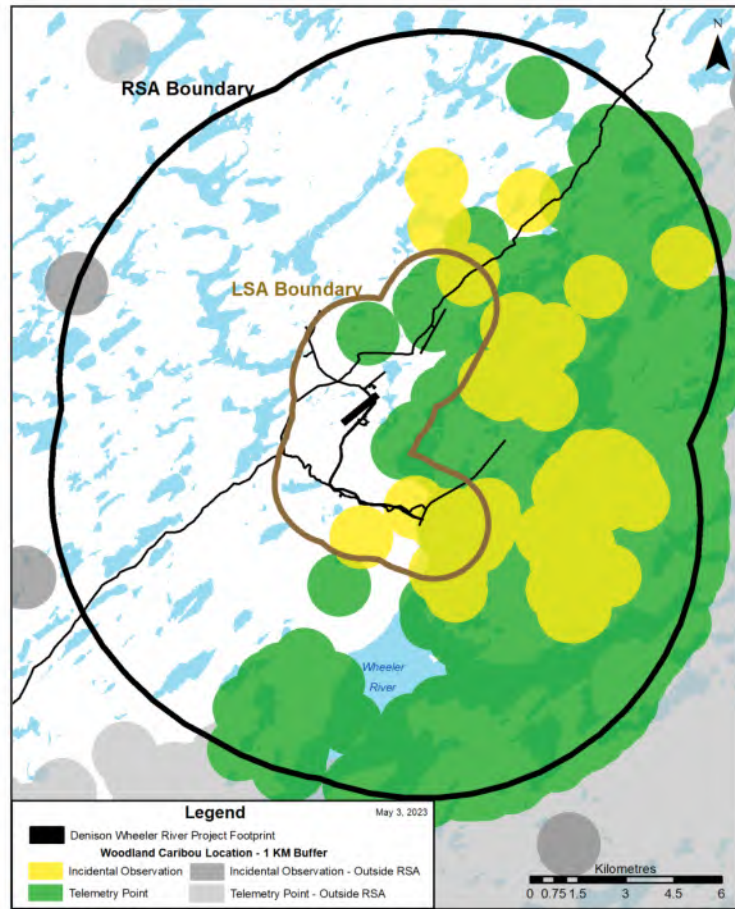
Additional mitigation measures to minimize effects on caribou and their habitat and tailored to Project features have been incorporated into the various Project management and monitoring plans within the Environmental Management System (EMS) including but limited to erosion and sediment controls, soil and vegetation monitoring, Decommissioning Plan, air quality monitoring, fuel spill control and response, Radiation Protection Plan, surface water and effluent monitoring, and Waste Management Plan.

The Project's EMS plans provide direction on monitoring and adaptive management so that issues are identified and mitigation measures are developed and implemented in a timely and effective manner. Mitigation measures specific to caribou are applicable during all Project phases, within all seasons and expected to be effective following appropriate implementation. Examples of the measures to minimize Project effects on wildlife in general, and caribou in particular, are highlighted below.

4.2.1 Disturbance Footprint

- Siting Project components in close proximity to the ISR mining area minimizes indirect effects on caribou and their habitat. The Project components are also west of the known home range of woodland caribou (based on tracking data received by the Ministry of Environment; Figure 4-2), although the absence of data does not mean the absence of caribou and Denison has observed caribou in the area. . Appropriate siting is anticipated to minimize the potential for interactions with woodland caribou and Project activities.
- The Project footprint (i.e., the area of maximum physical disturbance) has been reduced to the extent safely practicable, resulting in limited/minimal habitat loss/disturbance and noise propagation.
- Portions of the proposed Project footprint will be developed within previously disturbed areas, including roads currently used for exploration activities, thereby minimizing additional habitat disturbance.

Denison-Wheeler Study Area - Woodland Caribou Location Data



| RSA Boundary | | |
|------------------------|-------------------|---------------------|
| Data Type | Years | Number of Locations |
| Incidental Observation | 1987, 2017 – 2022 | 89 |
| Telemetry Point* | 2013 – 2016 | 3,848 |

*Data from 15 individual woodland caribou cows

| LSA Boundary | | |
|------------------------|-------------------|---------------------|
| Data Type | Years | Number of Locations |
| Incidental Observation | 2017 – 2022 | 19 |
| Telemetry Point* | 2013, 2015 – 2016 | 62 |

*Data from 4 individual woodland caribou cows

NOTE: Absence of data does not mean absence of woodland caribou.

Figure 4-2 Saskatchewan Ministry of Environment Woodland Caribou Location Data Provided to Denison

4.2.2 Wildlife and Habitat Protection

- Project activities have been assessed for their potential to disturb or remove wildlife and/or wildlife habitat (e.g., site clearing, soil disturbance) to determine potential effects on wildlife and wildlife habitat and the assessment, including proposed mitigation measures, for the Project will guide Project activities.
- Pre-disturbance wildlife clearance surveys will be conducted within the Project Area; results of the clearance surveys will inform the development and implementation of appropriate mitigation (e.g., delay of work) to address the identified issue (e.g., presence of caribou).
- Personal firearms for employees and contractors will be prohibited within the Project Area to prevent hunting activities.
- Policies will be implemented prohibiting employees and contractors from feeding, approaching, or harassing wildlife species within the Project Area.
- To support wildlife habitat regeneration, progressive restoration including ecosystem-based revegetation will be conducted on disturbed areas as soon as practicable in accordance with the Decommissioning Plan.

4.2.3 Wildlife Deterrence and Prevention of Wildlife Entrapment

- In addition to installing secure fencing around all contaminated areas to prevent accidental contaminant exposure, buildings and other Project components will be designed and maintained to exclude wildlife from using buildings for refuge or shelter, and to deter wildlife from potentially becoming entrapped.

4.2.4 Sensory Disturbance

- Noise emitting Project activities will be managed to minimize sensory disturbance of wildlife, especially during sensitive time periods, such as calving. This would include:
 - locating excessive noise generating activities such as the concrete batching operation as far away from sensitive wildlife locations as possible;
 - directing the generator discharge openings away from sensitive locations; and
 - making use of available on-site obstructions to control sound exposure at sensitive areas (i.e., locate sources behind buildings).
- The main sources of noise will be related to transport of people and goods, drilling of holes for the freeze wall and wellfield, operation of the batch plant, operation of the processing plant, and operation of the pumphouses. Low sound emission equipment and the use of silencers or mufflers (whenever practical) will be used to reduce noise associated with Project activities. There will be regular maintenance of equipment to ensure it is in proper working order and not emitting noise unduly.

- Lighting will be focused on work sites and not surrounding areas, to minimize light trespass and other light-related pollution sources.
- Facilities will be illuminated only to meet standards set for the protection of workers to avoid over-illumination.
- Battery-powered, light vehicles and mobile equipment, and an AC powered dual rotary drill will be used for ISR wellfield development instead of a traditional diesel-powered unit, where practical, to reduce air emissions and noise levels and improve energy efficiency.
- Fugitive dust sources that could lead to deposition of dust on vegetation and waterbodies (including potential deposition of trace metals and radionuclides) will be reduced by:
 - dust suppression techniques on site roadways, such as road watering and traffic management;
 - directing processing plant exhaust from drying and packaging areas through a stack prior to release outside of the building;
 - designing the stack height based on results of air dispersion modelling to be an appropriate height for optimal dispersion;
 - making a wash bay available to clean items, equipment, and vehicles that may have been in contact with potentially contaminated materials. Contaminated water from the wash bay will be collected in a sump tank and routed to the water treatment plant for treatment and discharge; and,
 - conducting radiological clearance scanning as required for any items, equipment, and vehicles leaving the Project Area.

4.2.5 Road and Traffic Management

- Traffic and access control measures will be implemented, including managing traffic volume by scheduling truck convoys, using high-volume haul trucks, and restricting public access (e.g., private vehicles, snowmobiles, all-terrain vehicles, and foot traffic) to the Project site and roads with both north and south security access gates. It is important to note that if any individual were seeking access around the Project area to undertake Aboriginal and / or Treaty Rights, Denison staff would facilitate this, provided it was safe to do so given Project activities in the area.
- Appropriate road signage will be installed (e.g., speed limits, identification of wildlife crossings and areas of high activity) along Project roads to minimize the risk of wildlife-vehicle collisions.
- Speed limits will be implemented to reduce the risk of wildlife-vehicle collisions.
- Wildlife will have the right-of-way on Project roads, unless it is unsafe to stop (i.e., if a collision is imminent). Vehicles will not be used to encourage caribou to move off Project roads and processes will be implemented for employees and contractors to slow down and/or stop vehicles/equipment to allow caribou to move away or off the road before resuming normal road speeds for the area.

- Road watering and regular road maintenance to limit dust dispersion.
- Employees and contractors will report and communicate the location and circumstances of any roadkill observed on or alongside Project roads. Large-bodied wildlife carcasses found will be promptly reported to ENV and disposed of as directed to prevent scavenging.
- Vegetation along Project roads will be managed to reduce attractiveness to wildlife (e.g., forage plants) and maintain appropriate sightlines for drivers to minimize wildlife-vehicle collisions.
- Alternative measures on Project roads for de-icing and winter traction (e.g., sand, gravel) or dust suppression (e.g., water) will be implemented, whenever practicable, to limit the use of specialty chemicals and potential exposure of wildlife including caribou to them.
- Appropriately sized gaps in the roadside snowbanks during winter will be maintained to facilitate caribou crossing and escape and, with that, reducing their risk of vehicle collisions.
- New Project site and access roads will be designed to minimize sightlines for predators, whenever practicable, while still maintaining general road safety.
- Ditches and culverts along Project roads will be designed and maintained to minimize pooling of water as roadside pools may attract caribou.

4.2.6 Water Management, Waste Management, Emissions, and Hazardous Materials Management

- Education on and enforcement of proper water, waste, emissions and hazardous materials management practices will be provided to employees and contractors.
- A freeze wall will be established around the uranium deposit to reduce potential for groundwater disturbance or contamination mitigating the likelihood of exposure of caribou to contaminants in local areas of groundwater discharge to surface.
- The ISR wellfield and processing plant will be designed to re-use most of the solutions inside each circuit, reducing water use requirements to the extent feasible. Make-up water will be preferentially sourced from site runoff (instead of freshwater) where possible.
- Contaminated wastes (e.g., mineralized drill cuttings, process precipitates) will be temporarily stored on double lined pads with leak detection capabilities and an associated monitoring program until final disposal at an approved facility. An adjacent pond will be used to collect contact water from these pads.
- All contact water will be routed to the Industrial Wastewater Treatment Plant for treatment and eventual release to the environment. All treated effluent released to surface water will meet federal and provincial regulatory discharge limits. This will mitigate exposure of caribou to Project-related contaminants released to the environment.

- Surface pipelines will be designed to have secondary containment or catchment and have leak detection systems in place at key locations to mitigate the likelihood of the release of such chemicals to the environment that could result in exposure of caribou to the chemicals.
- Double-walled high-density polyethylene (HDPE) or equivalent piping will be used in the wellfields and will be freeze protected and secured to minimize pipe movement to mitigate the likelihood of the piping failure and the associated release of wellfield chemicals to the environment that could result in exposure of caribou to the chemicals.
- Denison is proposing to segregate and compost organic wastes on site in a composting system, reducing the volume of material in the domestic landfill generating odours and thereby minimizing wildlife attractants.
- Domestic waste will be collected and temporarily stored in wildlife-proof containers to avoid attracting wildlife and reduce the risk for human-wildlife interactions. The wildlife-proof containers will be inspected regularly for evidence of wildlife presence or access to waste disposal facilities. If evidence of wildlife presence or access to waste disposal facilities is detected, modified systems will be implemented and/or off-site waste disposal/incineration frequencies will be increased.
- A "no littering policy" for employees and contractors will be implemented within the Project Area.
- Air emissions will be reduced to the extent practical through implementation of the development of air emissions management and monitoring plans within the EMS.
- All vehicles and equipment will be equipped with industry-standard emission control systems; unnecessary idling of vehicles will be prohibited to reduce emissions.
- The use of hazardous materials will be limited as much as possible.
- Appropriate hazardous materials management practices will be implemented in accordance with industry guidelines to minimize the risk of accidental spills or leakage. This will mitigate the likelihood of release to the environment that could result in exposure of caribou to the hazardous materials.
- Hazardous materials will be handled, stored, and disposed of appropriately and in accordance to avoid attracting wildlife (e.g., wildlife-proof containers, exclusion fencing) to mitigate the likelihood of exposure of caribou to hazardous materials.
- Physical deterrents (e.g., fencing) will be employed around contaminated areas (e.g., waste ponds and waste pads), the domestic landfill, or hazardous materials storage areas to discourage wildlife use / interaction. The deterrents will be monitored and maintained .
- Appropriate spill response kits will be positioned adjacent to areas where hazardous materials are stored in accordance with the Spill Response Plan to mitigate the likelihood of

the release of hazardous material to the environment that could result in exposure of caribou to the material.

- A minimum 100 m distance from any waterbody will be maintained for fuel storage, refueling activities, or equipment servicing in accordance with the Spill Response Plan. This will mitigate the likelihood of a fuel spill to water that could result in exposure of caribou to fuel.
- Appropriate fuel, chemical, and materials management practices will be followed in accordance with the Spill Response Plan to minimize the risk of accidental spills or leakage of diesel fuel, other hydrocarbons, and other hazardous materials and mitigate the likelihood of exposure of caribou to such chemicals.
- All vehicles and equipment will be maintained in good working condition (e.g., no leaks) and furnished with industry-standard spill response kits.

4.2.7 Wildlife Education

- Employees and contractors will be provided with wildlife education and awareness training, including education about potential caribou issues on site and training on the mitigation measures summarized with the EMS and specifically in this Plan to avoid or minimize potential Project effects on caribou and caribou habitat.
- Employees and contractors will be educated on waste and hazardous waste management practices / policies that limit human-wildlife interactions and the potential exposure of wildlife to those wastes.
- Designated employees will be trained in appropriate wildlife deterrent techniques to minimize wildlife interactions with the Project.
- Employees and contractors will be requested to report wildlife observations, including prompt reporting of caribou observations and immediate communication to on-site staff. Wildlife encounters and outcomes will be monitored, and logbooks will be used to record wildlife observations. Logbooks and reports will be available to employees. Incidental observations recorded by staff will be entered into Species Detection Loadforms and submitted to the Saskatchewan Conservation Data Centre annually.

4.3 Restore

The temporal bounds for the Project as stated in the EIS are years 1 to 3 for construction, years 3 to 18 for operation, years 18 to 23 for decommissioning, and fifteen years of post-decommissioning monitoring and inspections from years 23 to 38. Importantly, during physical decommissioning the majority of Project components are scheduled to be removed from site which is expected to facilitate restoration activities. Also, because of the selected ISR mining method, there are no large, permanent Project components, such as waste rock piles or tailings management facilities, for which large scale and potentially complex restoration strategies are needed.

Denison's decommissioning commitment is to return the land back to the Province of Saskatchewan for unrestricted surface land use post-closure. The Project's Conceptual Decommissioning Plan (CDP) is included in the draft EIS. The details of decommissioning and restoration will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP.

The CDP outlines plans for physical decommissioning (mining area remediation; asset removal; and decontamination, demolition, and disposal), followed by restoration. A summary of the CDP is provided here.

- Ongoing decommissioning of Project components will be completed when possible.
- Denison has committed to progressively restore areas no longer necessary to support/facilitate Operations to limit the amount of disturbance at any given time. Restoration of inactive areas will take place when/as these areas become available. The progress and success of these activities will be assessed regularly at a schedule commensurate with the expectations of the activities per the decommissioning plan. Progressive restoration including ecosystem-based revegetation will be conducted on disturbed areas as soon as safely and logistically practicable with the use of suitable/appropriate native species and in accordance with the decommissioning plan.
- Once the asset removal, decontamination, demolition, and disposal are completed, and the site has been cleared and leveled, restoration activities, including planting, will take place. Currently this would largely be with jack pine seedlings, but the mix of plants will depend on location and available species. Restoration activities monitored until it is deemed self-sustaining and viable wildlife habitat.
- Future discussions will be held with Indigenous and general public Interested Parties to determine the amount of access to the area they wish to maintain in the future (post-decommissioning). Based on results of these discussions, transportation corridors including roads or trails associated with the Project site that are no longer needed will be graded, scarified, and vegetated with native, self-sustaining species as required. Access to facilitate safe post-closure monitoring or requested by appropriate Interested Parties (e.g., to facilitate land use) may be left in place. Access to the site may be restricted by gates and/or berms.
- Laydown areas will be scarified, covered with 0.5 to 1.0 m of stockpiled overburden, and vegetated with native, self-sustaining species. The footprints of other infrastructure, such as the camp, will be scarified and vegetated with native, self-sustaining species as required. The topsoil and brush stockpiled during pre-construction activities will be used during restoration.
- Lessons learned from progressive decommissioning and any site-specific restoration studies will be incorporated into the DDP. Additionally, information from other northern Saskatchewan mine

sites will be examined to help Denison select the restoration tools, including revegetation options, that will contribute towards decommissioning success.

Closure of the entire Project will be completed in accordance with provincial and federal regulations and guidance documents with the fundamental considerations being to confirm physical and chemical stability of the site to protect human health and the environment.

Progressive decommissioning and restoration will be completed throughout the life of the Project, whenever feasible, and reported to the regulatory agencies as part of the annual reporting requirements throughout Operation. Associated activities will focus on the decontamination, demolition, and disposal of unused buildings and infrastructure, as well as the removal of unused equipment and machinery. Progressive decommissioning and restoration are expected to continue and result in positive effects as revegetation is continued and regeneration occurs. Following decommissioning and restoration, wildlife habitat is expected to recover to baseline conditions.

5 Habitat Loss Calculation

5.1 Habitat Loss in Context of the Disturbance Management Threshold for SK1

To support the Plan with respect to the calculation of habitat loss, a mapping exercise was completed to provide context on the Project-related habitat loss in consideration of the woodland caribou range (SK1) disturbance management threshold (ECCC 2020).

5.1.1 Approach

First the Project infrastructure footprint area was delineated and estimated to be 80 ha. Next, a 500 m buffer was applied to the Project footprint, resulting in a total potential disturbance area of 1,350 ha. This is consistent with the approach for determining direct and indirect effects, as outlined in ECCC (2020).

Finally, an analysis was undertaken to quantify the amount of caribou habitat that is currently disturbed within the Project footprint + 500 m buffer. According to ECCC (2020), there are two contributors to disturbed habitat in SK1: 1. anthropogenic disturbance + 500 m buffer and 2. fire disturbance in the last 40 years, without a buffer. The two factors for disturbed habitat were considered as follows:

1. Existing anthropogenic disturbance + 500 m: For anthropogenic disturbance calculations to inform the Plan, mapping was completed and evaluated to determine the existing anthropogenic disturbance. Although the EIS considered anthropogenic disturbances on IKONOS imagery at the 1:5,000 scale, the mapping exercise to support habitat loss calculations in the Plan used anthropogenic disturbances visible on Landsat at the 1:50,000 scale, to be consistent with the definitions of disturbed habitat from the amended recovery strategy (ECCC 2020).
2. Fire disturbance in the last 40 years, without buffer: To determine ecosites that were in a regenerating phase or having experienced fire disturbance in the last 40 years, the ecosites BS3/BS7-Jack pine-blueberry/Black spruce-blueberry/lichen were used, based on previous ecosite classification work completed to support the EIS.

5.1.2 Results

As shown in Table 5-1 and Figure 5-1, the proposed Project footprint + 500 m buffer is almost entirely located within existing, buffered anthropogenic disturbance. This means the Project footprint + 500 m buffer is located within already disturbed habitat, according to ECCC (2020). Additionally, the mapping exercise shows that approximately half of the Project footprint + 500 m buffer is located within regenerating forest, i.e., forest burned less than 40 years ago (Figure 5-2).

Table 5-1: Existing Disturbed Habitat within Buffered Project Footprint

| | Area within Project Footprint + 500 m buffer (1,350 ha) |
|--|--|
| Existing anthropogenic disturbance (+ 500 m buffer) | 1,298 ha |
| Regenerating forest (fire disturbance in the last 40 years; no buffer) | 730 ha |

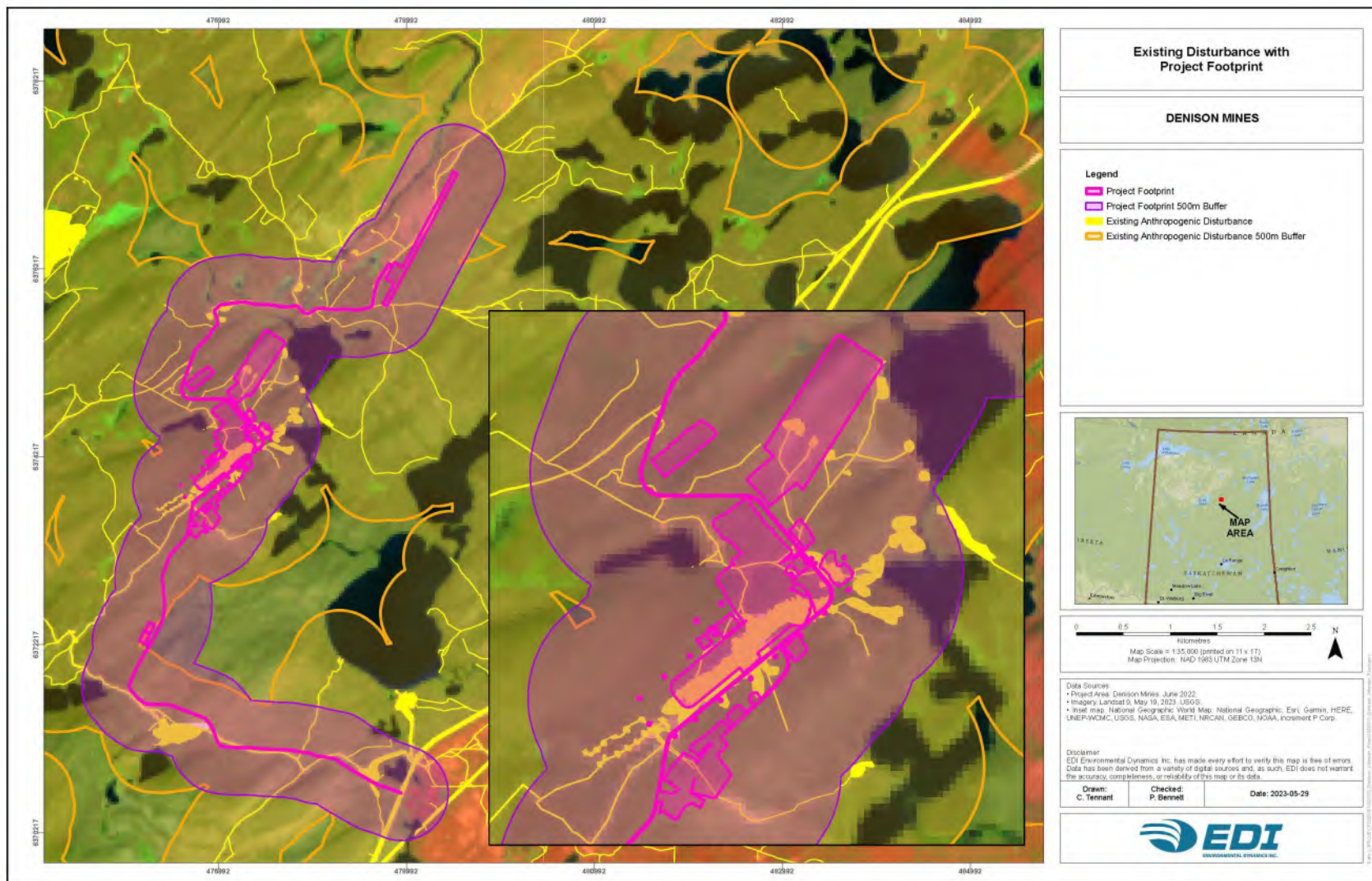


Figure 5-1: Proposed Project Footprint (+ 500 m buffer) with Existing Anthropogenic Disturbance (+ 500 m buffer) Visible on Landsat at 1:50,000

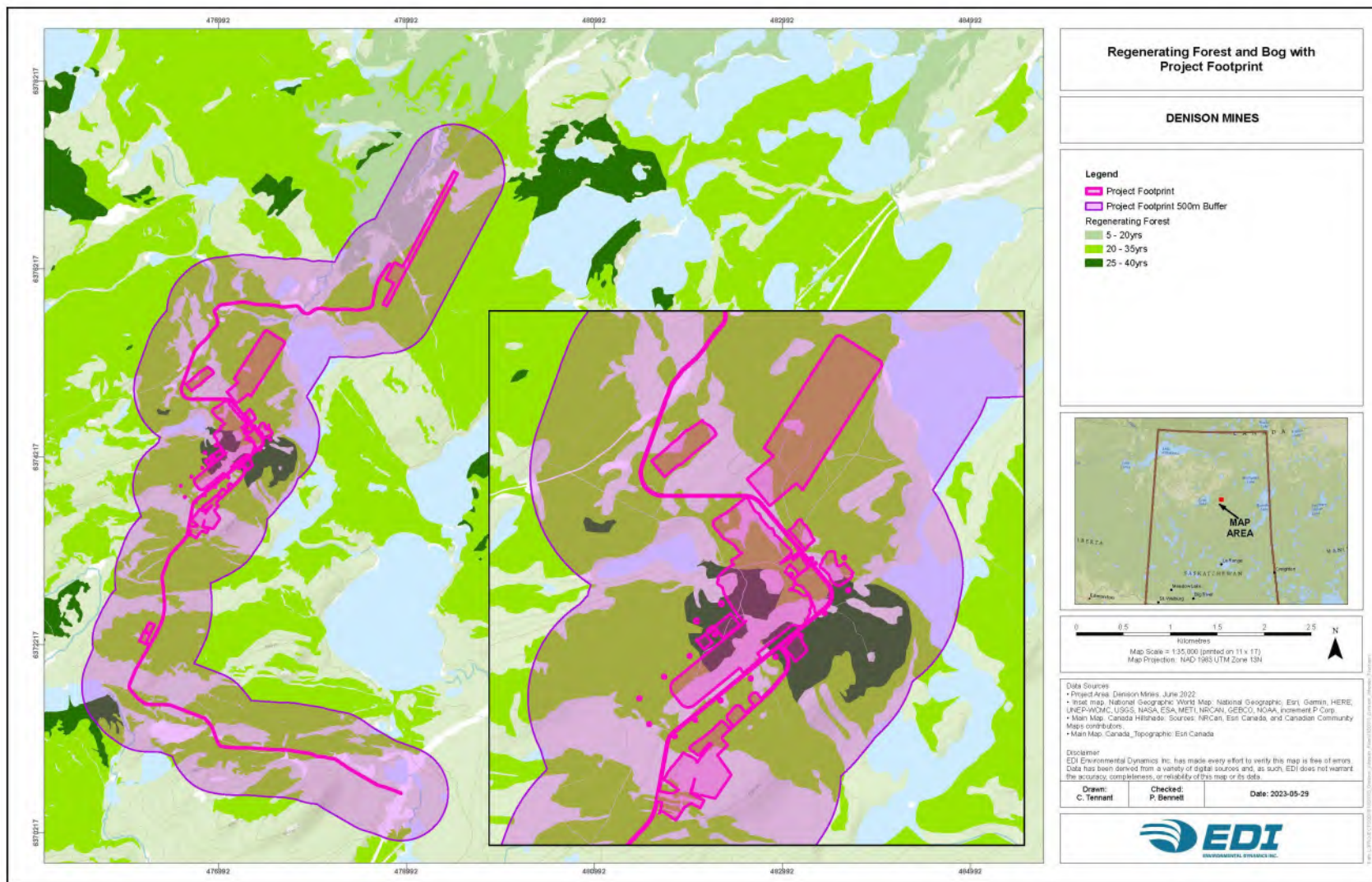


Figure 5-2: Proposed Project Footprint (+ 500 m buffer) with Regenerating Forest

Based on the above analysis using ECCC (2020) criteria, should the Project proceed, the disturbance management threshold for SK1 range would remain unchanged.

Additionally, ECCC (2020) identified the caribou population in the SK1 range as being self-sustaining at a threshold of 40% undisturbed habitat and recommended that total anthropogenic disturbance in the SK1 Boreal Shield range should not exceed 5% with the remainder (i.e., 55%) being attributed to natural disturbance (while maintaining a minimum of 40% undisturbed habitat in the range). ECCC (2020) calculated that approximately 58% of the SK1 Boreal Shield range is currently affected by past forest fires and 3% of the range is affected by anthropogenic disturbances. For additional context, the size of the SK1 Boreal Shield range is estimated at 18,034,870 ha (ECCC 2020). The Project footprint + 500 m buffer (1,350 ha) would represent an estimated Project-related disturbance of 0.007% at the scale of the SK1 Boreal Shield Woodland Caribou Management Unit.

5.2 Direct Loss Calculation

The Project infrastructure footprint has been delineated and the area was determined to be 80 ha. Of this area, 12 ha are comprised of previously disturbed land resulting from past activities (e.g., access, exploration camp and laydown areas). The remainder of the Project footprint is comprised of regenerating forest (forest less than 40 years old) habitat which is typically considered to be low quality habitat for caribou (Figure 5.3).

Table 5-2: Land Cover Types within the Project Footprint

| Total Area | |
|---|-------|
| Project footprint | 80 ha |
| Existing anthropogenic disturbance | 12 ha |
| Regenerating forest habitat (i.e., low quality caribou habitat) | 68 ha |

Denison understands that the Project will likely result in a limited residual effect on caribou and their habitat within the RSA; however, these effects are considered to be small in a relative sense when considered in the context of the SK1 range, as described in Section 5.1.

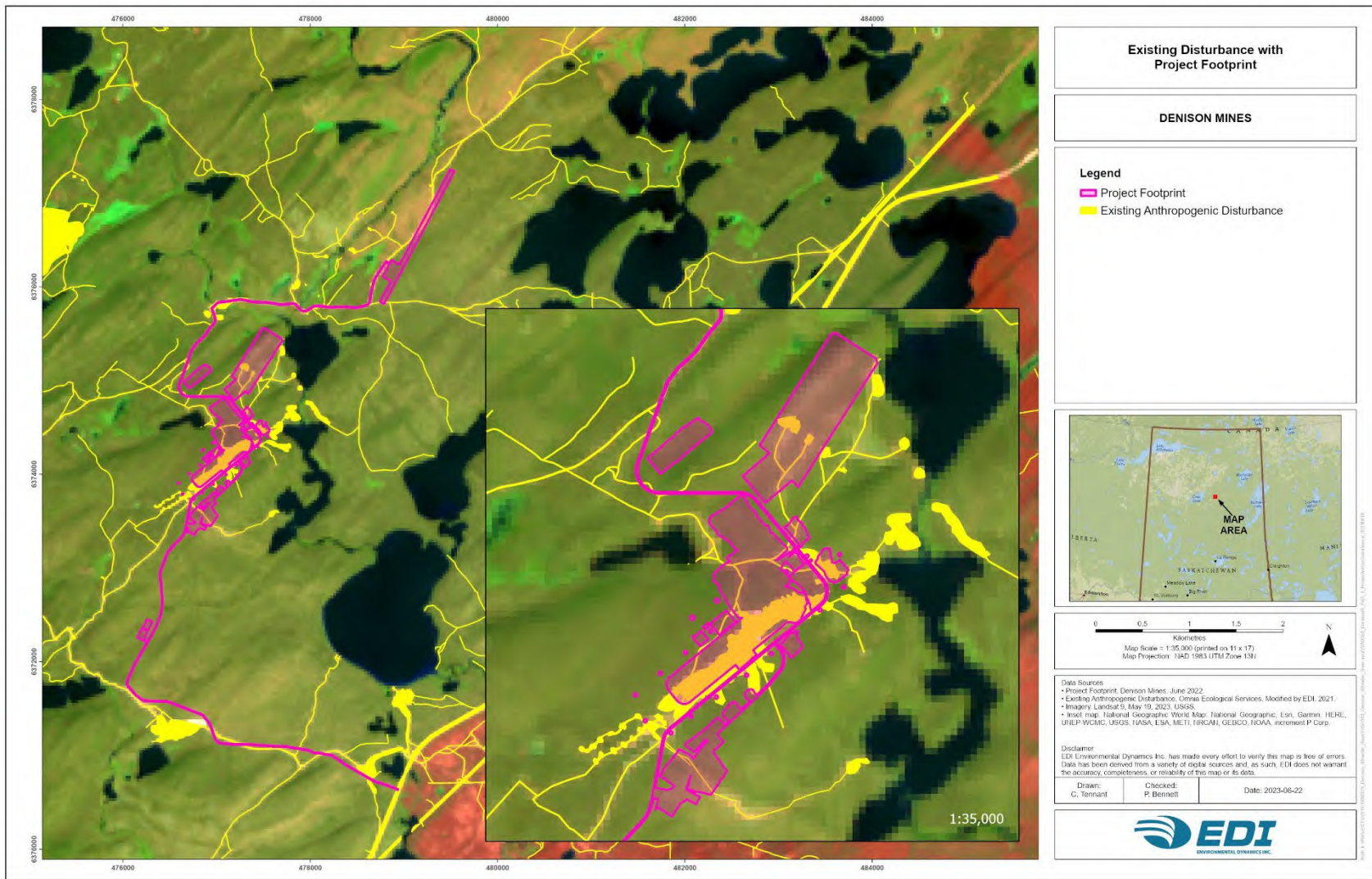


Figure 5-3: Proposed Project Footprint with Existing Anthropogenic Disturbance Visible on Landsat at 1:50,000

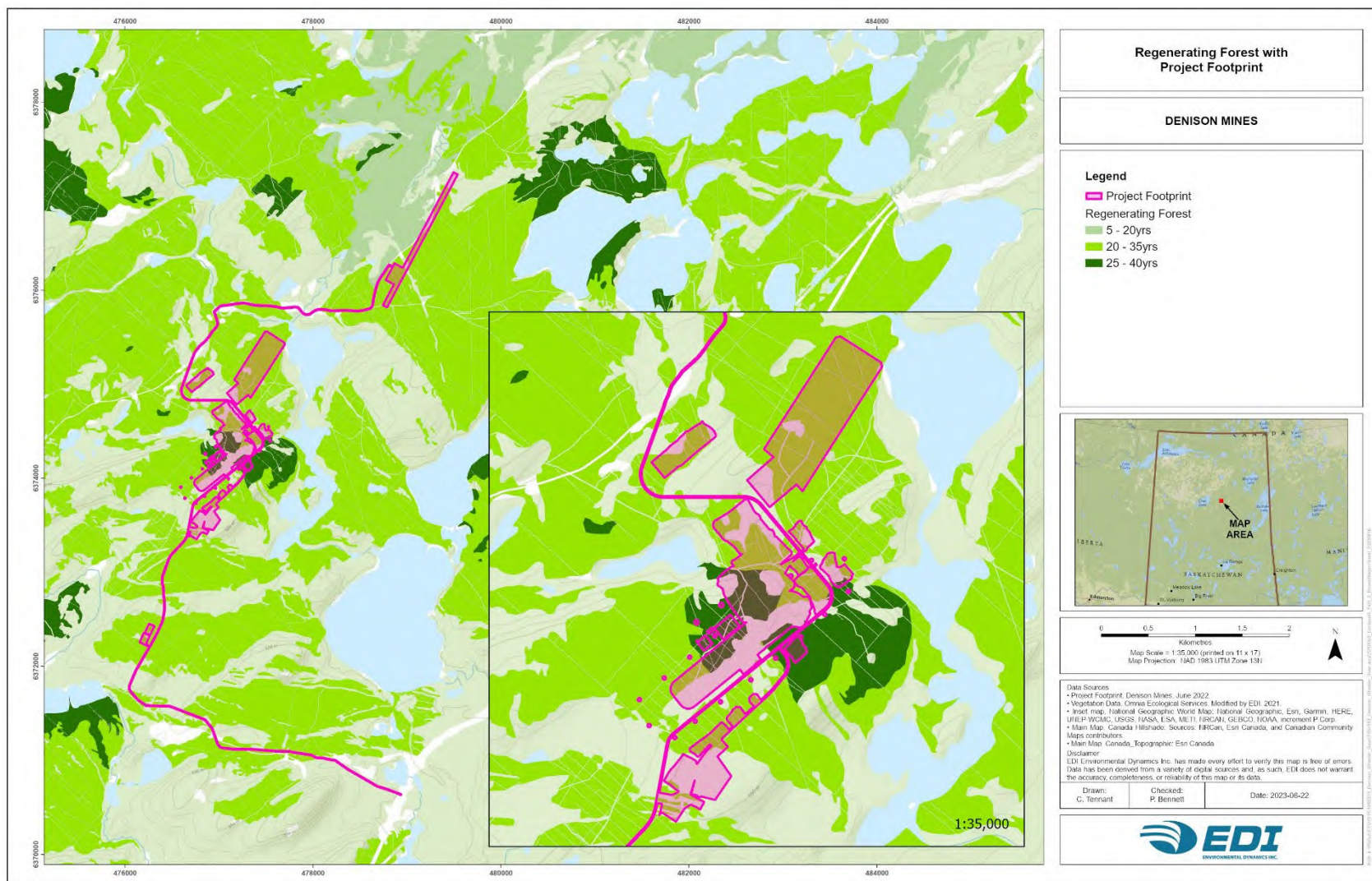


Figure 5-4: Proposed Project Footprint with Regenerating Forest

It is Denison's understanding that currently there are no provisions/requirements for caribou habitat offset by the ENV for projects within the SK1 range. Denison recognizes the importance of woodland caribou to Indigenous groups, the general public, other Interested Parties in Saskatchewan, and Canada. As such, as part of this Plan, Denison is proposing to continue to work with ENV to determine an appropriate offset based on the habitat loss as a result of the Project. Denison expects that the proposed offset calculations would likely include aspects of additionality, temporal considerations, spatial considerations, and other aspects, depending on the expectations/requirements of the caribou habitat offset process that the ENV is currently refining/finalizing. The proposed offset calculations are expected to be refined through ongoing communications with ENV to appropriately address issues at the provincial level related to caribou and habitat.

Future versions of the Plan will include detailed options to develop and advance restoration work and initiatives to provide responsible, proactive environmental stewardship. These offsets (Figure 5-5) are expected to be further refined/defined through Plan updates as the Project proceeds and consultations with ENV advance. Some initial options are presented at a conceptual level in Section 6.

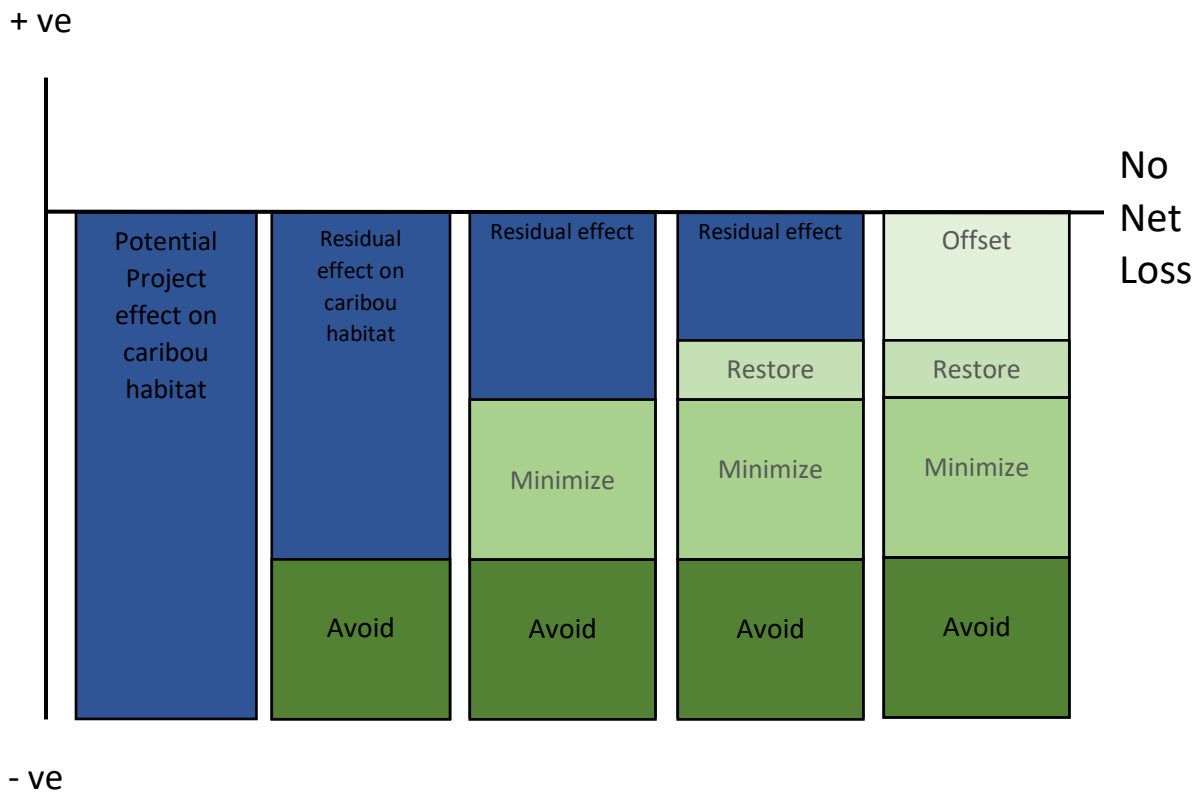


Figure 5-5: Wheeler River Project Conceptual Caribou Mitigation Plan to Achieve No Net Loss

6 Offset Framework

This section provides a discussion on offset options will become more defined as the Plan advances, in consultation with ENV. This is expected to offset residual effects over the life-of-the-Project and enhance the restoration activities occurring within the Project footprint to result in no net loss of habitat within the RSA as a result of the Project.

6.1 Conceptual Offset Opportunities

An opportunity that Denison has proactively identified is a combined linear feature mitigation and restoration option. Denison has implemented a practical and experimental pilot study to investigate the design, implementation, testing, and monitoring of several functional and structural habitat mitigation options. This opportunity involves two components: 1) applying treatments to address (i.e., reduce) lines-of-sight and discourage linear feature use by both caribou and their predators, and 2) restoration focused on re-establishing terrestrial lichen communities co-established with a biological soil crust (BSC) component.

Importantly, to complete this pilot program, Denison has partnered with the University of Saskatchewan and Northwest Communities Environmental Services (an Indigenous-owned environmental company) under the Developing Eco-Restoration Together (DERT) program. This unique project aims to co-create ecological restoration practices that centre Indigenous peoples, worldviews, and values while also braiding knowledge from the land, Indigenous knowledge, and western science. The project is supported by the three partners but is ultimately guided by the Indigenous Project Advisory Board, and the Community Liaison/Education Coordinator. Through restoration trials, community engagement, and various planting techniques, Denison, with their partners are seeking to return ecosystem functions in areas where they have been previously disturbed (e.g., exploration cutlines). Through collaboration with community members, University of Saskatchewan, industry partners, two graduate students, and local youth, this project is expected to ultimately inform the creation of a framework for effective restoration practices in northern Saskatchewan that centre on caribou and Indigenous communities.

6.1.1 Caribou Trail Study

Wildlife, particularly bears, wolves, and woodland caribou, are using anthropogenic linear features to move throughout their habitat with greater ease. This can result in increased chance encounters between predators and prey and could contribute to the reduction in woodland caribou populations (Omnia 2022). Denison is conducting research on the use of linear features predators and prey in the Athabasca Basin to collect relevant data to inform an effective plan designed to disrupt the current risk related to predator/prey movements/interactions.

Currently, ENV has no guidelines or protocols for assessing the status of disturbance features or for evaluating the need for linear feature mitigation. Denison proactively initiated research to collect field-based findings on the effectiveness of linear disruption features on predator/prey movements in the vicinity of the Project. This field program was designed and implemented to deploy and monitor the effectiveness of five linear feature treatments across nine locations. Treatment types include, seeding and/or planting of jack pine, spreading coarse woody debris, tree tipping, constructing biodegradable fencing, and earth/debris mounding. Methods vary by location but have a common goal: to discourage prolonged disturbance and encourage new growth in areas of disturbance (Omnia 2022). Each

treatment area is monitored by game cameras year-round to determine how wildlife interact with the created physical and visual barriers. All treatments are temporary and biodegradable with the purpose of reducing trail use in the near-term so that the forest can regenerate naturally.

Preliminary results are encouraging and indicate that bear use of treated lines was reduced by 43% compared to untreated lines, caribou use was reduced by 95%, and wolf and moose use was reduced by approximately 94%. Overall, use of treated lines by species of interest was reduced by approximately 83% when compared to baseline monitoring rates. These successful preliminary results will guide future work to define potential offset options associated with linear feature mitigation and restoration.

6.1.2 Biological Soil Crust Research

To support restoration planning, additional research will be designed to investigate BSCs and conducted by a soil science graduate student at the University of Saskatchewan. This research is expected to contribute to the goals of the Developing Eco-Restoration Together Project. BSCs are communities of lichen, bryophytes, cyanobacteria, and microorganisms found in the top layer of the soil (Heindel et al. 2019). These surface soil mats are rich in diversity, and play an important role in the broader ecosystem, especially in locations with extreme climate, little moisture, and nutrient-poor soil (Cowden et al., 2022). Research on BSCs has been focused on desert regions, and this research provides insight to BSC's role in boreal ecosystems, specifically in northern Saskatchewan. By gaining a better understanding of how to support BSC establishment and growth, it is expected that the findings can inform restoration activities that would ultimately benefit caribou.

Sampling of BSCs within the region will be based on a fire chronosequence. This is expected to provide a foundation to better understand the functions and species present in BSCs, and how they develop post-disturbance (Coxson and Marsh 2001). Understanding how these communities develop and interact is important, especially considering the gap in knowledge on soil microbial communities, non-vascular species, and their role in restoration techniques.

A critical element in supporting caribou populations is the consideration of caribou forage lichens. Due to the slow-growing nature of lichens, it can be difficult to include them in restoration activities (McMullin and Rapai 2020). Denison is planning to focus on caribou forage, primarily through transplanting and propagation of the appropriate lichen species. Natural regrowth of lichen communities after fires takes place in a complex setting, where BSCs and bryophyte communities stabilize soil surfaces, providing habitats where lichen propagules can establish and grow (Coxson and Marsh 2001). Denison hypothesizes that reestablishment of terrestrial lichen communities will have a better chance of success where these supporting BSC components can be co-established at the same time. The findings from the BSC research within post-fire environments is expected to support lichen communities, restoration activities for the DERT project, and ultimately caribou and caribou habitat within the Wheeler River Project area.

7 Monitoring and Adaptive Management Framework

An adaptive management framework will be developed to support the implementation of this Plan (Figure 7-1). In this context the adaptive management framework provides the means for the integration of Plan scope, management, and monitoring to systematically evaluate assumptions to adapt and learn. In practical terms the framework will consider the outcomes of actions taken/implemented, whether they have been successful and, if not, how can such actions be adapted to increase the likelihood of success. Outcomes of the Plan would be measured by establishing performance indicators as the way to define and measure progress toward achieving the objectives.

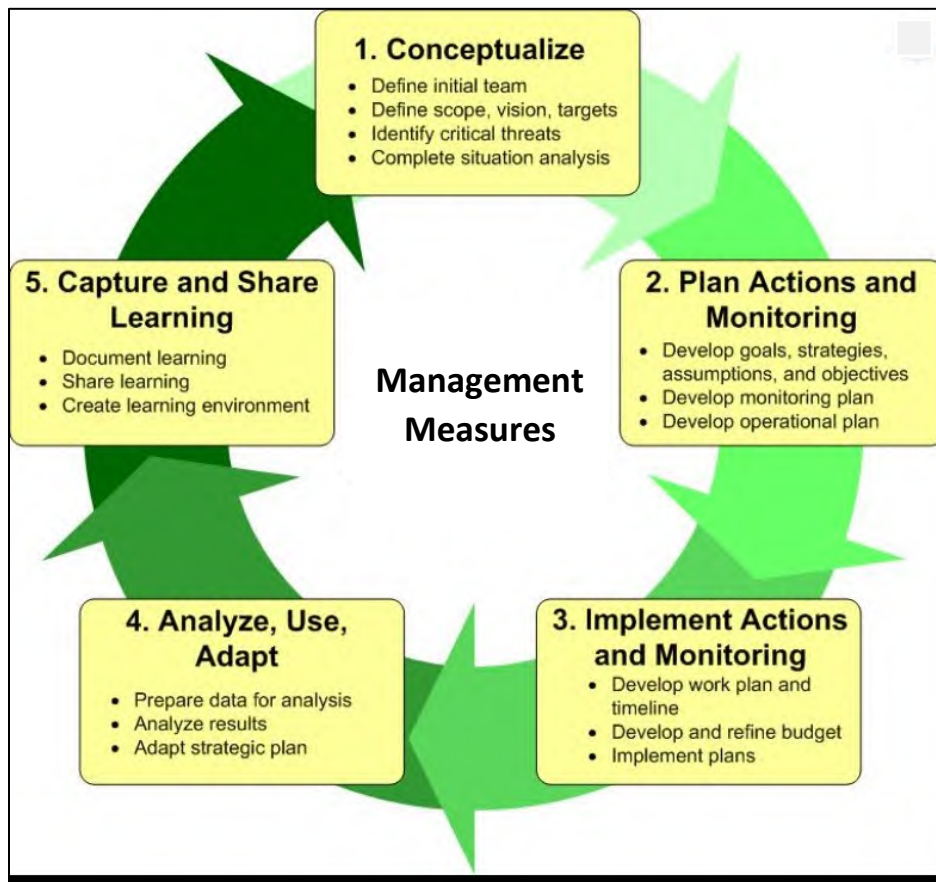


Figure 7-1: Adaptive Management Cycle

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Attachment: IR-150

| | |
|---|---|
| Number | IR-150 |
| Dept. | ECCC |
| Project effects link | Wildlife and Wildlife habitat |
| Reference to EIS, appendices, or supporting documentation | Section 9.3.5.2.1, Best Management Practices for working in Boreal Woodland Caribou Range in Saskatchewan |
| Context and Rationale | <p>Context and Rationale: In the draft EIS Section 9.3.5.2.1, the Proponent states: “Denison proactively initiated research to provide field-based findings on the effectiveness of linear disruption features on predator/prey movements.”</p> <p>“Results will help the development of proactive and meaningful restoration strategies as an ongoing part of the overall Project (Omnia 2022). Additionally, the 2023 field program will support a program that uses the results from the 2021/2022 Caribou Trail Study in long-term reclamation planning. The program will be led by the University of Saskatchewan and is funded by Denison, an Indigenous-owned environmental company, the Northwest Communities Environmental Services (Métis owned), Mitacs, and the Natural Science and Engineering Research Council of Canada through an alliance grant. The Caribou Trail Study and the reclamation plan will culminate with the development of a Woodland Caribou Management Plan.”</p> <p>ECCC is available to support the Proponent through review of study programs should those programs be made available during the review process.</p> <p>ECCC requests to see the 2021/2022 study to further our review of caribou use in the Project area.</p> |
| Information Requirement | Provide the report for 2021/2022 Caribou Trail study for long-term reclamation planning for ECCC review. |

Response:

The requested report titled *Pilot Program: Linear Feature Mitigation Interim Report- Status Update and Preliminary Results* is included below.

**Denison Mines Corporation
Wheeler River Project**

**Pilot Program: Linear Feature Mitigation
Interim Report- Status Update and Preliminary Results**

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November 2022
Omnia Project ID: 2103-01

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Denison Wheeler River Project.

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Table 4. Seedling health assessment results.

1 INTRODUCTION

Federal and provincial planning documents and woodland caribou (*Rangifer tarandus caribou*) population assessments have indicated that much of the Saskatchewan woodland caribou population is at risk from landscape-level disturbance. There exist no guidelines for evaluating reclamation requirements or outlining what the criteria for reclamation are. Omnia Ecological Services (Omnia) has been engaged by Denison Mines Corporation (Denison) to continue to support the project application (e.g., assessment of impacts and regional mapping/inventory) with respect to reclamation/offset planning to assist with developing potential woodland habitat reclamation selection and criteria protocol through the use of cost effective and practical functional habitat restoration/mitigation options. If successful, these mitigation techniques could be deployed at a larger scale within the SK Boreal Shield and may assist government in developing mitigation/reclamation criteria.

A pilot project of potential mitigation options to disrupt predator-prey movement patterns on linear features by creating a physical, visual, and/or line-of sight barriers has been deployed at 12 sites within the Wheeler River study area ([Figure 1](#)). Detailed background information and full details of site-specific treatments, including preliminary planning and consultation, can be accessed in Omnia (2022). Also included in that report are preliminary findings from the first five months of monitoring.

The objectives of this interim report are to outline preliminary results gathered from monitoring data thus far (year 1) and outline program follow-up requirements and recommendations for future consideration.

2 MONITORING

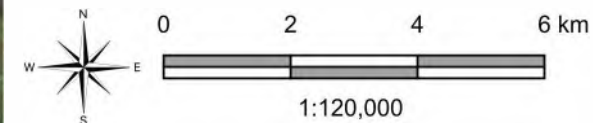
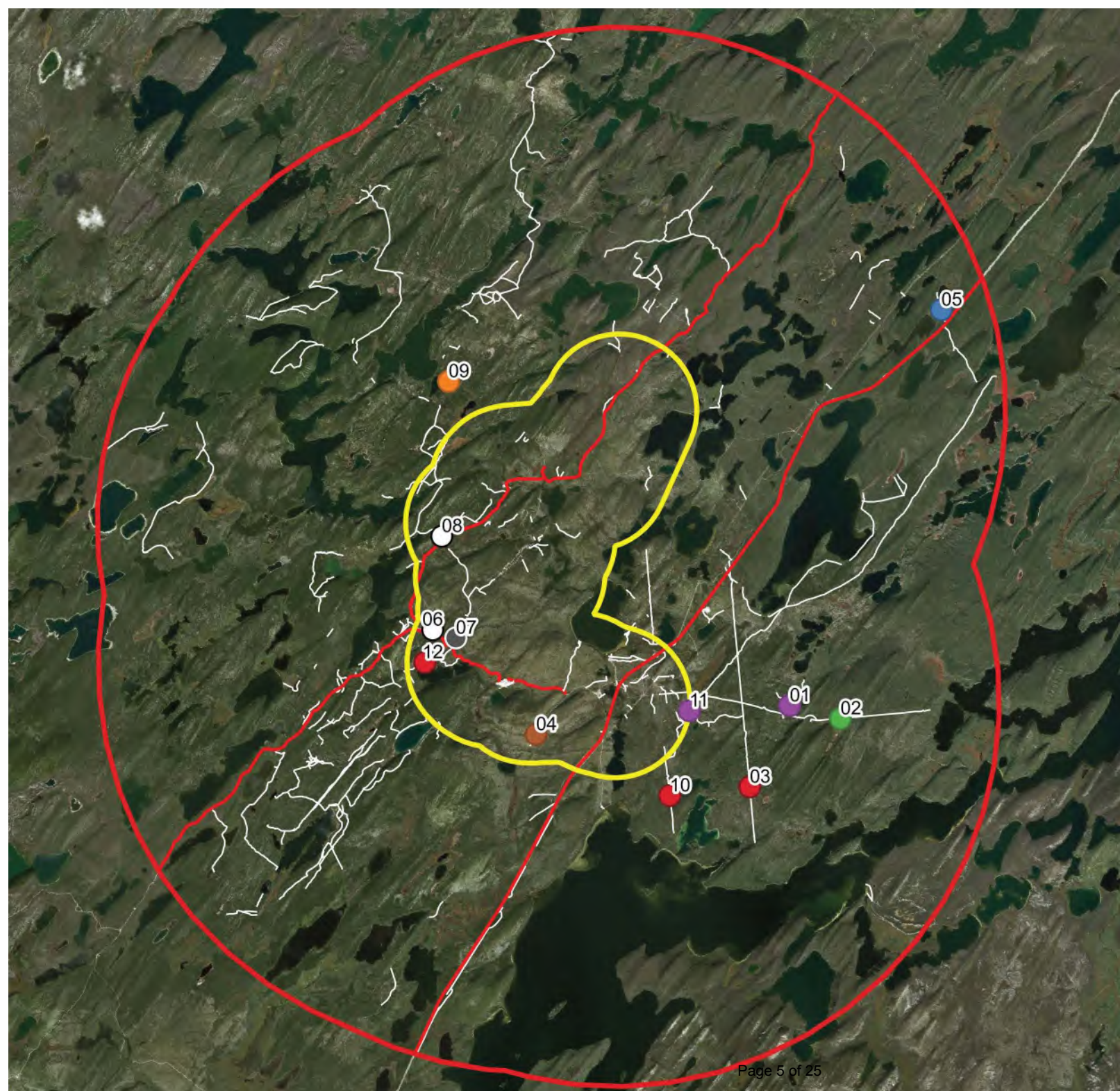
A site visit was completed in May 2022 as part of the planned bi-annual inspection/data collection with the following objectives:

- Revisit and check the status of all 12 treatment sites.
- Make any repairs or modifications as required.
- Remove and replace covert camera memory cards to collect wildlife use data collected since deployment.
- Replace covert camera batteries to support ongoing monitoring.
- Measure height and assess health status of planted Jack pine seedlings.

2.1 Methods

The linear feature mitigation sites were visited from May 24-25, 2022. Photographs were taken at each site and notes were taken on overall conditions of the installation, durability, effect of snow cover/melt, issues encountered, and modifications or repairs conducted. Any signs of wildlife use in the area were also noted (i.e., tracks, pellets). Covert camera cards were replaced and camera setups were adjusted where required to prevent unnecessary false trigger events (such as from burlap flapping in the wind). All camera batteries were replaced. Camera photographs were retrieved and analyzed for wildlife use along the 12 treated linear features (LFs) and six reference/untreated parallel linear features.

Figure 1. Installed mitigation features for the linear feature reclamation and mitigation trial.
- Denison Wheeler River Project



For treated and untreated LFs, each wildlife trigger event was characterized as a “use” event if the animal appeared to be travelling on the line and/or displaying non-avoidance behavior, such as approaching/interacting with the burlap or other treatment features. Behavior such as crossing the LF, traveling in the adjacent forest, or paralleling the LF was characterized as “non-use” of the LF. Cameras were programmed to take five photographs per trigger event, often allowing for movement trajectory to be determined. However, if field of view was limited, body language and movement cues of the animals were used to best determine appropriate categorization, such as angle of head/body, no assumption of sharp turns, etc. Photograph analysis findings were compared to results gathered from multi-year baseline linear feature camera monitoring across the project area, and between treated and reference sites. Effects of treatments on wildlife use of LFs was then analyzed across all species of interest and between individual species types.

Each seedling that was planted when treatments were installed in July 2021 was measured for height, and a relative health score was assigned to each seedling: 1=healthy, 2=average, 3=poor 4=dead/missing. Evidence of browsing events by wildlife were also recorded.

2.2 Results

2.2.1 Treatment Visits

[Table 1](#) summarizes the overall status of the treatment types, wildlife sign observations and modifications completed. Coarse woody debris (CWD) treatments maintained reasonable coverage and withstood snow pack/snowmelt ([Photograph 1](#)). Tree hinging/structures treatments were holding up very well and only a few structures/tree hinges had fallen over and needed reinforcing ([Photograph 2](#)). Needles on the trees that were hinged were yellowing but remained intact ([Photograph 3](#)). Trench and pile treatments were holding up very well and didn't appear compressed following the winter snow ([Photographs 4](#)). Burlap installations, both on their own and when combined with other treatment types, required minimal repairs ([Photograph 5](#)).

Repairs consisted of:

- Replacement of ripped/ deteriorating burlap panels
- Replacing wooden lath ripped off by a bear (Site 10, [Photograph 6](#))
- Adding screws and staples to reinforce, where required

2.2.2 Wildlife Photograph Analysis

Overall

Photographs were analyzed from 18 different cameras totaling 4,861 camera days. One hundred-ninety-four (194) detections were recorded of 13 different species, averaging four detections per 100 cameras nights. The most commonly detected species from all cameras, treatment and reference, was snowshoe hare with 56 detections, followed by woodland caribou with 44 detections, and black bear with 25 detections ([Table 2](#)). [Table 2](#) summarizes the detections rates of species of interest (caribou, moose, black bear, wolf) by treatment type / reference linear feature. Detection rates of species of interest and human (ATV) use were compared with baseline covert camera results from multi-year linear feature monitoring conducted in the Denison Wheeler

River study area ([Table 2a](#)). Results were separated into desired non-use and use of linear feature type (treated versus untreated monitoring/reference trails). The results for trails (approximately 5m wide) were included for direct comparison and data from hand-cut lines and roads were excluded. A similar comparison was completed for treatments where no burlap was present, either on its own or in combination with other blocking techniques ([Table 2b](#)). This was to assess for trends without the potential wildlife attractant effects of the burlap. When treatments including burlap were included in the analysis, detection rates of all species of interest on treated lines are less than those of multi-year linear feature monitoring in the area. Bear use of treated lines was reduced with 61% compared with untreated lines, moose use was reduced with a 92%, and caribou use was reduced with 94% ([Table 2a](#)). No wolves were detected using treated lines. Overall use of treated lines by species of interest was reduced by approximately 85% when compared to monitoring rates. When installations including burlap are excluded from analysis, the reduction in detection rates along the treated sites are even more pronounced. No bears or wolves were observed using treated lines, while only a single caribou and moose were detected using treated lines.

Treatment Sites

[Figures 2 and 3](#) highlight the relative effectiveness of the individual treatment types on wildlife species of interest detections and their use of the treated linear features. Non-use of the treated line by wildlife via travel in the adjacent forest, crossing, or paralleling the line was the desired effect and was therefore rated as positive. Use of a treated LF via traveling down the line/interacting with the treatment features was an undesired effect and was therefore rated as negative.

[Figure 2](#) shows the results of the treatments for all species of interest combined. CWD treatment sites had the most wildlife detections (20) of three species, (bear, caribou and moose) and all interactions were positive (non-use of the line). Tree hinging/structures had ten detections of bear and caribou, 92% of these interactions were rated as positive. Trench and pile treatments had three moose detections; two thirds positive. Trench and pile + burlap had a split response between bears (all use) and moose (all non-use). CWD + burlap and burlap only had all negative interactions.

[Figure 3](#) shows the results of the treatments for each species of interest. Caribou showed positive interactions (avoidance) with CWD and tree hinging/structures (100% and 83% of detections, respectively) and a negative interaction with burlap (100% of detections). Moose response to CWD and trench and pile + burlap was 100% positive, and was two-thirds positively associated with trench and pile. Black bears responded positively to CWD and tree hinging/structures, and negatively to CWD + burlap, trench and pile + burlap, and burlap only. Wolf responded negatively to burlap.

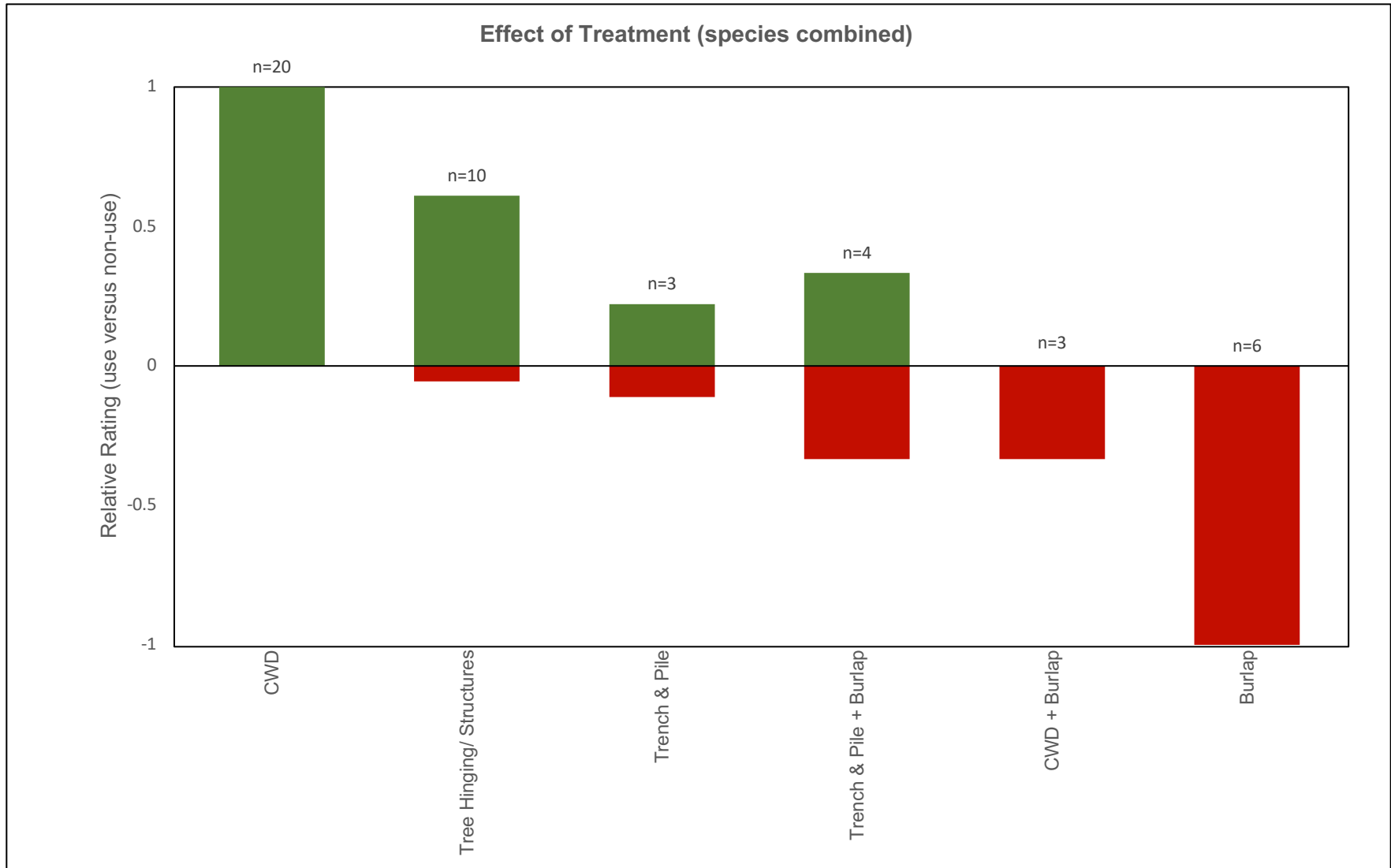


Figure 2. Wildlife detections by treatment type, all species combined (caribou, moose, black bear and wolf). Green/positive indicates desired avoidance of the treated LF; red/negative indicates undesired use of treated LF.

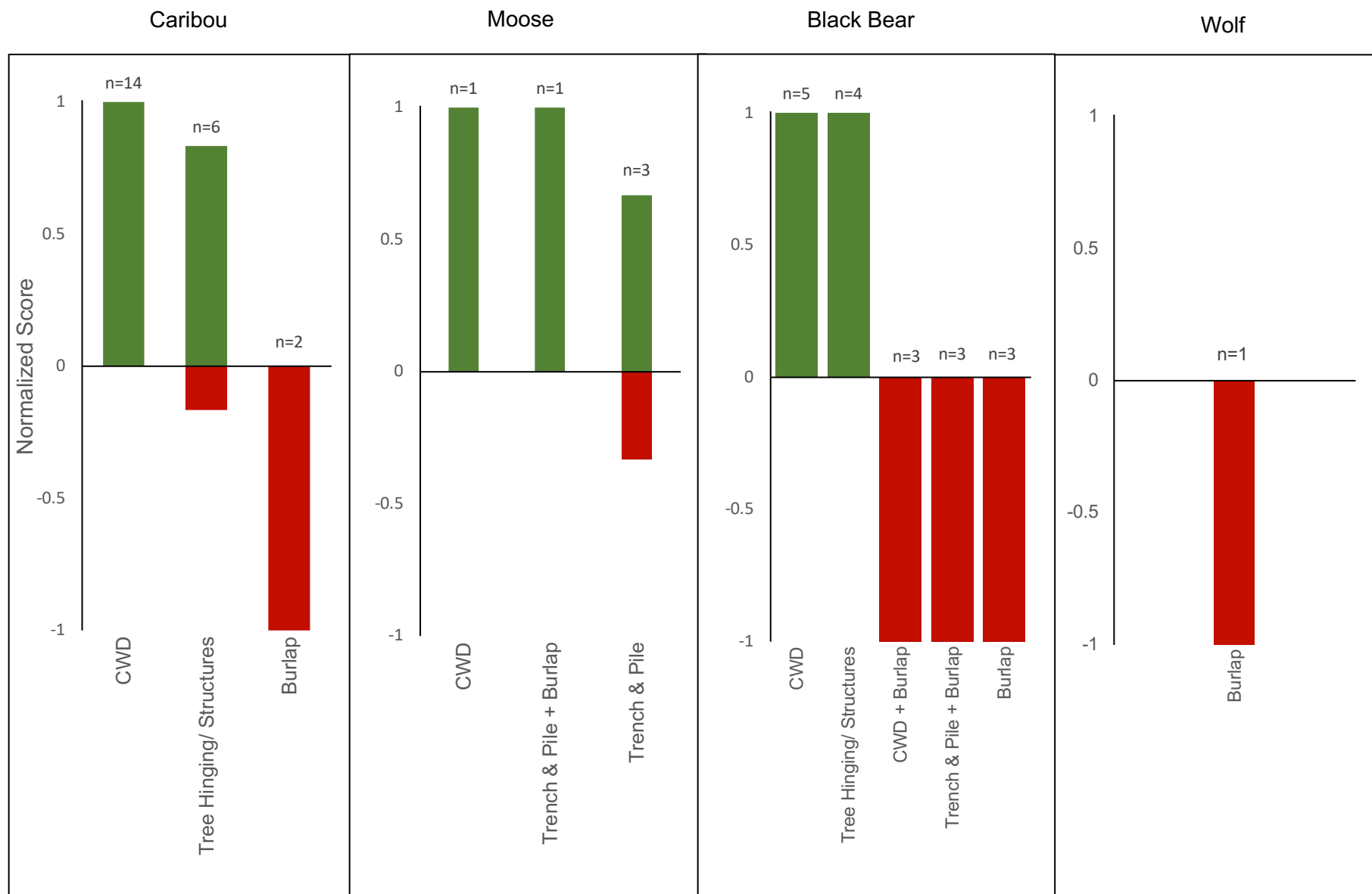


Figure 3. Caribou, moose, black bear and wolf detections by treatment type. Green/positive indicates desired avoidance of the treated LF; red/negative indicates undesired use of treated LF.

2.2.3 Seedling Health Assessment

A total of 476 seedlings were counted and measured, out of the initial 500 planted. Seedling height averaged 15cm (range 12-18cm) when planted and average height when measured in May 2022 was 18.8 cm ([Table 4.](#)). Average health status was 1.8. [Photograph 7](#) illustrates representative examples of each health status, ranging from 1-4, healthy, average, poor, and dead, respectively. Mortality/loss averaged 4.8%.

3 SUMMARY PRELIMINARY CONCLUSIONS – Year 1

- Detection rates of all species of interest on treated lines (including burlap) are less than those of multi-year linear feature monitoring in the area (bears 61% reduction, moose 92% reduction and caribou 94% reduction; no wolves). When burlap is removed from analysis, the frequency of detection on treated lines is further reduced (no bears or wolves; only 1 caribou and 1 moose)
- CWD, tree hinging/structures, and trench & pile treatments elicited all/mostly positive avoidance responses from species of interest.
- Burlap, when used alone or in combination with other treatments, elicited the most negative responses from species of interest. Although preliminary, early results indicate that burlap may act as an unwanted attractant for curious wildlife or is not perceived as a barrier to species movement ([Photograph 8](#)).
- Burlap remains the most labor-intensive treatment in terms of maintenance and repairs required.
- Overall planted seedling health was strong and growth progression is promising.

4 NEXT STEPS

- Continuation of multi-annual site visits to monitor the status of treatment types, make repairs or adjustments as necessary.
- Continuation of multi-annual inspection/service and data collection of covert cameras and analysis of covert camera photographs.
- Assess potential impacts of a 2022 forest fire on several treatment locations/cameras and determine suitability for continued monitoring and/or redeployment.
- Analysis of potential snow depth/weather effects on wildlife activity over time are anticipated as more winter data is collected.
- Evaluate seedling status once again in 2023 to ensure status.
- Verify tree-hinge/structure counts to ensure replicability at other sites.
- Quantify coarse woody debris (CWD) stem counts and volume estimates to ensure replicability at other sites.
- Monitoring is ongoing and an increased monitoring period, and associated sample size, will facilitate further analysis, including potential use of statistics.

TABLES

Table 1. Summary of treatment status, observations, and modifications.

| Treatment | # Linear Features | Overall | Wildlife Sign | Modifications |
|--------------------------|--------------------------|--|---|--|
| CWD | 2 | Holding up well after snow melt, minor compression | Faint caribou tracks at start of treatment, appear to deflect away from treatment; other caribou tracks on edge | none |
| CWD + Burlap | 1 | CWD holding up well, burlap corners lifted | none | reinforced burlap |
| Tree Hinging/ Structures | 3 | In great shape; needles on tree hinges yellowing but intact | none | Lifted/ reinforced a few structures/hinges that had fallen |
| Trench & Pile | 2 | Holding up very well, no compression | moose tracks avoid treatment and stay on parallel trail | none |
| Trench & Pile + Burlap | 1 | Trenches in good shape, burlap had a few holes | none | replaced 2 burlap panels |
| Burlap | 3 | Repairs made in December 2021 held up well, minor repairs needed | none | reinforced stakes pulled off by a bear, added more screws/ fixed burlap holes where needed |

Table 2. Wildlife detection results by treatment type/ reference.

| Treatment | # Linear Features | Camera Days | Detections/ 100 Camera Nights | | | | | | | | | | | | ATV | Comments |
|--------------------------|-------------------|-------------|-------------------------------|------|-------|---------|------|-------|---------|------|-------|---------|------|-------|------|---|
| | | | Bear | | | Caribou | | | Wolf | | | Moose | | | | |
| | | | Non-Use | Use | Total | Non-Use | Use | Total | Non-Use | Use | Total | Non-Use | Use | Total | | |
| CWD | 2 | 613 | 0.82 | 0 | 0.82 | 2.28 | 0 | 2.28 | 0 | 0 | 0 | 0.16 | 0 | 0.16 | 0 | - |
| CWD + Burlap | 1 | 306 | 0 | 0.98 | 2.27 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | - |
| Tree Hinging/ Structures | 3 | 745 | 0.54 | 0 | 0.54 | 0.67 | 0.13 | 0.81 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | - |
| Trench & Pile | 2 | 610 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.33 | 0.16 | 0.49 | 0 | - |
| Trench & Pile + Burlap | 1 | 305 | 0 | 0.98 | 0.98 | 0 | 0 | 0 | 0 | 0 | 0 | 0.33 | 0 | 0.33 | 0 | - |
| Burlap | 3 | 622 | 0 | 0.48 | 0.48 | 0 | 0.32 | 0.32 | 0 | 0.16 | 0.16 | 0 | 0 | 0 | 0 | - |
| TOTAL Treatments | 12 | 3201 | 0.28 | 0.28 | 0.56 | 0.59 | 0.09 | 0.69 | 0 | 0.03 | 0.03 | 0.12 | 0.03 | 0.16 | 0 | - |
| TOTAL Reference | 6 | 1660 | 0.24 | 0.18 | 0.42 | 0.60 | 0.72 | 1.33 | 0 | 0.18 | 0.18 | 0 | 0.12 | 0.12 | 1.02 | removed site 6 reference camera Dec2021 |

Table 3a. Comparison of caribou mitigation trial covert camera wildlife detections with baseline linear feature wildlife use inventory results.

| Denison Program | Associated Feature | Total Camera Days | Bear | | Caribou | | Wolf | | Moose | | Species of Interest (bear, caribou wolf, moose) | | All Animals* | | ATV | |
|--|--------------------|-------------------|-------|---------------|---------|---------------|-------|---------------|-------|---------------|---|---------------|--------------|---------------|-------|---------------|
| | | | Total | /100 cam days | Total | /100 cam days | Total | /100 cam days | Total | /100 cam days | Total | /100 cam days | Total | /100 cam days | Total | /100 cam days |
| Caribou Mitigation Trial | Treatment- Non-Use | 3201 | 9 | 0.28 | 19 | 0.59 | 1 | 0.03 | 4 | 0.12 | 33 | 1.03 | 89 | 2.78 | 0 | 0.00 |
| | Treatment- Use | | 9 | 0.28 | 3 | 0.09 | 0 | 0.00 | 1 | 0.03 | 13 | 0.41 | 39 | 1.22 | 0 | 0.00 |
| Covert Camera Monitoring 2019-2021 + Reference Cameras | Trail- Use | 6115 | 44 | 0.72 | 95 | 1.55 | 18 | 0.29 | 22 | 0.36 | 179 | 2.93 | 509 | 8.32 | 122 | 2.00 |

*includes mesocarnivores, small mammals, hares, birds, etc

Table 3b. Comparison of caribou mitigation trial covert camera wildlife detections with linear feature monitoring results, all burlap installations excluded.

| Denison Program | Associated Feature | Total Camera Days | Bear | | Caribou | | Wolf | | Moose | | Species of Interest (bear, caribou wolf, moose) | | All Animals* | | ATV | |
|--|--------------------|-------------------|-------|---------------|---------|---------------|-------|---------------|-------|---------------|---|---------------|--------------|---------------|-------|---------------|
| | | | Total | /100 cam days | Total | /100 cam days | Total | /100 cam days | Total | /100 cam days | Total | /100 cam days | Total | /100 cam days | Total | /100 cam days |
| Caribou Mitigation Trial | Treatment- Non-Use | 1837 | 9 | 0.49 | 19 | 1.03 | 1 | 0.05 | 3 | 0.22 | 32 | 1.74 | 83 | 4.52 | 0 | 0.00 |
| | Treatment- Use | | 0 | 0.00 | 1 | 0.05 | 0 | 0.00 | 1 | 0.05 | 2 | 0.11 | 19 | 1.03 | 0 | 0.00 |
| Covert Camera Monitoring 2019-2021 + Reference Cameras | Trail- Use | 6115 | 44 | 0.72 | 95 | 1.55 | 18 | 0.29 | 22 | 0.36 | 179 | 2.93 | 509 | 8.32 | 122 | 2.00 |

*includes mesocarnivores, small mammals, hares, birds, etc.

Table 4. Seedling health assessment results.

| Plot ID | Treatment | # Planted July 2021 | # Seedlings May 2022 | Average Height (cm) | Average Status ^a | % browsed | % Missing / Dead | Comments |
|------------------------|-------------------------|---------------------|----------------------|---------------------|-----------------------------|-------------|------------------|---|
| 1 | CWD | 65 | 61 | 19.9 | 1.5 | 36.1 | 6.2 | |
| 2 | Tree Hinging/Structures | 70 | 67 | 12.3 | 2.4 | 97.0 | 4.3 | |
| 4 | CWD + Burlap | 65 | 62 | 17.9 | 1.9 | 14.5 | 4.6 | |
| 6 | Trench & Pile | 60 | 57 | 22.2 | 1.54 | 33.3 | 5.0 | |
| 7 | Trench & Pile + Burlap | 60 | 60 | 21 | 1.2 | 1.7 | 0.0 | |
| 8 | Trench & Pile | 60 | 59 | 22.3 | 1.3 | 32.2 | 1.7 | |
| 9 | Tree Hinging/Structures | 60 | 53 | 12.7 | 2.2 | 88.7 | 11.7 | lost ~5 due to burlap log being cut down and landing on seedlings |
| 11 | CWD | 60 | 57 | 21.8 | 2 | 75.4 | 5.0 | |
| Total / Average | | 500 | 476 | 18.8 | 1.8 | 47.4 | 4.8 | |

a: 1= healthy, 2=average, 3=poor, 4=dead

REFERENCES

Omnia Ecological Services. 2022. Linear Feature Mitigation Trial. Project Update Report. Prepared for Denison Mines Corporation. 58pp.

FIELD PROGRAM PHOTOGRAPHS



Photograph 1. Status of CWD treatment May 2022.



Photograph 2. Status of tree hinge/structures treatment May 2022.



Photograph 3. May 2022 status of needles on tree that was hinged.



Photograph 4. Status of trench & pile treatment May 2022.



Photograph 5. Burlap repairs May 2022, before and after.



Photograph 6. Wooden lath removed by bear.



Photograph 7. Seedling health assessment examples 1-4, left to right, respectively.



Photograph 8. Burlap challenges with wildlife.

Attachment: IR-165

| | |
|---|---|
| Number | IR-165 |
| Dept. | CNSC ECCC |
| Project effects link | Birds (all species) |
| Reference to EIS, appendices, or supporting documentation | <p>Section 9.4.4.2.2</p> <p>Section 9.4.5.2.4, Avian Deterrence and Prevention of Entrapment</p> <p>Appendix 10-A (ERA)</p> |
| Context and Rationale | <p>Context: On p. 9-364 of the EIS, it is stated that exposure to hazardous materials through contact with contaminated waste ponds could affect avian health and contribute to mortality.</p> <p>However, the ERA places the avian receptors only in waterbodies and locations outside of the Project area (see Figure 5-2 in the ERA), i.e., Whitefish Lake, McGowan Lake, the inlet to Russell Lake, and Kratchkowsky Lake.</p> <p>Further, there are insufficient details on the potential effects of the water quality in the water management and treatment facilities on birds, species at risk, and other wildlife, including the risk of bioaccumulation of contaminants. The Proponent should assess potential effects of water quality from these areas using applicable CCME guidelines.</p> <p>Rationale: It is unclear whether the ecological risk assessment based on the chosen exposure locations is protective and conservative for avian species potentially exposed to contaminated waste ponds on the Project site.</p> <p>While mitigation measures such as physical, visual, and/or auditory deterrents are proposed in Section 9.4.5.2.4, the possibility of avian species coming into contact with waste ponds cannot be excluded based on the available information in the EIS. The possibility of birds, species at risk, and other wildlife accessing the water management and treatment facilities for drinking water or other purposes is not discussed in the draft EIS.</p> |
| Information Requirement | Please perform an ecological risk assessment with avian receptors located at the contaminated waste ponds, including: |

| | |
|--|--|
| | <p>1. Describe and analyze the possibility of birds, species at risk and other wildlife using the water or waste management facilities and provide an analysis to determine if there is a risk to wildlife that may access these areas.</p> <p>2. Identify the potential toxicity of water management ponds to aquatic migratory birds and species at risk (SAR).</p> <p>3. Describe what measures will be taken if the waters are found to be toxic to migratory birds and SAR.</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends that Denison ensure adequate mitigation measures are implemented to minimize the potential for avian exposure to pond waters.</p> |
|--|--|

Response:

Water Management Context and Risk of Exposure

Details on water management and treatment facilities are provided in Section 2 Project Description, Section 2.2.3 Water Management. Importantly, the Project does not include a tailings management facility because of the nature of the proposed mining and processing methods. A summary of water management plans is provided herein; please refer to the marked-up Figure 2.2-15 below.

Clean, non-contact runoff will be diverted around Project components where possible. Contact water will be collected in various ponds and routed to the process water pond (shown in yellow in figure below). These contact water management ponds have been designed to manage event driven runoff and are not intended to be “wet” ponds. That is, the contact water ponds are not designed to hold standing water for long periods of time; rather, they would contain / manage runoff volumes up to the design event and subsequently be pumped down to ensure ongoing management capacity. As a result, the quality of water in these ponds is expected to be relatively good as it would largely comprise precipitation and runoff from natural surfaces.

Additionally, given the design basis of the contact water management ponds (i.e., they are not wet ponds that are meant to hold water at all times), birds and wildlife are not likely to interact with them in a material fashion from a contaminant exposure perspective.

Considering the Project design, the ponds with potential to contain water for any period of time in consideration of potential temporary use by avian species are:

- the process water pond, and the
- effluent monitoring and release ponds.

Process water pond

The process water pond can hold up to 30,000 m³ of water. It will be a central pond collecting water from a variety of areas, including:

- water from the wash bay (shown in green in figure below),

- water from the domestic wastewater treatment plant,
- water from the dewatering of IWWTP precipitates (non-radioactive, gypsum type material), and
- precipitation-related contact water (shown in yellow in figure below; includes water from the wellfield runoff pond, clean waste rock pond, process precipitate pond, and landfill leachate collection [which is expected to be primarily surface contact water during the Operation phase]).

Water in the process water pond can be used directly in the processing plant or be directed to the industrial wastewater treatment plant (IWWTP) for treatment prior to release to Whitefish Lake. The majority of the flows into the process water pond during Operation (approximately 61% or 10.7 m³/hour out of total 17.5 m³/hour) are contact waters. As noted above, the quality of the contact water is expected to be relatively good given its sources. As such, a screening was conducted to evaluate the main non-contact water input to the pond, namely the water from the IWWTP precipitate pond. This input represents about 20% of the expected inflow to the process water pond and using this as an estimate for quality of the entire pond is considered conservative.

Effluent monitoring and release ponds

The effluent monitoring and release ponds will receive treated water from the IWWTP. Each of the three ponds will have capacity for 3,300 m³ of water and a composite liner system. The ponds have been designed to hold effluent for a period of 80 hours for testing before discharge to the environment. Having three ponds allows for increased operational flexibility, as one pond can be undergoing maintenance when required. A minimum of two ponds are required to be operational at all times to make sure all effluent released to surface water meets federal and provincial discharge limits. Each pond will be operated with the following stages: 1) filling, 2) holding while awaiting quality confirmation; and 3) releasing to Whitefish Lake once water quality is confirmed to meet discharge limits. There is potential for wildlife to be in contact for short periods of time with the ponds during the holding stage. Table 2.2-1 outlines the upper bound effluent quality proposed for the Project.

In addition to the above that considers where exposure to water management facilities could reasonably occur on the Project site, the following is also relevant as it concerns the likelihood that such exposure would occur. During construction and operations, bird and other wildlife species are expected to avoid the Project Area and Local Study Area (LSA) because of sensory disturbance from project activities that generate noise, artificial light, vibration, dust, etc. and the presence of workers (Adams et al. 2019, Habib et al., 2007; Narins, 1990). While some habituation to sensory disturbance is anticipated that could result in individuals of some species returning to the LSA, generally it is expected that many individuals will be displaced into available habitat elsewhere outside the LSA in the Regional Study Area (RSA). The LSA is not within a major flyway and the LSA currently provides limited waterfowl habitat relative to the neighbouring parts of the RSA. Overall, based on these considerations we characterize the likelihood of bird and other wildlife species exposures to water management facilities on the site as low.

Potential Toxicity to Aquatic Migratory Birds and Species at Risk (SAR)

A comparison of the expected water quality from the IWWTP precipitate pond, a conservative representation of the process water pond, to the Canadian Council of Ministers of the Environment (CCME) water quality guidelines (WQG) for the protection of livestock and considered protective of

animals potentially exposed to contaminated waste ponds on the Project site was completed. This comparison shows that the expected IWWTP precipitate pond water quality was below the CCME WQG for the protection of livestock for most constituents except selenium (**Table IR 165-1**), and as such, risks to birds, species at risk and other wildlife that may contact or ingest this water are not expected for those constituents below the CCME WQG protective of livestock.

Oviparous birds and fish are the most sensitive to selenium in aquatic environments with toxicity to birds and fish being associated with organic selenium primarily in the diets and tissues of exposed biota.³ Selenium toxicity to these organisms is manifested through the maternal transfer of selenium which may cause embryotoxicity and teratogenicity⁴. Considering the mitigation measures described below to deter avian use of the ponds, including vegetation management such as managing areas around the waste ponds being free of vegetation to limit the attraction of waterfowl and other wildlife to these areas for foraging and/or breeding, potential risks to avian birds exposed to selenium at this pond would be low.

A CCME WQG protective of livestock was not available for antimony, barium, iron, manganese, silver, strontium, tin and titanium. Potential risks to avian species are unlikely for silver and titanium as these parameters were not detected in the IWWTP precipitate pond. Avian species and wildlife are not expected to be at increased risk for antimony, barium, iron, manganese, strontium and tin because the IWWTP precipitate pond water concentrations for these parameters represents about 20% of the expected inflow to the process, and the mitigation measures, discussed below, to deter avian species and wildlife from these ponds, will reduce the receptor's exposure to these constituents.

Table IR165-1: Comparison of Expected IWWTP precipitate pond Water Quality to the CCME WQGs for the Protection of Livestock

| Constituent | Unit | C1-ETS2-SN | CCME Protection of Livestock |
|----------------------|------|------------|------------------------------|
| Aluminum, dissolved | mg/L | 0.018 | 5 |
| Antimony, dissolved | mg/L | 0.0007 | NV |
| Arsenic, dissolved | ug/L | 0.4 | 25 |
| Barium, dissolved | mg/L | 0.097 | NV |
| Beryllium, dissolved | mg/L | <0.0001 | 0.1 |
| Boron, dissolved | mg/L | 0.36 | 5 |
| Cadmium, dissolved | mg/L | 0.00045 | 0.08 |
| Chromium, dissolved | mg/L | 0.0064 | 0.05 |
| Cobalt, dissolved | mg/L | 0.0002 | 1 |
| Copper, dissolved | mg/L | 0.0021 | 0.5 ^a |
| Iron, dissolved | mg/L | 0.001 | NV |
| Lead, dissolved | mg/L | <0.0001 | 0.1 |
| Manganese, dissolved | mg/L | 0.0012 | NV |

³ Young, T.F., Finley, K., Adams, W., Besser, J., Hopkins, W.A., Jolley, D., McNaughton, E., Presser, T.S., Shaw, D.P., & Unrine J.(2010). What You Need to Know about Selenium. In: P.M. Chapman, W.J. Adams, M.L. Brooks, C.G. Delos, S.N. Luoma, W.A. Maher, H.M. Ohlendorf, T.S. Presser & D.P. Shaw (Eds.), Ecological Assessment of Selenium in the Aquatic Environment. Boca Raton (FL): CRC. p 7–45.

⁴ Ibid

| Constituent | Unit | C1-ETS2-SN | CCME Protection of Livestock |
|-----------------------|------|------------|------------------------------|
| Molybdenum, dissolved | mg/L | 0.018 | 0.5 |
| Nickel, dissolved | mg/L | 0.0004 | 1 |
| Selenium, dissolved | mg/L | 0.19 | 0.05 |
| Silver, dissolved | mg/L | <0.00005 | NV |
| Strontium, dissolved | mg/L | 4.1 | NV |
| Thallium, dissolved | mg/L | 0.0007 | 1 |
| Tin, dissolved | mg/L | 0.0044 | NV |
| Titanium, dissolved | mg/L | <0.0002 | NV |
| Uranium, dissolved | ug/L | 25 | 200 |
| Vanadium, dissolved | mg/L | 0.0064 | 0.1 |
| Zinc, dissolved | mg/L | 0.0027 | 50 |

Notes:

NV – no CCME WQG

a- lowest value between the sheep, cattle, swine and poultry value

Bold indicates that the predicted water quality exceeds the CCME WQG for protection of livestock.

A comparison of the proposed effluent quality in Table 2.2-1 of the EIS to the CCME WQG for the protection of livestock was also completed. This comparison shows that the proposed effluent quality was below the CCME WQG protective of livestock for most constituents except molybdenum and sulphate (**Table IR 165-2**). As such, birds, species at risk and other wildlife that may contact or ingest the proposed effluent quality are not expected to be at increased risk for those constituents below the CCME WQG protective of livestock.

Table IR165-2: Comparison of Proposed Effluent Quality to the CCME WQGs for the Protection of Livestock

| Constituent | Unit | Proposed Effluent Quality | CCME Protection of Livestock |
|--|------|---------------------------|------------------------------|
| General Chemistry | | | |
| Chloride | mg/L | 600 | NV |
| Sulphate | mg/L | 3915 | 1000 |
| Total Dissolved Solids | mg/L | 6420 | NA |
| Metals and Metalloids (Dissolved) | | | |
| Arsenic | mg/L | 0.006 | 0.025 |
| Cadmium | mg/L | 0.0018 | 0.08 |
| Chromium | mg/L | 0.025 | 0.05 |
| Cobalt | mg/L | 0.003 | 1 |
| Copper | mg/L | 0.022 | 0.5 ^a |
| Molybdenum | mg/L | 2.5 | 0.5 |
| Selenium | mg/L | 0.042 | 0.05 |
| Uranium | mg/L | 0.057 | 0.2 |
| Zinc | mg/L | 0.042 | 50 |
| Radionuclides | | | |

| Constituent | Unit | Proposed Effluent Quality | CCME Protection of Livestock |
|--------------|------|---------------------------|------------------------------|
| Uranium-238 | Bq/L | 0.7 | 0.2 ^b |
| Uranium-234 | Bq/L | 0.7 | 95 ^b |
| Thorium-230 | Bq/L | 0.9 | 22 ^b |
| Radium-226 | Bq/L | 0.15 | 13.5 ^b |
| Lead-210 | Bq/L | 0.419 | 8 ^b |
| Polonium-210 | Bq/L | 0.15 | 7 ^b |

Notes:

NV – no CCME WQG

NA- not applicable.

a - lowest value between the sheep, cattle, swine and poultry value

b - US DOE Standard (2019) for aquatic biota, including riparian animals

Bold indicates that the proposed effluent quality exceeds the CCME WQG for protection of livestock.

For molybdenum and sulphate increased risks to avian species and wildlife exposed to effluent in the ponds are not expected as the mitigation measures, discussed below, to deter avian species and wildlife from the ponds, will reduce the potential receptor's exposure to these constituents.

A CCME WQG protective of livestock was not available for chloride and for the radionuclides. Avian species and wildlife are not expected to be at increased risk to those constituents without a CCME WQG protection of livestock because the mitigation measures, discussed below, to deter avian species and wildlife from the ponds, will reduce the receptor's exposure to these constituents.

A comparison of the proposed effluent quality for radionuclides to the US Department of Energy (DOE) Standard⁵ for *a graded approach for evaluating radiation doses to aquatic and terrestrial biota* (Table IR165-2), that is protective of wildlife exposed to radionuclides, suggests that wildlife are not expected to be at increased risks to these radionuclides, as the proposed effluent quality for these radionuclides were below the US DOE Standard. As such, increased risk are not expected to avian species, species at risk and other wildlife exposed to constituents in contaminated waste ponds on the Project site.

Mitigation Measures

Mitigation measures outlined in the draft EIS to minimize the potential for avian exposure to pond water include:

- Employees and contractors will be provided with wildlife education and awareness training, including education about potential avian issues on site and training on the mitigation measures to avoid or minimize potential adverse Project effects on avian species and their habitat.
- Employees and contractors will be educated on waste management policies that limit human-avian interactions.
- Designated employees will be trained in appropriate avian deterrent techniques to minimize avian interactions with the Project.

⁵ US Department of Energy. 2019. DOE Standard: A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota. U.S. Department of Energy, Washington, DC. DOE-STD-1153-2019.

- Employees and contractors will be requested to report avian observations on site, injured or dead birds (which will be reported to SK MOE). Avian encounters and outcomes will be monitored, and logbooks will be used to record observations. Logbooks and reports will be available to employees.
- Physical, visual, and/or auditory deterrents and exclusion measures will be employed around hazardous materials to discourage avian use, as required.
- Vegetation management will be incorporated in the vicinity of waste ponds to discourage avian use of potentially affected vegetation.

Adaptive management will be a component of the wildlife management plan which will be developed to support licensing. If birds are observed on site ponds, additional deterrent techniques could be employed. Examples of other deterrent options to dissuade birds from landing on ponds under an adaptive management framework are provided here:

- Visual deterrents: Reflective tape/flagging could be properly and appropriately installed on infrastructure and/or over the ponds. Predator decoys (i.e., plastic hawks, owls) could be strategically installed on visible high points, such as building roofs and fence posts. Brightly coloured flags flown from posts and/or inflatable tube dancers could be installed along the perimeter of the ponds and/or on the facilities, as appropriate. Inflatable tube dancers are similar to scarecrows, but determined to be more effective (Lukas et al. 2020⁶) likely resulting from the constant motion caused by the wind. A combination of the above visual deterrents would be expected to provide the best results.
- Auditory deterrents: Ultrasonic deterrent systems create a “net” that has been shown to repel birds from an area (Ezeonu et al. 2012⁷). Propane cannons are another effective method shown to deter birds. The use of propane cannons has been more widely studied and are recommended over ultrasonic deterrent systems. Propane cannons have been shown to be more effective when paired with a radar-activated on-demand system that fires cannons when birds are entering the area (Ronconi and Cassady St. Clair, 2006⁸), as birds can habituate to a timely, consistent firing/noise event.

⁶ Lukas, S, Clark, L, Davis, A, Sanchez, D, Brewer, L. 2020. Nonlethal Bird Deterrent Strategies: Methods for reducing fruit crop losses in Oregon. Oregon State University Extension Service.

⁷ Ezeonu, SO, Amaefule, DO, Okonkwo, GN. 2012. Construction and Testing of Ultrasonic Bird Repeller. Journal of Natural Sciences Research 2(9): 8-17.

⁸ Ronconi, RA, St. Clair, CC. 2006. Efficacy of a radar-activated on-demand system for deterring waterfowl from oil sands tailings ponds. Journal of Applied Ecology 43: 111-119

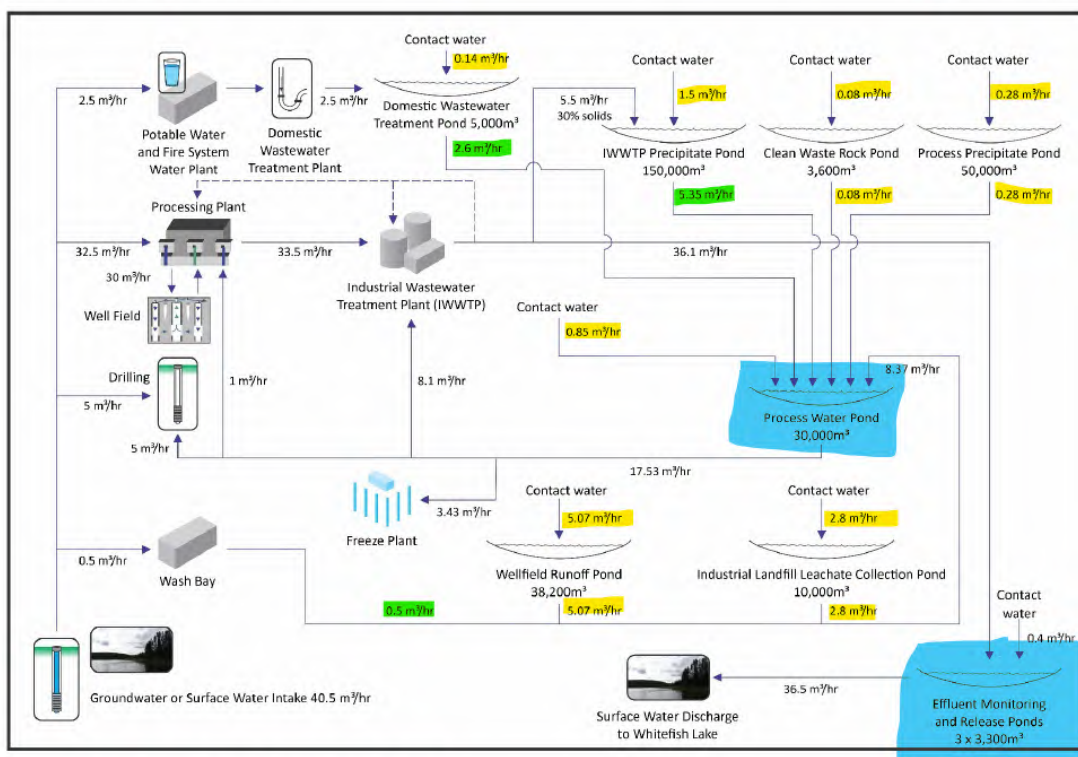


Figure 2.2-15: Operation Water Balance for the Project

References

- Adams, C. A., A. Blumenthal, E. Fernández-Juricic, E. Bayne, and C. C. St. Clair. 2019. Effect of anthropogenic light on bird movement, habitat selection, and distribution: a systematic map protocol. *Environmental Evidence* 8(S1): 1–16.
- Habib, L., E.M. Bayne and S. Boutin. Chronic industrial noise affects pairing success and age structure of ovenbirds *Seiurus aurocapilla*. *Journal of Applied Ecology*, 44: 176–184.
- Narins, P.M. 1990. Seismic communication in anuran amphibians. *Bioscience* 40 (4):268-274

Attachment: IR-183 to 187

| | |
|---|---|
| Number | IR-183 |
| Dept. | CNSC |
| Project effects link | Human Health with respect to radiation exposure |
| Reference to EIS, appendices, or supporting documentation | Section 10.2 Appendix 10-C |
| Context and Rationale | <p>Context: Exposure scenarios for workers have been identified and high-level summaries of the assumptions and resultant dose estimates have been provided. However, the detailed dose calculations have not been provided.</p> <p>Rationale: The method used to estimate effective, equivalent and committed dose is required to be verified. Sample dose calculations should be included, to confirm use of acceptable input data, for at least the most dose significant scenarios.</p> |
| Information Requirement | Provide the dose calculations for deriving the dose estimates for workers in all exposure scenarios, for at least the most dose significant scenarios. |

| | |
|---|---|
| Number | IR-184 |
| Dept. | CNSC |
| Project effects link | Human Health with respect to radiation exposure |
| Reference to EIS, appendices, or supporting documentation | Section 10.2 Appendix 10-C, 2.0 |
| Context and Rationale | <p>Context: It is stated in Appendix 10-C, section 2.0 that: “In addition, the CNSC has proposed a 100 mSv 5-year equivalent dose to lens of eye, in accordance with recent recommendations of the International Commission for Radiological Protection (ICRP, 2012a). This implies an average annual equivalent dose to lens of 20 mSv/a and will be considered as an applicable dose limit for workers.”</p> <p>As per section 14 of the Radiation Protection Regulations, the equivalent dose limit for the lens of an eye for nuclear energy workers (NEWs), effective January 1, 2021, is 50 mSv in a one-year dosimetry period.</p> |

| | |
|-------------------------|--|
| | Rationale: The reason of the requested change is to ensure consistency with the Radiation Protection Regulations. |
| Information Requirement | The EIS and Appendix 10-C should be aligned with the Radiation Protection Regulations regarding the equivalent dose limit for the lens of an eye for NEWs. |

| | |
|---|---|
| Number | IR-185 |
| Dept. | CNSC |
| Project effects link | Human Health with respect to radiation exposure |
| Reference to EIS, appendices, or supporting documentation | Section 10.2.3.2 Appendix 10-C Table 3.10-3.12 |
| Context and Rationale | Context: The Geometries for External Exposure Scenarios Modelled in MicroShield for Sources in various locations were provided in tables 3.10-3.12 in appendix 10-C. The doses from those scenarios were omitted. Rationale: The method used to estimate effective, equivalent, and committed dose is required to be verified. Sample dose calculations should be included, to confirm use of acceptable input data. |
| Information Requirement | The proponent is asked to provide all the necessary information and assumptions required to perform the MicroShield calculations independently and to list the resulting calculated values from the listed scenarios. |

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|---|---|
| Number | IR-186 |
| Dept. | CNSC |
| Project effects link | Human Health with respect to radiation exposure |
| Reference to EIS, appendices, or supporting documentation | Section 10.2.3.2.4, Section 10.2.3.2.6, Section 10.2.4 Appendix 10-C, Section 3.2 |
| Context and Rationale | Context: In sections 10.2.3.2.4 and 10.2.3.2.6, as well as section 3.2 of Appendix 10-C, the proponent has stated that workers in the drying and packaging areas of the processing plant will be required to wear powered air purifying respirators (PAPR) to reduce/eliminate inhalation exposure. |

| | |
|-------------------------|--|
| | <p>Further in section 10.2.4, which elaborates mitigation measures, it is stated: “For the drying and packaging/loading areas of the ISR plant, use of PAPR has been assumed. It will be needed in these areas, and it has been planned in these areas to substantially reduce doses from inhalation of uranium dust. Dust levels in these areas will be monitored and kept ALARA.”</p> <p>The use of respirators appears to be in contradiction of the requirements of section 13 of the Uranium Mines and Mills Regulations, which states: No licensee shall rely on the use of a respirator to comply with the Radiation Protection Regulations unless the use of the respirator (a) is for a temporary or unforeseen situation; and (b) is permitted by the code of practice referred to in the licence.</p> <p>The proponent is also reminded that respirators should not be the first choice for dose reduction in workplaces. They should only be used when the hierarchy of control (elimination, substitution, engineering, or administrative controls) is not possible.</p> <p>Rationale: At this stage of the project, the proponent is expected to identify design improvements to these areas of the ISR plant/processing plant following the hierarchy of control for the radiological protection of workers, as per regulatory requirements and as described in REGDOC-2.7.1, Radiation Protection.</p> |
| Information Requirement | <p>Provide the rationale for mandating the use of respirators by workers in the drying and packaging areas of the processing plant.</p> <p>Include the demonstration of the application of the hierarchy of control for radiological protection within the design of these areas of the processing plant.</p> <p>Justify that this approach complies with section 13 of the Uranium Mines and Mills Regulations.</p> |

| | |
|---|--|
| Number | IR-187 |
| Dept. | CNSC |
| Project effects link | Human Health with respect to radiation exposure |
| Reference to EIS, appendices, or supporting documentation | <p>Section 10.2.3.2.4, Section 10.2.3.2.6</p> <p>Appendix 10-C, Section 3.3, 6.0</p> |

| | |
|-------------------------|--|
| Context and Rationale | <p>Context: The exposure scenarios and assumptions for the workers in the drying area and the packaging/loading area of the processing plant include the wearing of PAPRs, which is assumed to provide a 1000-fold reduction in dust exposure.</p> <p>Further to reference IR-186, the use of a respirator as well as in worker dose predictions for the project, appears to contravene section 13 of the Uranium Mines and Mills Regulations, and does not follow the hierarchy of controls for radiological protection of workers as described in REGDOC-2.7.1, Radiation Protection.</p> <p>Rationale: At this stage of the project, the proponent is expected to identify design improvements to these areas of the ISR plant/processing plant following the hierarchy of control for the radiological protection of workers, as per regulatory requirements and as described in REGDOC-2.7.1, Radiation Protection.</p> |
| Information Requirement | <p>Modify the exposure scenarios and assumptions (i.e., remove the use of a respirator) for the workers in the drying area and the packaging/loading area of the processing facility.</p> <p>Assess the resultant exposures against CNSC regulatory dose limits and the ALARA principle.</p> <p>Identify mitigation measures as per the hierarchy of control for radiological protection.</p> |

Summary of IRs 183 to 187 and Responses:

IR-183 (CNSC): Provide the dose calculations for deriving the dose estimates for workers in all exposure scenarios, for at least the most dose significant scenarios.

Response: *Example dose calculations are provided in Appendix A of the Worker Dose Assessment, which is Appendix 10-C of the EIS. As noted in response to IRs 185, 186, and 187, some revisions to Appendix A are detailed in an attached memo.*

IR-184 (CNSC). As per section 14 of the Radiation Protection Regulations, the equivalent dose limit for the lens of an eye for nuclear energy workers (NEWs), effective January 1, 2021, is 50 mSv in a one-year dosimetry period. The EIS and Appendix 10-C should be aligned with the Radiation Protection Regulations regarding the equivalent dose limit for the lens of an eye for NEWs.

Response: *The text cited by the reviewer from Section 2.0 of Appendix 10-C about a proposed additional limit for 5-year equivalent dose to lens of eye will be deleted to be consistent with the Regulation.*

IR-185 (CNSC). The proponent is asked to provide all the necessary information and assumptions required to perform the MicroShield calculations independently and to list the resulting calculated values from the listed scenarios.

Response: *The source radiochemistries, geometries, and distance/time assumptions that are inputs to the external dose calculation are provided in the Worker Dose Assessment, which is Appendix 10-C of the EIS.*

The calculation of external dose is detailed in Appendix A (Table A.3) of the Worker Dose Assessment. This calculation uses dose rates at distance as output from MicroShield. As we have noticed several typos in Table A.3, and have changed inputs for drying and packaging in response to IR-186, a revised table is provided (see Table A.3 below).

IR-186 (CNSC). Provide the rationale for mandating the use of respirators by workers in the drying and packaging areas of the processing plant. Include the demonstration of the application of the hierarchy of control for radiological protection within the design of these areas of the processing plant. Justify that this approach complies with section 13 of the Uranium Mines and Mills Regulations.

Response: *We had used a very conservative dust level in drying and packaging areas (representing equipment sources of dust to the exhaust system). While the hazard cannot be eliminated or substituted, engineering controls will minimize the pathway. As a primary engineering control, the equipment and exhaust will be in a negative pressure enclosure. Under normal operation, workers will not be inside the enclosure. To support a more realistic exposure assessment for drying and packaging, a conservative design estimate for potential dust levels in the main room has been obtained. It is anticipated that workers in these areas will not require PAPR under normal circumstances. As an administrative control, dust levels in the room will be monitored, and individual worker exposures will be monitored and managed. PAPR will be available if needed as a control of last resort. The approach will respect the hierarchy of control and will comply with Section 13 of the Uranium Mines and Mills Regulations. A new worker exposure assessment has been completed for drying and packaging areas, using the design estimate for dust levels in the main room, a revised time spent in the area, and no routine use of PAPR (see revised Tables A.1 and A.3 below).*

IR-187 (CNSC). Modify the exposure scenarios and assumptions (i.e., remove the use of a respirator) for the workers in the drying area and the packaging/loading area of the processing facility. Assess the resultant exposures against CNSC regulatory dose limits and the ALARA principle. Identify mitigation measures as per the hierarchy of control for radiological protection.

Response: *As described in response to IR-186, a new worker exposure assessment has been completed for drying and packaging areas, using the design estimate for dust levels in the main room, a revised time spent in the area, and no routine use of PAPR (see revised Tables A.1 and A.3 below). The in-design engineering controls will include negative pressure enclosure of source equipment and exhaust, as well as ventilation controls in the main rooms (drying and packaging areas). Administrative controls will include area and individual monitoring and time-exposure management. It is shown that CNSC regulatory dose limits can be met without PAPR. This will be confirmed by air and dose monitoring during the commissioning phase as the control system is optimized. PAPR will be available as needed for non-routine situations, such as any necessary work within the enclosures.*

Changes to the Worker Dose Calculations and Report:

The Worker Dose Assessment (Appendix 10-C of the EIS) will be revised to reflect the information provided in Responses to IRs above. References to routine use of PAPR as an exposure control will be deleted. The primary engineering controls on dust exposure in the drying and packaging areas will be explained. Section 6.0 (Radiation Protection Strategies) will be updated to reflect the hierarchy of controls – elimination > substitution > engineering > administrative > PPE. Neither elimination nor substitution of the hazard are feasible controls for the Project, given its purpose to produce uranium

concentrate, and given the radioactive nature of uranium. Elimination of an exposure pathway would typically involve engineering controls. Engineering controls will be utilized as a first line of defense.

As noted in the responses, a design estimate has been obtained for dust levels in the main room for the drying area and the packaging/loading area. This value of 0.5 mg/m³ is a conservative representation of potential dust levels for workers under normal operations. It translates to a respirable dust value of 0.4 mg/m³ and a U-238 activity of 3.9 Bq/m³. This value has been used in revised calculations of the dust inhalation dose (presented herein). In addition, time spent in the room has been reduced from 8 to 4 hours per day. The revised dose calculations show that the CNSC regulatory dose limits can be met without use of PAPR.

Because the dust sources (dryer and calciner in the drying area; drum loader in the packaging area) will be fully enclosed under negative pressure, workers will not be in the enclosure, and time spent at 1 m from source will be zero. The time at distance allocation has been revised to:

0 h/d at 1 m, 3 h/d at 5 m, and 1 h/d at 10 m

This time at distance allocation is relevant to the external dose, which is a minor dose component for the drying and packaging/loading areas.

To accommodate these new assumptions, the worker dose calculations have been revised. In addition, several typos in the tables of the June 2022 Worker Dose Assessment have been corrected. For completeness, all the tables from the report that have any changes are provided below, including the example calculations from Appendix A of the Worker Dose Assessment. Any word or numeric value that has changed is shown in red font.

The revised effective dose from dust inhalation, in both drying and packaging areas, without use of PAPR, is calculated to be 11.7 mSv/a (Table 5.1 and Table A.1) well below the 5-year average effective dose limit of 20 mSv/a. Actual dust levels will be confirmed during the commissioning phase, using both area monitoring and sampling pumps worn by workers, and the control system will be optimized to ensure that doses are ALARA. Monitoring will continue through the operations phase, in accordance with the Radiation Protection Program.

Section 2.0 of the Worker Dose Assessment (on Regulatory Context) will be updated to align with the Radiation Protection Regulations, by deleting the following text:

~~“In addition, the CNSC has proposed a 100 mSv 5-year equivalent dose to lens of eye, in accordance with recent recommendations of the International Commission for Radiological Protection (ICRP, 2012a). This implies an average annual equivalent dose to lens of 20 mSv/a and will be considered as an applicable dose limit for workers.”~~

Section 6.0 of the Worker Dose Assessment (on Radiation Protection Strategies) will be updated to describe the planned mitigations, consistent with the hierarchy of controls. Text in this section relevant to dust exposure will be revised as follows:

“Doses to workers at the Wheeler River Project are expected to be maintained below the average annual dose limit of 20 mSv/a for NEWs. Several mitigations have been assumed and will be important

in keeping doses ALARA. For the drying and packaging/loading areas of the ISR Plant, ~~the engineering controls will include negative pressure enclosures around source equipment and exhaust, as well as ventilation controls in the main rooms (beyond enclosures). Administrative controls will include area and individual monitoring and time-exposure management. Actual dust levels will be confirmed during the commissioning phase and the control system will be optimized to ensure that doses are ALARA. Use of PAPR has been assumed. It will be needed in these areas, and it has been planned in these areas to substantially reduce dose from inhalation of uranium dust. Dust levels in these areas should be monitored and kept as low as reasonably achievable.”~~

~~“Powered Air Purifying Respirators (PAPR) should be available in these areas in case of need for any non-routine work that may involve high dust exposures. However, PAPR is a control of last resort. Under the Radiation Protection Program, a radiation work permit process will be in place for any non-routine work that may involve unusually high exposures, ensuring that risks are assessed and exposure controls are optimized in accordance with the ALARA principle. protection factor of 1000 is provided by several types of respirators such as Powered Air Purifying Respirators (PAPR) with a full facepiece or hood, and Supplied-Air Respirators (SAR) in positive-pressure mode or continuous flow mode. Alternatively, a Self-Contained Breathing Apparatus will provide protection factors over 10,000 if used in positive-pressure mode. It should be noted that Air Purifying Respirators will not offer protection against radioactive gases such as radon.”~~

~~“Dust inhalation is also a potentially significant component of dose at the core shack. At this location, PAPR will not be required; however, dust levels should be monitored here too. An administrative level of respirable dust equal to ¼ of the ACGIH TLV of 0.27 mg/m³ has been assumed. Again, dust levels will be confirmed during the commissioning phase and the control system will be optimized to ensure that doses are ALARA. It may be possible to increase air exchange in the core shack, above the planned 6 exchanges per hour, should this be necessary. This would help also with radon exposure in the core shack.”~~

Radiation Protection Program documents, now in preparation, to be completed during licensing, will provide more detail regarding radiation protection processes and procedures.

Tables of the Worker Dose Assessment (in Section 3, Section 5, and Appendix A) will be revised as discussed above. The revised tables are shown below.

Table 3.1: Exposure Locations and Sources

| Location | Work Area | Source | Worker Function |
|---------------------|----------------------------------|-------------------------------|-----------------------------------|
| Wellfield | Wellfield drilling | Cuttings in drum | Driller 1 |
| | Pump houses | UBS in pump house piping | Wellfield Operator 1 |
| | UBS Pond | UBS in storage pond | Wellfield Operator 1 |
| | Wellfield piping | UBS in piping | Wellfield Operator 2 ^a |
| ISR Plant | Process Precipitate Removal Area | UBS feed tank | Plant Operator 1 ^a |
| | | Totes of filter cake | |
| | | Precipitate thickener | |
| | Yellowcake Precipitation Area | Yellowcake precipitation tank | Plant Operator 2 ^a |
| | | Yellowcake conveyor | |
| | | Yellowcake thickener | |
| | Water Treatment Area | WTP clarifier | Plant Operator 3 ^a |
| | Drying Area | Yellowcake | Plant Operator 4 ^a |
| | Packaging Loading Area | Yellowcake | Plant Operator 5 ^a |
| Site Ponds Pads | Special Waste Pad | Drill cuttings | Equipment Operator 1 |
| | Contaminated Landfill | none | Equipment Operator 1 |
| | Process Precipitate Pond | Process precipitate | Equipment Operator 1 |
| Site infrastructure | Core Shack | 3 cores | Geologist/Geotech Loggers |

(a) Operator and Maintenance worker have the same exposure characteristics

Table 3.2: Concentrations in Dust and Occupancy in Work Area for the Indoor and Outdoor Dust Inhalation Scenarios

| Work Area | Worker | Respirable Dust in Air (kg/m ³) | U-238 in Dust (Bq/kg) | Ra-226 in Dust (Bq/kg) | U-238 in Air (Bq/m ³) | Daily Occupancy h/d | Active months per year ^d |
|----------------------------------|-------------------------|---|-----------------------|------------------------|-----------------------------------|---------------------|-------------------------------------|
| Wellfield | Driller 1 | - | - | | 9.49E-04 ^a | 11 | 8 |
| Wellfield | Wellfield Operator 1, 2 | - | - | | 9.49E-04 ^a | 8 | 12 |
| Process Precipitate Removal Area | Plant Operator 1 | - | - | | 3.41E-03 ^a | 8 | 12 |
| Yellowcake Precip Area | Plant Operator 2 | - | - | | 3.41E-03 ^a | 8 | 12 |
| Water Treatment Area | Plant Operator 3 | - | - | | 3.41E-03 ^a | 8 | 12 |
| Drying Area | Plant Operator 4 | 4.00E-07 | 9.74E+06 | | 3.90E+00 ^b | 4 | 12 |
| Packaging Loading Area | Plant Operator 5 | 4.00E-07 | 9.74E+06 | | 3.90E+00 ^b | 4 | 12 |
| Special Waste Pad | Equipment Operator 1 | - | - | | 6.83E-03 ^a | 2 | 12 |
| Process Precipitate Pond | Equipment Operator 1 | - | - | | 9.95E-04 ^a | 4 | 12 |
| Contaminated Landfill | Equipment Operator 1 | - | - | | 4.25E-04 ^a | 3 | 12 |
| Core Shack | Geologist/ | 6.75E-08 | 2.99E+06 | 2.06E+06 | 2.02E-01 ^c | 11 | 6 |
| | Geotech Logger | | | | | | |

(a) U-238 (Bq/m³) in air calculated from IEC (2022) µg/m³ in outdoor air at each location, operations phase, with calciner

(b) U-238 in air shown for drying and packaging areas is an ambient concentration, based on a design value for dust in the main room of the drying area (0.5 mg/m³ total)

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- (c) U-238 in air for core shack based on an administrative level for respirable dust equal to ¼ of the ACGIH Threshold Limit Value (TLV); U-238 concentration in dust from ore assays by R and D Enterprises (2018)
- (d) Workers are assumed to work 20 days per month

Table 3.3: Concentrations of Radon and Occupancy in Work Area for the Indoor and Outdoor Radon Inhalation Scenarios

| Work Area | Worker | Source | Rn-222 in Air (Bq/m ³) | Daily Occupancy h/d | Active months per year ^b |
|----------------------------------|--------------------------|-----------|------------------------------------|---------------------|-------------------------------------|
| Wellfield | Driller 1 | Outdoor | 6.75E+01 ^a | 11 | 8 |
| Wellfield | Wellfield Operator 1, 2 | Outdoor | 6.75E+01 ^a | 8 | 12 |
| Process Precipitate Removal Area | Plant Operator 1 | Outdoor | 1.17E+02 ^a | 8 | 12 |
| | | Cake | 2.72E+01 | | |
| | | Thickener | 7.35E+02 | | |
| Yellowcake Precip Area | Plant Operator 2 | Outdoor | 1.17E+02 ^a | 8 | 12 |
| | | Thickener | 4.96E+02 | | |
| Water Treatment Area | Plant Operator 3 | Outdoor | 1.17E+02 ^a | 8 | 12 |
| | | Clarifier | 1.28E+02 | | |
| Drying Area | Plant Operator 4 | Outdoor | 1.17E+02 ^a | 4 | 12 |
| Packaging Loading Area | Plant Operator 5 | Outdoor | 1.17E+02 ^a | 4 | 12 |
| Special Waste Pad | Equipment Operator 1 | Outdoor | 8.82E+02 ^a | 2 | 12 |
| Process Precipitate Pond | Equipment Operator 1 | Outdoor | 9.03E+01 ^a | 4 | 12 |
| Contaminated Landfill | Equipment Operator 1 | Outdoor | 2.97E+01 ^a | 3 | 12 |
| Core Shack | Geologist/Geotech Logger | Outdoor | 6.75E+01 ^a | 11 | 6 |
| | | Cores | 1.18E+03 | | |

(a) Rn-222 (Bq/m³) in air taken from IEC (2022) value in outdoor air at each location, operations phase, with calciner

(b) Workers are assumed to work 20 days per month

Table 3.9: Exposure Factors for External Exposures.

| Location | Source ^a | Worker Function | h/d in area | h/d at 1 m | h/d at 5 m | h/d at 10 m | active months per year |
|-----------------|-----------------------------------|----------------------|-------------------|------------------|------------------|-------------------|---------------------------------|
| Wellfield | Cuttings in Drum | Driller 1 | 11 | 2 | 4 | 5 | 8 |
| | UBS Solution in pump house piping | Wellfield Operator 1 | 4 | 2 | 1 | 1 | 12 |
| | UBS solution in storage pond | Wellfield Operator 1 | 4 | 2 | 1 | 1 | 12 |
| | UBS Solution in piping | Wellfield Operator 2 | 8 | 4 | 2 | 2 | 12 |
| ISR Plant | UBS feed tank | Plant Operator 1 | 8 | 6 | 1 | 1 | 12 |
| | Totes of filter cake | | | | | | |
| | Precipitate Thickener | | | | | | |
| | Yellowcake precipitation tank | Plant Operator 2 | 8 | 6 | 1 | 1 | 12 |
| | Yellowcake conveyor | | | | | | |
| | Yellowcake Thickener | | | | | | |
| | WTP Clarifier | Plant Operator 3 | 8 | 6 | 1 | 1 | 12 |
| | Drying Area, Dryer | Plant Operator 4 | 4 | 0 | 3 | 1 | 12 |
| | Drying Area, Calciner | | | | | | |
| | Packaging/Loading Area | Plant Operator 5 | 4 | 0 | 3 | 1 | 12 |
| Site Ponds Pads | Special Waste Pad | Equipment Operator 1 | 2 | 0 | 2 | 0 | 12 |
| | none | Equipment Operator 1 | 3 | 0 | 2 | 1 | 12 |
| | Process Precipitate Pond | Equipment Operator 1 | 4 | 0 | 3 | 1 | 12 |

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| | | | | | | | |
|------------|---------|------------------------------|----|---|---|---|---|
| Core Shack | 3 cores | Geologist/Geotech Loggers | 11 | 2 | 8 | 1 | 6 |
|------------|---------|------------------------------|----|---|---|---|---|

(a) When there are several sources in one work area, the worker is assumed to divide his time roughly equally among those sources (see Appendix Table A.3).

Table 3.11: Geometries for External Exposure Scenarios Modelled in MicroShield for Sources in the ISR Plant



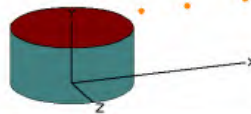

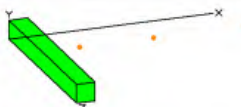
| Source | Geometry | Source Type | MicroShield Geometry | Volume (m ³) | Shielding Thickness (mm) | Shielding material | Source form | Density (kg/m ³) |
|------------------------------|--|-----------------------------------|--|--------------------------|--------------------------|--------------------|-------------|------------------------------|
| UBS Feed Tank | Height: 5.2m, diameter: 3.3m | UBS Feed |  | 4.45E+01 | 6.35 | Steel | Liquid | 1.00E+03 |
| Totes of Filter Cake | 3 totes of filter cake, each 1m height, 1m diameter | Process Precipitates |  | 3.00E+00 | 6.35 | PET | Cake | 1.88E+03 |
| Precipitate Thickener | Height: 5m, Diameter: 10m, drum 1.7m above the floor | Process Precipitates |  | 3.93E+02 | 6.35 | Steel | Slurry | 1.30E+03 |
| Precipitation Tank | Height: 5.2m, Diameter: 3.3m | Yellowcake Precipitation Solution |  | 4.45E+01 | 6.35 | Steel | Liquid | 1.00E+03 |
| Yellowcake in Screw conveyor | Height: 1m, Length: 10m, Width: 1m | UO ₄ |  | 1.00E+01 | 6.35 | Steel | Cake | 2.40E+03 |

Table 3.11: Geometries for External Exposure Scenarios Modelled in MicroShield for Sources in the ISR Plant (continued)

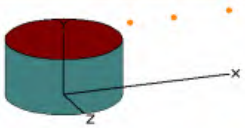
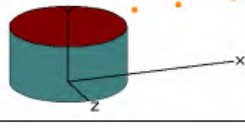
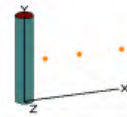
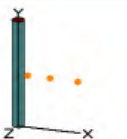
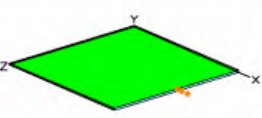
| Source | Geometry | Source Type | MicroShield Geometry | Volume (m ³) | Shielding Thickness (mm) | Shielding material | Source form | Density (kg/m ³) |
|----------------------|---|-----------------|--|--------------------------|--------------------------|--------------------|-------------|------------------------------|
| Yellowcake Thickener | Height: 5m, Diameter: 10m, drum 1.7m above the floor | UO ₄ |  | 3.93E+02 | 6.35 | Steel | Slurry | 1.30E+03 |
| WTP Clarifier | Height: 5m, Diameter: 10m, drum 1.7m above the floor | NA |  | 3.93E+02 | 6.35 | Steel | Slurry | 1.00E+03 |
| Dryer | Horizontal cylinder, Length: 10m, Diameter: 2m | UO ₄ |  | 3.14E+01 | 6.35 | Steel | powder | 2.03E+03 |
| Calciner | Horizontal cylinder, Length: 20m, Diameter: 2m | UO ₄ |  | 6.28E+01 | 6.35 | Steel | powder | 2.03E+03 |
| Drum Storage | 350 barrels on a pad, each height: 0.89m, diameter: 0.58m | UO ₄ |  | 1.08E+02 | 1.20 | Steel | powder | 1.71E+03 |

Table 5.1: Internal Annual Dose from Dust Inhalation

| Work Area | Worker | Effective Dose from Inhalation U-238 ⁺ (mSv/a) | Effective Dose from Inhalation Ra-226 ⁺ (mSv/a) | Total Effective Dose (mSv/a) |
|----------------------------------|-------------------------|---|--|------------------------------|
| Wellfield | Driller 1 | 5.21E-03 | - | 5.21E-03 ^a |
| Wellfield | Wellfield Operator 1, 2 | 5.68E-03 | - | 5.68E-03 ^a |
| Process Precipitate Removal Area | Plant Operator 1 | 2.04E-02 | - | 2.04E-02 ^a |
| Yellowcake Precip Area | Plant Operator 2 | 2.04E-02 | - | 2.04E-02 ^a |
| Water Treatment Area | Plant Operator 3 | 2.04E-02 | - | 2.04E-02 ^a |
| Drying Area | Plant Operator 4 | 1.17E+01 | - | 1.17E+01 ^b |
| Packaging Loading Area | Plant Operator 5 | 1.17E+01 | - | 1.17E+01 ^b |
| Special Waste Pad | Equipment Operator 1 | 1.02E-02 | - | 1.02E-02 ^{ac} |
| Process Precipitate Pond | Equipment Operator 1 | 2.98E-03 | - | 2.98E-03 ^{ac} |
| Contaminated Landfill | Equipment Operator 1 | 9.54E-04 | - | 9.54E-04 ^{ac} |
| Core Shack | Geologist/ | 5.63E+00 | 1.02E+00 | 6.65E-00 ^d |
| | Geotech Logger | | | |

(a) Based on outdoor concentration of U dust from IEC (2022); U-238⁺ DCF 2.60E-06 Sv/Bq from ICRP 137 includes U-238+U-234

(b) Based on indoor concentration of U dust, which dominates; U-238⁺ DCF 2.60E-06 Sv/Bq from ICRP 137 includes U-238+U-234

(c) Equipment Operator 1 frequents 3 locations; the 3 doses must be added for this worker

(d) Based on indoor concentration of ore dust, which dominates; U-238⁺ DCF 2.08E-05 Sv/Bq from ICRP 137 includes the entire U-238 series; doses shown for U-238⁺ and Ra-226⁺ reflect the portions from U-238 to Th-230, and from Ra-226 to Po-210, respectively.

Table 5.2: Internal Annual Dose from Radon Inhalation

| Work Area | Worker | Source | Dose from Radon in Air (mSv/a) | Total Radon Dose for Worker (mSv/a) |
|----------------------------------|-------------------------|-----------|--------------------------------|-------------------------------------|
| Wellfield | Driller 1 | Outdoor | 9.44E-02 ^a | 9.44E-02 |
| Wellfield | Wellfield Operator 1, 2 | Outdoor | 1.03E-01 ^a | 1.03E-01 |
| Process Precipitate Removal Area | Plant Operator 1 | Outdoor | 1.78E-01 ^a | 2.27E+00 |
| | | Cake | 7.47E-02 ^b | |
| | | Thickener | 2.02E+00 ^b | |
| Yellowcake Precip Area | Plant Operator 2 | Outdoor | 1.78E-01 ^a | 1.54E+00 |
| | | Thickener | 1.36E+00 ^b | |
| Water Treatment Area | Plant Operator 3 | Outdoor | 1.78E-01 ^a | 5.30E-01 |
| | | Clarifier | 3.52E-01 ^b | |
| Drying Area | Plant Operator 4 | Outdoor | 8.89E-02 ^a | 8.89E-02 |
| Packaging Loading Area | Plant Operator 5 | Outdoor | 8.89E-02 ^a | 8.89E-02 |
| Special Waste Pad | Equipment Operator 1 | Outdoor | 3.37E-01 ^a | 4.23E-01 |
| Process Precipitate Pond | Equipment Operator 1 | Outdoor | 6.89E-02 ^a | |
| Contaminated Landfill | Equipment Operator 1 | Outdoor | 1.70E-02 ^a | |
| Core Shack | Geologist/ | Outdoor | 7.08E-02 ^a | 2.30E+00 |
| | Geotech Logger | Cores | 2.23E+00 ^b | |

(a) Based on outdoor concentration of radon from IEC (2022)

(b) Based on an indoor source of radon to indoor air

Table 5.3: Effective Dose and Equivalent Dose to the Lens of the Eye for Workers from External Exposure

| Work Area | Worker | Source | By Exposure Scenario | | By Worker | |
|----------------------------------|----------------------|-------------------|-----------------------|-----------------------------|-----------------------|-----------------------------|
| | | | External Dose (mSv/a) | Dose to Lens of Eye (mSv/a) | External Dose (mSv/a) | Dose to Lens of Eye (mSv/a) |
| Wellfield | Driller 1 | Cuttings | 10.16 | 16.40 | 10.16 | 16.40 |
| Wellfield | Wellfield Operator 2 | Piping | 0.05 | 0.07 | 0.05 | 0.07 |
| | Wellfield Operator 1 | Pump House Piping | 0.24 | 0.34 | 0.53 | 0.81 |
| | | UBS Pond | 0.29 | 0.47 | | |
| Process Precipitate Removal Area | Plant Operator 1 | Feed Tank | 0.24 | 0.39 | 12.59 | 20.40 |
| | | Cake | 8.19 | 13.15 | | |
| | | Thickener | 4.16 | 6.86 | | |
| Yellowcake Precip Area | Plant Operator 2 | Precip Tank | 0.08 | 0.13 | 0.10 | 0.15 |
| | | Cake | 0.02 | 0.02 | | |
| | | Thickener | 0.001 | 0.001 | | |
| Water Treatment Area | Plant Operator 3 | Clarifier | 1.70 | 2.61 | 1.70 | 2.61 |
| Drying Area | Plant Operator 4 | Dryer | 0.002 | 0.002 | 0.004 | 0.004 |
| | | Calciner | 0.002 | 0.002 | | |
| Packaging Loading Area | Plant Operator 5 | Drums | 0.009 | 0.009 | 0.009 | 0.009 |
| Special Waste Pad | Equipment Operator 1 | Waste Pad | <0.0001 ^a | 0.0001 ^a | 5.68 | 9.33 |
| Process Precipitate Pond | Equipment Operator 1 | Precip Pond | 5.68 | 9.33 | | |
| Contaminated Landfill | Equipment Operator 1 | No source | 0.000 | 0.000 | | |

Annex 1 – FIRT IR Table – Technical Review of the **Wheeler River Project** draft EIS
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| | | | | | | |
|------------|------------------------------|-------|------|------|------|------|
| Core Shack | Geologist/ Geotech Logger | Cores | 2.02 | 3.25 | 2.02 | 3.25 |
|------------|------------------------------|-------|------|------|------|------|

(a) Dose to Equipment Operator 1 at the Special Waste Pad is mitigated by a 2m wide berm, which provides shielding.

Table 5.4: Total Dose from Internal and External Pathways for Workers

| Work Area | Worker | Internal Dose (mSv/a) | | External Dose (mSv/a) | Total Effective Dose (mSv/a) |
|----------------------------------|----------------------|-----------------------|----------|-----------------------|------------------------------|
| | | Dust | Radon | | |
| Wellfield | Driller 1 | 5.21E-03 | 9.44E-02 | 10.16 | 10.26 |
| Wellfield | Wellfield Operator 2 | 5.68E-03 | 1.03E-01 | 0.05 | 0.16 |
| | Wellfield Operator 1 | 5.68E-03 | 1.03E-01 | 0.53 | 0.64 |
| Process Precipitate Removal Area | Plant Operator 1 | 2.04E-02 | 2.27E+00 | 12.59 | 14.88 |
| Yellowcake Precip Area | Plant Operator 2 | 2.04E-02 | 1.54E+00 | 0.10 | 1.66 |
| Water Treatment Area | Plant Operator 3 | 2.04E-02 | 5.30E-01 | 1.70 | 2.25 |
| Drying Area | Plant Operator 4 | 1.17E+00 ^a | 8.92E-02 | 0.004 | 11.77 |
| Packaging Loading Area | Plant Operator 5 | 1.17E+00 ^a | 8.92E-02 | 0.009 | 11.78 |
| Special Waste Pad | Equipment Operator 1 | 1.02E-02 | 3.37E-01 | - ^b | 6.11 |
| Process Precipitate Pond | Equipment Operator 1 | 2.98E-03 | 6.89E-02 | 5.68 | |
| Contaminated Landfill | Equipment Operator 1 | 9.54E-04 | 1.70E-02 | - | |
| Core Shack | Geologist/ | 6.65E+00 ^a | 2.30E+00 | 2.02 | 10.97 |
| | Geotech Logger | | | | |

(a) Dust exposures in work area to be monitored and kept ALARA.

(b) External dose mitigated by a berm around the Special Waste Pad, which provides shielding

Appendix A Example Calculations

Table A.1: Dust Inhalation Dose Calculation

| Work Area | Worker | U-238 in Air (Bq/m ³) | Exposure Time (h/a) | DCF (Sv/Bq) | Total Effective Dose (mSv/a) |
|--------------------------|-------------------------|-----------------------------------|---------------------|-------------|------------------------------|
| Wellfield | Driller 1 | 9.49E-04 | 1760 | 2.60E-06 | 5.21E-03 |
| Wellfield | Wellfield Operator 1, 2 | 9.49E-04 | 1920 | 2.60E-06 | 5.68E-03 |
| Precipitate Removal Area | Plant Operator 1 | 3.41E-03 | 1920 | 2.60E-06 | 2.04E-02 |
| Yellowcake Precip Area | Plant Operator 2 | 3.41E-03 | 1920 | 2.60E-06 | 2.04E-02 |
| Water Treatment Area | Plant Operator 3 | 3.41E-03 | 1920 | 2.60E-06 | 2.04E-02 |
| Drying Area | Plant Operator 4 | 3.90E+00 | 960 | 2.60E-06 | 1.17E+01 |
| Packaging Loading Area | Plant Operator 5 | 3.90E+00 | 960 | 2.60E-06 | 1.17E+01 |
| Special Waste Pad | Equipment Operator 1 | 6.83E-03 | 480 | 2.60E-06 | 1.02E-02 |
| Precipitate Pond | Equipment Operator 1 | 9.95E-04 | 960 | 2.60E-06 | 2.98E-03 |
| Industrial Landfill | Equipment Operator 1 | 4.25E-04 | 720 | 2.60E-06 | 9.54E-04 |
| Core Shack | Geologist/ | 2.02E-01 | 1320 | 2.08E-05 | 6.65E+00 |
| | Geotech Logger | | | | |

Total Effective Dose (mSv/a) = C_{air} (Bq/m³) x I (m³/h) x ET (h/a) x DCF (Sv/Bq) x 1000 (mSv/Sv)

Notes:

Concentrations from indoor sources for Drying/Packaging and Core Shack

Concentrations in Drying and Packaging are respirable activity based on a design value for dust in the main room of the drying area (0.5 mg/m³ total)

DCFs (Sv/Bq) from ICRP 137: U238+U234 (2.60E-6); U238 to Po-210 (2.08E-5)

Inhalation Rate (I) from ICRP 119 is 1.2 m³/h

Table A.2: Radon Dose Calculation

| Work Area | Worker | Source | Radon in Air (Bq/m ³) | Exposure Time (h/a) | Equilibrium Factor F | Radon Dose (mSv/a) | Total (mSv/a) |
|----------------------------------|---------------------------|-----------|-----------------------------------|---------------------|----------------------|--------------------|---------------|
| Wellfield | Driller 1 | Outdoor | 6.75E+01 | 1760 | 0.10 | 9.44E-02 | 9.44E-02 |
| Wellfield | Wellfield Operator 1, 2 | Outdoor | 6.75E+01 | 1920 | 0.10 | 1.03E-01 | 1.03E-01 |
| Process Precipitate Removal Area | Plant Operator 1 | Outdoor | 1.17E+02 | 1920 | 0.10 | 1.78E-01 | 2.27E+00 |
| | | Cake | 2.72E+01 | 1920 | 0.18 | 7.47E-02 | |
| | | Thickener | 7.35E+02 | 1920 | 0.18 | 2.02E+00 | |
| Yellowcake Precip Area | Plant Operator 2 | Outdoor | 1.17E+02 | 1920 | 0.10 | 1.78E-01 | 1.54E+00 |
| | | Thickener | 4.96E+02 | 1920 | 0.18 | 1.36E+00 | |
| Water Treatment Area | Plant Operator 3 | Outdoor | 1.17E+02 | 1920 | 0.10 | 1.78E-01 | 5.30E-01 |
| | | Clarifier | 1.28E+02 | 1920 | 0.18 | 3.52E-01 | |
| Drying Area | Plant Operator 4 | Outdoor | 1.17E+02 | 960 | 0.10 | 8.89E-02 | 8.89E-02 |
| Packaging Loading Area | Plant Operator 5 | Outdoor | 1.17E+02 | 960 | 0.10 | 8.89E-02 | 8.89E-02 |
| Special Waste Pad | Equipment Operator 1 | Outdoor | 8.82E+02 | 480 | 0.10 | 3.37E-01 | 4.23E-01 |
| Process Precipitate Pond | Equipment Operator 1 | Outdoor | 9.03E+01 | 960 | 0.10 | 6.89E-02 | |
| Contaminated Landfill | Equipment Operator 1 | Outdoor | 2.97E+01 | 720 | 0.10 | 1.70E-02 | |
| Core Shack | Geologist/ Geotech Logger | Outdoor | 6.75E+01 | 1320 | 0.10 | 7.08E-02 | 2.30E+00 |
| | | Cores | 1.18E+03 | 1320 | 0.18 | 2.23E+00 | |

Radon Dose (mSv/a) = (C_{air} (Bq/m³)/3700 Bq/m³ per WL) x F x (ET (h/a)/170 h per WL) * 5 (mSv/a per WL)

Table A.3: External Dose Calculation

| Work Area | Worker | Source | Exposure Time (h/d) at: | | | Max Effective Dose (mSv/h) | | | Max Lens Dose (mSv/h) | | | Exp Days (d/a) | By Exposure Scenario | |
|--------------------------|---------------------------|-------------------|-------------------------|------|------|----------------------------|----------|----------|-----------------------|----------|----------|----------------|-----------------------|-----------------------------|
| | | | 1m | 5m | 10m | 1m | 5m | 10m | 1m | 5m | 10m | | External Dose (mSv/a) | Dose to Lens of Eye (mSv/a) |
| Wellfield | Driller 1 | Cuttings | 2 | 4 | 5 | 2.68E-02 | 1.86E-03 | 4.84E-04 | 4.33E-02 | 3.01E-03 | 7.82E-04 | 160 | 10.16 | 16.40 |
| Wellfield | Wellfield Operator 2 | Piping | 4 | 2 | 2 | 4.91E-05 | 9.10E-06 | 3.40E-06 | 6.85E-05 | 1.26E-05 | 4.68E-06 | 240 | 0.05 | 0.07 |
| | Wellfield Operator 1 | Pump House Piping | 2 | 1 | 1 | 4.74E-04 | 4.13E-05 | 1.08E-05 | 6.74E-04 | 5.81E-05 | 1.52E-05 | 240 | 0.24 | 0.34 |
| | | UBS Pond | 2 | 1 | 1 | 4.63E-04 | 1.80E-04 | 8.75E-05 | 7.59E-04 | 2.94E-04 | 1.43E-04 | 240 | 0.29 | 0.47 |
| Precipitate Removal Area | Plant Operator 1 | Feed Tank | 2.2 | 0.33 | 0.33 | 4.35E-04 | 8.51E-05 | 2.82E-05 | 7.13E-04 | 1.39E-04 | 4.60E-05 | 240 | 0.24 | 0.39 |
| | | Cake | 1.6 | 0.33 | 0.33 | 2.08E-02 | 1.92E-03 | 5.06E-04 | 3.34E-02 | 3.09E-03 | 8.14E-04 | 240 | 8.19 | 13.15 |
| | | Thickener | 2.2 | 0.33 | 0.33 | 7.17E-03 | 3.26E-03 | 1.43E-03 | 1.18E-02 | 5.34E-03 | 2.34E-03 | 240 | 4.16 | 6.86 |
| Yellowcake Precip Area | Plant Operator 2 | Precip Tank | 2 | 0.33 | 0.33 | 1.63E-04 | 3.18E-05 | 1.05E-05 | 2.65E-04 | 5.17E-05 | 1.71E-05 | 240 | 0.08 | 0.13 |
| | | Cake | 2 | 0.33 | 0.33 | 3.69E-05 | 7.89E-06 | 2.50E-06 | 3.69E-05 | 7.89E-06 | 2.50E-06 | 240 | 0.02 | 0.02 |
| | | Thickener | 2 | 0.33 | 0.33 | 2.33E-06 | 1.87E-06 | 8.74E-07 | 2.33E-06 | 1.87E-06 | 8.74E-07 | 240 | 0.001 | 0.001 |
| Water Treatment Area | Plant Operator 3 | Clarifier | 6 | 1 | 1 | 1.06E-03 | 5.03E-04 | 2.22E-04 | 1.63E-03 | 7.51E-04 | 3.30E-04 | 240 | 1.70 | 2.61 |
| Drying Area | Plant Operator 4 | Dryer | 0 | 1.5 | 0.5 | 9.12E-06 | 4.37E-06 | 1.55E-06 | 1.51E-05 | 4.37E-06 | 1.55E-06 | 240 | 0.002 | 0.002 |
| | | Calciner | 0 | 1.5 | 0.5 | 1.52E-05 | 5.10E-06 | 2.30E-06 | 1.52E-05 | 5.10E-06 | 2.30E-06 | 240 | 0.002 | 0.002 |
| Packaging Loading Area | Plant Operator 5 | Drums | 0 | 3 | 1 | 5.91E-05 | 1.19E-05 | 3.79E-06 | 5.91E-05 | 1.19E-05 | 3.79E-06 | 240 | 0.009 | 0.009 |
| Special Waste Pad | Equipment Operator 1 | Waste Pad | 0 | 2 | 0 | 1.02E-07 | 8.54E-08 | 5.86E-08 | 1.84E-07 | 1.55E-07 | 1.06E-07 | 240 | 4.10E-05 | 0.0001 |
| Precipitate Pond | Equipment Operator 1 | Waste Pond | 0 | 3 | 1 | 1.49E-02 | 6.78E-03 | 3.31E-03 | 2.45E-02 | 1.12E-02 | 5.43E-03 | 240 | 5.68 | 9.33 |
| Industrial Landfill | Equipment Operator 1 | No source | 0 | 3 | 0 | - | - | - | - | - | - | 240 | 0 | 0 |
| Core Shack | Geologist/ Geotech Logger | Cores | 2 | 8 | 1 | 6.59E-03 | 4.39E-04 | 1.12E-04 | 1.06E-02 | 7.09E-04 | 1.81E-04 | 120 | 2.02 | 3.25 |

External Dose (mSv/a) = [Σ ET (h/d) x Max Effective Dose (mSv/h)] x ED (d/a)

Dose to Lens (mSv/a) = [Σ ET (h/d) x Max Lens Dose (mSv/h)] x ED (d/a)

Notes:

Maximum dose rates at distance (mSv/h) are output from Microshield scenarios; highest value considering all possible orientations.

Skin dose was less than or equal to lens dose, depending on the scenario.

Attachment: IR-195

| | |
|---|---|
| Number | IR-195 |
| Dept. | ECCC |
| Project effects link | Change to an environmental component due to hazardous contaminants |
| Reference to EIS, appendices, or supporting documentation | Appendix 10-A (ERA), Section 3.1.2.1 |
| Context and Rationale | <p>Context: Figure 3-2 depicts modelled concentrations of COPCs in the receiving environment surface water during all Project phases. Effluent discharge rates during Operations and Decommissioning are not anticipated to differ significantly. However, COPC concentrations seem to decrease rapidly after the end of the operations period despite effluent releases continuing into the decommissioning phase.</p> <p>Rationale: There has been no information provided on predicted changes in effluent COPC concentrations and discharge rates during the decommissioning phase. It remains unclear how COPC concentrations would decrease so quickly following the end of operations.</p> |
| Information Requirement | <ol style="list-style-type: none"> 1. Provide further information on modelled maximum COPC concentrations for each individual Project phase with estimated timing for peak concentrations to appear in the receiving environment. 2. Provide further information on predicted effluent quality during the Project decommissioning phase. 3. Update ERA figures and conclusions as needed. |

Figures and tables to support response in IR table:

Table IR195-1: Modelled Maximum COPC Concentrations in Water by Individual Project Phase

| | Non-radionuclides during Operations Phase (mg/L) | | | | | | | | | | | |
|-----------------------|---|----------|-------------|----------|-------------|----------|------------|----------|----------|----------|--------------|----------|
| Location | Arsenic | Cadmium | Chloride | Cobalt | Chromium | Copper | Molybdenum | Sulphate | Selenium | Uranium | Vanadium | Zinc |
| Kratchkowsky Lake | 1.19E-04 | 2.38E-05 | 3.22E-01 | 1.01E-04 | 5.30E-04 | 6.22E-04 | 1.07E-04 | 6.87E-01 | 3.35E-05 | 3.12E-05 | 1.67E-04 | 7.00E-04 |
| Whitefish Lake North | 1.10E-04 | 2.34E-05 | 3.22E-01 | 1.01E-04 | 5.24E-04 | 6.20E-04 | 1.07E-04 | 6.87E-01 | 3.28E-05 | 3.05E-05 | 1.55E-04 | 6.89E-04 |
| Whitefish Lake Middle | 1.46E-04 | 3.97E-05 | 6.53E+00 | 1.29E-04 | 7.46E-04 | 8.22E-04 | 2.43E-02 | 5.80E+01 | 4.33E-04 | 5.74E-04 | 6.70E-04 | 1.06E-03 |
| Whitefish Lake South | 1.49E-04 | 3.86E-05 | 6.50E+00 | 1.28E-04 | 7.30E-04 | 8.17E-04 | 2.39E-02 | 5.78E+01 | 4.12E-04 | 5.46E-04 | 5.64E-04 | 1.03E-03 |
| McGowan Lake | 1.26E-04 | 3.27E-05 | 4.46E+00 | 1.19E-04 | 6.53E-04 | 7.50E-04 | 1.57E-02 | 3.89E+01 | 2.58E-04 | 3.37E-04 | 3.28E-04 | 9.00E-04 |
| Icelander River | 1.26E-04 | 3.26E-05 | 4.42E+00 | 1.19E-04 | 6.52E-04 | 7.48E-04 | 1.56E-02 | 3.85E+01 | 2.56E-04 | 3.33E-04 | 3.26E-04 | 8.98E-04 |
| Russell Lake Inlet | 1.22E-04 | 3.01E-05 | 3.46E+00 | 1.14E-04 | 6.17E-04 | 7.17E-04 | 1.18E-02 | 2.97E+01 | 1.95E-04 | 2.51E-04 | 2.68E-04 | 8.40E-04 |
| | Non-radionuclides during Decommissioning Phase (mg/L) | | | | | | | | | | | |
| Kratchkowsky Lake | 1.19E-04 | 2.38E-05 | 3.22E-01 | 1.01E-04 | 5.30E-04 | 6.22E-04 | 1.07E-04 | 6.87E-01 | 3.35E-05 | 3.12E-05 | 1.67E-04 | 7.00E-04 |
| Whitefish Lake North | 1.10E-04 | 2.34E-05 | 3.22E-01 | 1.01E-04 | 5.24E-04 | 6.20E-04 | 1.07E-04 | 6.87E-01 | 3.28E-05 | 3.05E-05 | 1.55E-04 | 6.89E-04 |
| Whitefish Lake Middle | 1.46E-04 | 3.97E-05 | 6.14E+00 | 1.29E-04 | 7.46E-04 | 8.22E-04 | 2.43E-02 | 3.87E+01 | 4.33E-04 | 5.74E-04 | 6.70E-04 | 1.06E-03 |
| Whitefish Lake South | 1.49E-04 | 3.86E-05 | 6.11E+00 | 1.28E-04 | 7.30E-04 | 8.17E-04 | 2.40E-02 | 3.85E+01 | 4.12E-04 | 5.47E-04 | 5.64E-04 | 1.03E-03 |
| McGowan Lake | 1.26E-04 | 3.28E-05 | 4.20E+00 | 1.19E-04 | 6.54E-04 | 7.50E-04 | 1.58E-02 | 2.60E+01 | 2.59E-04 | 3.38E-04 | 3.28E-04 | 9.01E-04 |
| Icelander River | 1.26E-04 | 3.26E-05 | 4.16E+00 | 1.19E-04 | 6.52E-04 | 7.49E-04 | 1.56E-02 | 2.57E+01 | 2.56E-04 | 3.34E-04 | 3.26E-04 | 8.99E-04 |
| Russell Lake Inlet | 1.22E-04 | 3.01E-05 | 3.26E+00 | 1.14E-04 | 6.17E-04 | 7.17E-04 | 1.18E-02 | 1.99E+01 | 1.95E-04 | 2.52E-04 | 2.69E-04 | 8.40E-04 |
| | Radionuclides during Operations Phase (Bq/L) | | | | | | | | | | | |
| Location | Uranium-238 | | Uranium-234 | | Thorium-230 | | Radium-226 | | Lead-210 | | Polonium-210 | |
| Kratchkowsky Lake | 3.85E-04 | | 3.85E-04 | | 1.01E-02 | | 5.70E-03 | | 6.22E-03 | | 6.33E-03 | |
| Whitefish Lake North | 3.77E-04 | | 3.77E-04 | | 1.01E-02 | | 5.63E-03 | | 5.68E-03 | | 5.78E-03 | |

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| | | | | | | |
|-----------------------|--|----------|----------|----------|----------|----------|
| Whitefish Lake Middle | 7.05E-03 | 7.05E-03 | 1.87E-02 | 6.87E-03 | 8.35E-03 | 6.71E-03 |
| Whitefish Lake South | 6.71E-03 | 6.71E-03 | 1.85E-02 | 6.73E-03 | 8.25E-03 | 7.22E-03 |
| McGowan Lake | 4.14E-03 | 4.14E-03 | 1.57E-02 | 6.32E-03 | 6.68E-03 | 6.23E-03 |
| Icelander River | 4.10E-03 | 4.10E-03 | 1.56E-02 | 6.32E-03 | 6.66E-03 | 6.20E-03 |
| Russell Lake Inlet | 3.08E-03 | 3.08E-03 | 1.43E-02 | 6.14E-03 | 6.41E-03 | 6.16E-03 |
| Location | Radionuclides during Decommissioning Phase (Bq/L) | | | | | |
| Kratchkowsky Lake | 3.85E-04 | 3.85E-04 | 1.01E-02 | 5.70E-03 | 6.22E-03 | 6.33E-03 |
| Whitefish Lake North | 3.77E-04 | 3.77E-04 | 1.01E-02 | 5.63E-03 | 5.68E-03 | 5.78E-03 |
| Whitefish Lake Middle | 7.05E-03 | 7.05E-03 | 1.87E-02 | 6.87E-03 | 8.36E-03 | 6.71E-03 |
| Whitefish Lake South | 6.72E-03 | 6.72E-03 | 1.85E-02 | 6.73E-03 | 8.25E-03 | 7.22E-03 |
| McGowan Lake | 4.15E-03 | 4.15E-03 | 1.57E-02 | 6.33E-03 | 6.68E-03 | 6.23E-03 |
| Icelander River | 4.11E-03 | 4.11E-03 | 1.56E-02 | 6.32E-03 | 6.66E-03 | 6.20E-03 |
| Russell Lake Inlet | 3.09E-03 | 3.09E-03 | 1.43E-02 | 6.14E-03 | 6.41E-03 | 6.16E-03 |

Table IR195-2: Modelled Maximum COPC Concentrations in Sediment by Individual Project Phase

| | Non-radionuclides during Operations Phase (mg/kg dw) | | | | | | | | | | |
|-----------------------|---|----------|-------------|----------|-------------|----------|------------|----------|----------|----------|--------------|
| Location | Arsenic | Cadmium | Chloride | Cobalt | Chromium | Copper | Molybdenum | Selenium | Uranium | Vanadium | Zinc |
| Kratchkowsky Lake | 8.35E+00 | 3.38E-01 | - | 2.52E-01 | 5.86E+00 | 1.85E+00 | 3.37E-01 | 6.22E-01 | 5.78E-01 | 1.12E+01 | 9.93E+00 |
| Whitefish Lake North | 8.35E+00 | 3.38E-01 | - | 2.52E-01 | 5.86E+00 | 1.85E+00 | 3.37E-01 | 6.22E-01 | 5.78E-01 | 1.12E+01 | 9.93E+00 |
| Whitefish Lake Middle | 1.07E+01 | 4.79E-01 | - | 3.02E-01 | 7.41E+00 | 2.28E+00 | 5.40E+01 | 4.90E+00 | 6.39E+00 | 3.40E+01 | 1.32E+01 |
| Whitefish Lake South | 1.03E+01 | 4.73E-01 | - | 3.02E-01 | 7.35E+00 | 2.28E+00 | 5.30E+01 | 4.70E+00 | 6.12E+00 | 3.06E+01 | 1.31E+01 |
| McGowan Lake | 9.33E+00 | 4.30E-01 | - | 2.88E-01 | 6.90E+00 | 2.16E+00 | 3.88E+01 | 3.33E+00 | 4.26E+00 | 2.08E+01 | 1.21E+01 |
| Russell Lake Inlet | 8.95E+00 | 4.06E-01 | - | 2.80E-01 | 6.63E+00 | 2.09E+00 | 2.95E+01 | 2.60E+00 | 3.26E+00 | 1.73E+01 | 1.15E+01 |
| Location | Non-radionuclides during Decommissioning Phase (mg/kg dw) | | | | | | | | | | |
| Kratchkowsky Lake | 8.35E+00 | 3.38E-01 | - | 2.52E-01 | 5.86E+00 | 1.85E+00 | 3.37E-01 | 6.22E-01 | 5.78E-01 | 1.12E+01 | 9.93E+00 |
| Whitefish Lake North | 8.35E+00 | 3.38E-01 | - | 2.52E-01 | 5.86E+00 | 1.85E+00 | 3.37E-01 | 6.22E-01 | 5.78E-01 | 1.12E+01 | 9.93E+00 |
| Whitefish Lake Middle | 1.10E+01 | 4.97E-01 | - | 3.05E-01 | 7.59E+00 | 2.31E+00 | 5.72E+01 | 5.48E+00 | 7.18E+00 | 3.72E+01 | 1.36E+01 |
| Whitefish Lake South | 1.05E+01 | 4.90E-01 | - | 3.04E-01 | 7.53E+00 | 2.30E+00 | 5.62E+01 | 5.26E+00 | 6.87E+00 | 3.33E+01 | 1.35E+01 |
| McGowan Lake | 9.47E+00 | 4.43E-01 | - | 2.90E-01 | 7.03E+00 | 2.18E+00 | 4.11E+01 | 3.71E+00 | 4.78E+00 | 2.22E+01 | 1.24E+01 |
| Russell Lake Inlet | 9.04E+00 | 4.15E-01 | - | 2.81E-01 | 6.73E+00 | 2.10E+00 | 3.13E+01 | 2.88E+00 | 3.64E+00 | 1.82E+01 | 1.17E+01 |
| | Radionuclides during Operations Phase (Bq/kg dw) | | | | | | | | | | |
| Location | Uranium-238 | | Uranium-234 | | Thorium-230 | | Radium-226 | | Lead-210 | | Polonium-210 |
| Kratchkowsky Lake | 7.14E+00 | | 7.14E+00 | | 2.32E+01 | | 6.51E+01 | | 3.74E+02 | | 3.80E+02 |
| Whitefish Lake North | 7.14E+00 | | 7.14E+00 | | 2.32E+01 | | 6.51E+01 | | 3.74E+02 | | 3.80E+02 |
| Whitefish Lake Middle | 7.85E+01 | | 7.85E+01 | | 3.77E+01 | | 7.46E+01 | | 5.41E+02 | | 5.42E+02 |
| Whitefish Lake South | 7.51E+01 | | 7.51E+01 | | 3.75E+01 | | 7.41E+01 | | 5.07E+02 | | 5.09E+02 |

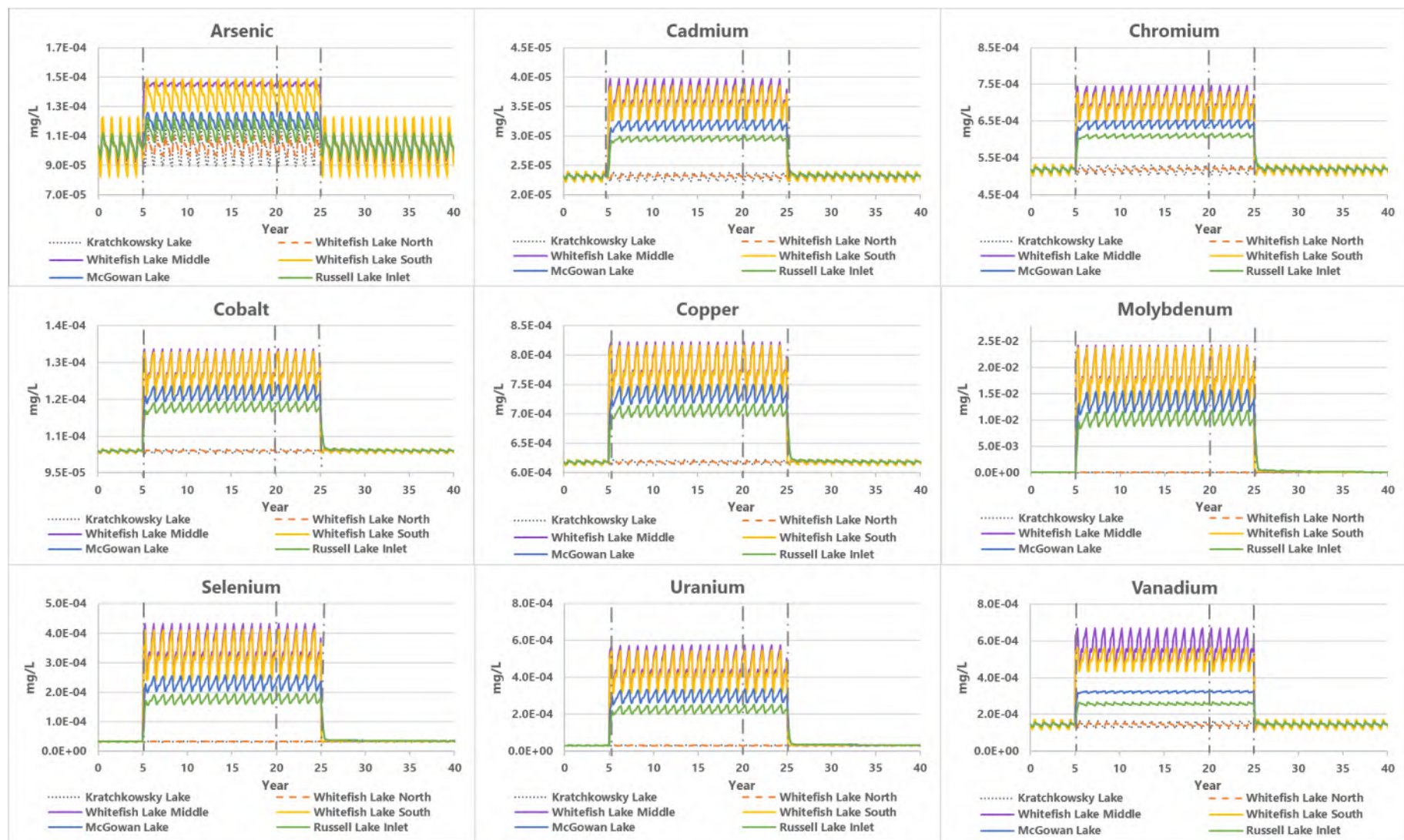
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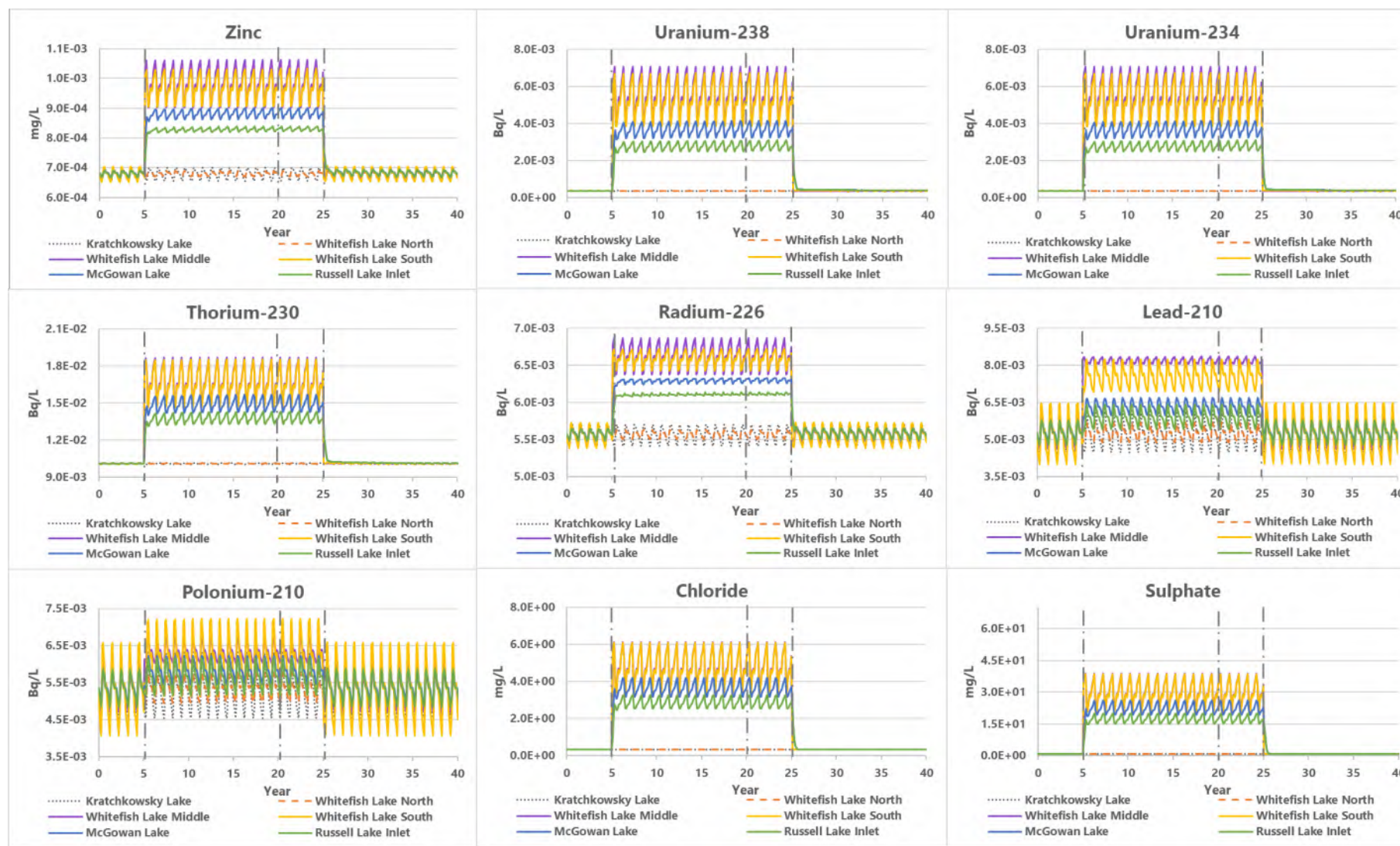
| | | | | | | |
|-----------------------|--|----------|----------|----------|----------|----------|
| McGowan Lake | 5.23E+01 | 5.23E+01 | 3.36E+01 | 7.15E+01 | 4.36E+02 | 4.41E+02 |
| Russell Lake Inlet | 4.01E+01 | 4.01E+01 | 3.11E+01 | 6.98E+01 | 4.11E+02 | 4.16E+02 |
| Location | Radionuclides during Decommissioning Phase (Bq/kg dw) | | | | | |
| Kratchkowsky Lake | 7.14E+00 | 7.14E+00 | 2.32E+01 | 6.51E+01 | 3.74E+02 | 3.80E+02 |
| Whitefish Lake North | 7.14E+00 | 7.14E+00 | 2.32E+01 | 6.51E+01 | 3.74E+02 | 3.80E+02 |
| Whitefish Lake Middle | 8.82E+01 | 8.82E+01 | 3.83E+01 | 7.57E+01 | 5.57E+02 | 5.58E+02 |
| Whitefish Lake South | 8.44E+01 | 8.44E+01 | 3.80E+01 | 7.52E+01 | 5.19E+02 | 5.22E+02 |
| McGowan Lake | 5.87E+01 | 5.87E+01 | 3.41E+01 | 7.23E+01 | 4.42E+02 | 4.47E+02 |
| Russell Lake Inlet | 4.48E+01 | 4.48E+01 | 3.15E+01 | 7.04E+01 | 4.14E+02 | 4.20E+02 |

Table IR195-2: Summary of Effluent Quality for the Wheeler River Project during Operations and Decommissioning Phase

| Constituent of Potential Concern (COPC) | Unit | Effluent Quality |
|---|------|------------------|
| General Chemistry | | |
| Chloride | mg/L | 600 |
| Sulphate | mg/L | 3915 |
| Total Dissolved Solids | mg/L | 6420 |
| Metals and Metalloids | | |
| Arsenic | mg/L | 0.006 |
| Cadmium | mg/L | 0.0018 |
| Chromium | mg/L | 0.025 |
| Cobalt | mg/L | 0.003 |
| Copper | mg/L | 0.022 |
| Molybdenum | mg/L | 2.5 |
| Selenium | mg/L | 0.042 |
| Uranium | mg/L | 0.057 |
| Vanadium | mg/L | 0.059 |
| Zinc | mg/L | 0.042 |
| Radionuclides | | |
| Uranium-238 | Bq/L | 0.7 |
| Uranium-234 | Bq/L | 0.7 |
| Thorium-230 | Bq/L | 0.9 |
| Radium-226 | Bq/L | 0.15 |
| Lead-210 | Bq/L | 0.419 |
| Polonium-210 | Bq/L | 0.15 |

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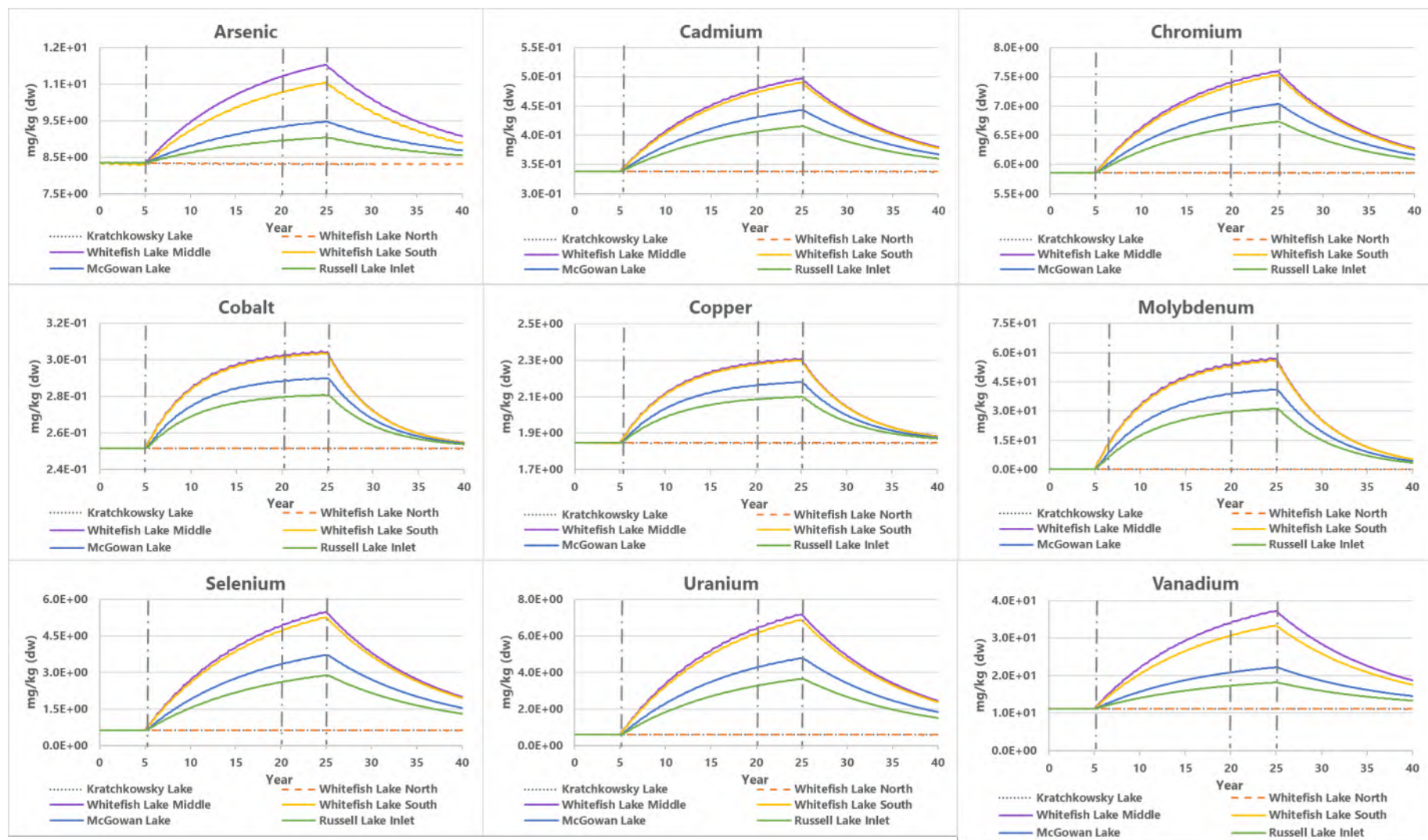




Long dash dot lines separate the time periods of project phases: 3 years baseline; 2 years construction; 15 years operations; 5 years decommissioning; first 15 years post-decommissioning

Figure IR195-1: Modelled Concentrations of COPCs in Water during Project Phases

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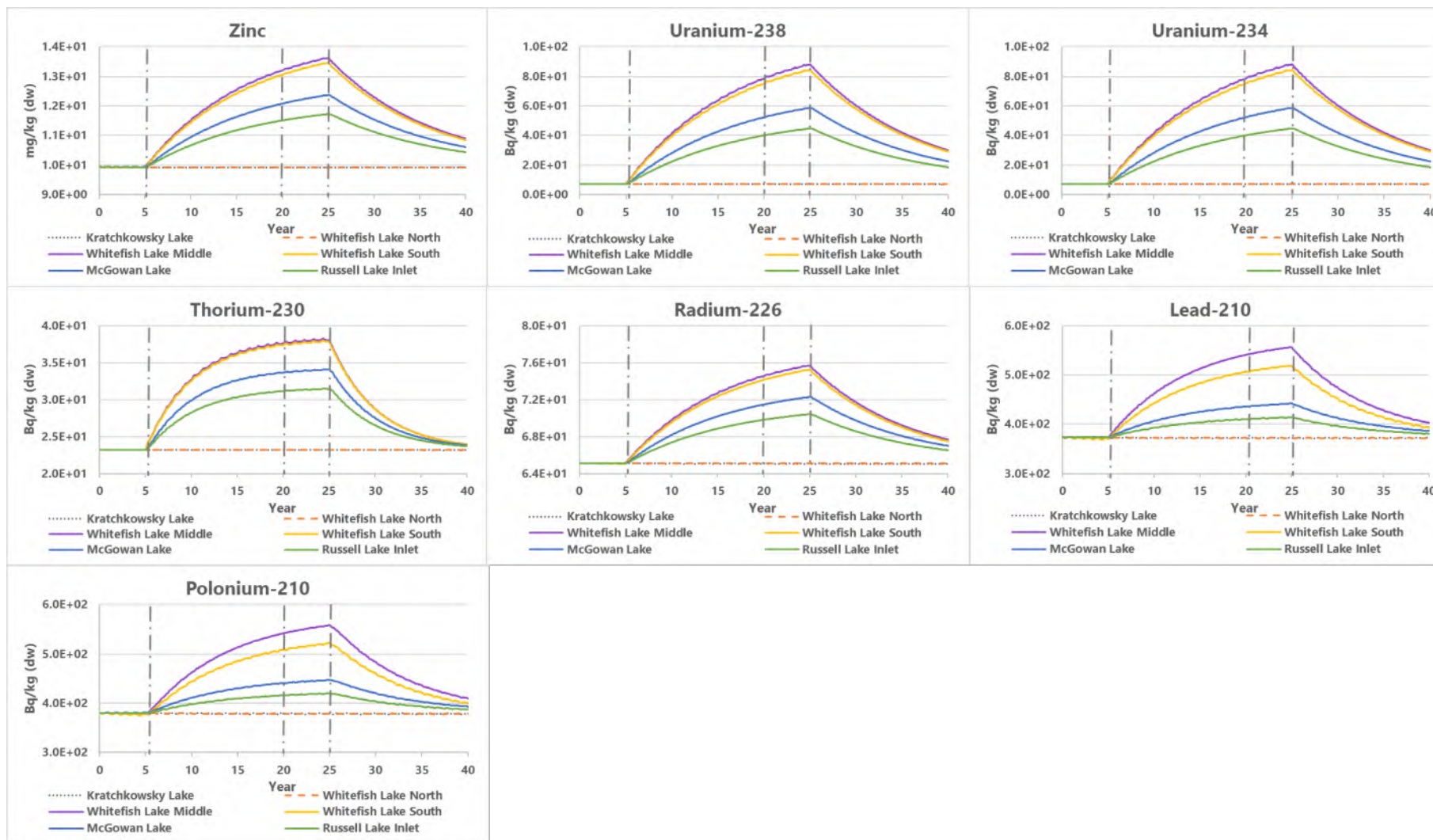


Figure IR195-2: Modelled Concentrations of COPCs in Sediment during Project Phases

Attachment: IR-196

| | |
|---|---|
| Number | IR-196 |
| Dept. | ECCC |
| Project effects link | Change to an environmental component due to hazardous contaminants |
| Reference to EIS, appendices, or supporting documentation | Appendix 10-A (ERA), Section 3.1.2.3 |
| Context and Rationale | <p>Context: Table 3-6 provides predicted maximum sediment concentrations of COPCs compared to sediment quality guidelines. Several selected sediment screening values are not the most stringent sediment quality guidelines, with no justification provided. Additionally, copper and lead appear to be missing guidelines that are available from the Burnett-Seidel and Liber (2013) study.</p> <p>Rationale: The most stringent guidelines should be used for the sediment quality risk assessment in the ERA. Use of the most stringent guidelines will allow the most protective assessment to analyze risks to the receiving environment, aquatic and terrestrial biota.</p> |
| Information Requirement | <ol style="list-style-type: none"> 1. Provide further information and justification for the selection of less stringent thresholds. 2. Update the ERA as needed. |

Updated Appendix 10-A Table 3-6 below (red text indicates a change from the existing table in the draft EIS) to support response in IR table:

| Table 3-6: Sediment Quality Screening for the Wheeler River Project | | | | | | | | | | |
|---|----------|---------------------------------|---|-------|--------------------------------|--------|---------------------|------|-----------------------------------|---|
| Constituent | Units | Maximum – Whitefish Lake (LA-5) | Sediment Quality Guidelines | | | | | | Selected Sediment Screening Value | Is Concentration Greater than Selected Screening Value? (Y/N) |
| | | | Burnett-Seidel and Liber ^(b) | | Thompson et al. ^(c) | | CCME ^(d) | | | |
| | | | REF | NE2 | LEL | SEL | ISQG | PEL | | |
| Metals and Metalloids | | | | | | | | | | |
| Arsenic | mg/kg dw | 10.7 | 21 | 522 | 9.8 | 346 | 5.9 | 17 | 21 | No |
| Cadmium | mg/kg dw | 0.48 | n/d | n/d | n/d | n/d | 0.6 | 3.5 | 0.6 | No |
| Chromium | mg/kg dw | 7.41 | 31.5 | 26.2 | 47.6 | 115.4 | 37.3 | 90 | 31.5 | No |
| Cobalt | mg/kg dw | 0.3 | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/a |
| Copper | mg/kg dw | 2.28 | 9.1 | 11.3 | 22 | 268.8 | 35.7 | 197 | 9.1 | No |
| Lead | mg/kg dw | 10.23 | 16.3 | 19.7 | 37 | 412 | 35 | 91.3 | 16.3 | No |
| Molybdenum | mg/kg dw | 53.99 | 23 | 245 | 14 | 1,239 | n/d | n/d | 23 | Yes |
| Nickel | mg/kg dw | 4 | 21 | 326 | 23 | 484 | n/d | n/d | 21 | No |
| Selenium | mg/kg dw | 4.9 | 3.6 | 30 | 1.9 | 16 | n/d | n/d | 3.6 | Yes |
| Uranium | mg/kg dw | 6.39 | 97 | 2,296 | 104 | 5,874 | n/d | n/d | 97 | No |
| Vanadium | mg/kg dw | 34.03 | 35.1 | 31.8 | 35.2 | 160 | n/d | n/d | 35.1 | No |
| Zinc | mg/kg dw | 13.2 | n/d | n/d | n/d | n/d | 123 | 315 | 123 | No |
| Radionuclides | | | | | | | | | | |
| Uranium-234 | Bq/kg dw | 78.53 | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/a |
| Uranium-238 | Bq/kg dw | 78.53 | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/a |
| Thorium-230 | Bq/kg dw | 37.71 | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/a |
| Radium-226 | Bq/kg dw | 74.55 | n/d | n/d | 600 | 14,400 | n/d | n/d | 600 | No |
| Lead-210 | Bq/kg dw | 540.82 | n/d | n/d | 900 | 20,800 | n/d | n/d | 900 | No |
| Polonium-210 | Bq/kg dw | 541.96 | n/d | n/d | 800 | 12,100 | n/d | n/d | 800 | No |
| Bold and Grey shading indicates sediment concentration exceeds the REF or LEL value. | | | | | | | | | | |
| a) Sediment concentrations predicted based on release of aqueous source-terms to LA-5 and interaction with sediment. Modelling performed in IMPACT according to the equations outlined in Appendix A. | | | | | | | | | | |

Attachment: IR-198

| | |
|---|--|
| Number | IR-198 |
| Dept. | HC |
| Project effects link | Change to an environmental component due to radiological contaminants |
| Reference to EIS, appendices, or supporting documentation | Appendix 10-A (ERA) Appendix B, Tables B.7 and B.8 Ref. 19-2638 Appendix 10-A (ERA), Table 4-3 Ref. 19-2638 (p. 4.17) |
| Context and Rationale | Context: Section 10 Appendix 10-A (ERA) contains Table 4-3 (p. 4.17), which lists ingestion rates for traditional foods and includes the category “organs” for Mammals. Tables B.7 and Table B.8 in Section 10 Appendix 10-A (ERA) Ref. 19-2638 provide the predicted concentrations of radionuclides for ecological receptors during the project phases and during future centuries, respectively. They list the concentrations of radionuclides in moose and in moose organs, which is presented as a single cumulative organ value. Other terrestrial and aquatic animals (such as the black bear and woodland caribou) that are a part of the traditional diet of nearby Indigenous communities have higher concentrations of radionuclides than moose, yet concentrations are not provided for organs of these species. Rationale: While Health Canada is not aware of transfer factors to individual organs, or to organs in animals that are not ruminants, it would be beneficial to have a better understanding of radionuclide concentrations in the organs of other animals that may be consumed by local Indigenous communities. |
| Information Requirement | 1. Provide more clarification on how the mammalian organ ingestion rates are calculated (which animals and relative contribution percentages). 2. Provide a rationale for why concentrations of radionuclides were not assessed in organs of animals (other than moose) that are consumed as country foods by Indigenous people harvesting in the area. |

Response:

1. Mammalian Organ Ingestion Rates

The derivation of the Traditional Foods diet is explained in detail in Section 4.2.4.2 of Appendix 10-A (ERA), which states: “A dietary study was performed for residents of Patuanak and La Plonge to understand which traditional foods were consumed by each community and the approximate amounts consumed. The results of the survey were summarized in CanNorth (2017) by average daily intake in grams (fresh weight) of country foods by species and season, for Patuanak, La Plonge, and an average. A summary of the ERFN traditional food ingestion rates by food type is shown in Table 4-3 and the proportions of food types are shown in Figure 4-3.”

As shown in Table 4-3 in Appendix 10-A the mammalian organ ingestion rate was 6.2 g/d for La Plonge, and 16.2 g/d for Patuanak, and the average was 12.8 g/d for both areas combined. A more detailed breakdown of organ types is provided in IR-198 Table 1 below which indicates that organs are consumed from moose, woodland caribou, and barren-ground caribou. As shown in IR-198 Table 1 below, the greatest contribution to the total organ ingestion rate is from moose organs. Looking at the total organ ingestion rate, approximately 80% of the contribution is from moose liver, kidney, and other parts (see IR-198 Figure 1 below); therefore, it was decided for the ERA to assign the total organ ingestion rate to moose organs.

2. Rationale for Concentrations of Radionuclides in Moose Organs Only

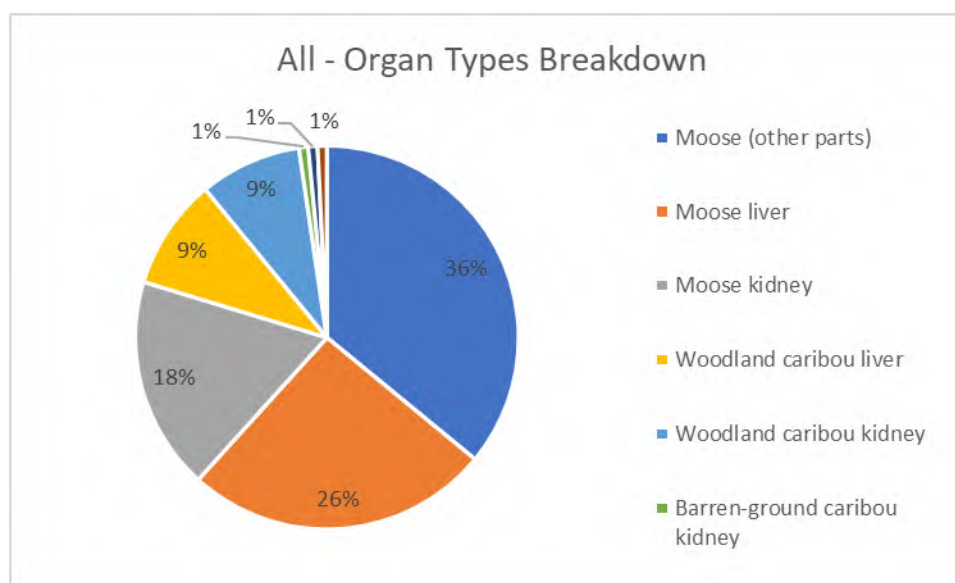
The reviewer also requested rationale for why concentrations of radionuclides are not provided for organs of animals other than moose. The reviewer acknowledges that they are “not aware of transfer factors to individual organs or to organs that are not ruminants, it would be beneficial to have a better understanding of radionuclide concentrations in the organs of other animals that may be consumed by local Indigenous communities.” The transfer factor for moose organs was scaled based on the beef organs transfer factor from CSA N288.1-20 (see Table 3-15 in Appendix A to Appendix 10-A). Limited literature data is available for transfer factors for organs. It was decided to represent organs with moose organs based on the results from the ERFN diet explained above.

Denison acknowledges that the ingestion transfer factors for woodland caribou organs would be higher than the transfer factors for moose. These ingestion transfer factors are summarized in IR-198 Table 2 below for the relevant radionuclides, and the resulting tissue concentrations based on predicted concentrations at McGowan Lake are summarized in IR-198 Table 3. The predicted tissue concentrations for woodland caribou organs ranges from about 0.6 to 6.9 times higher than the predicted tissue concentrations for moose organs for radionuclides in the U-238 decay chain. However, based on the breakdown of organ ingestion rates shown in IR-198 Table 1 below, the caribou organ intake rate is ¼ of the moose organ intake rate, which roughly offsets the higher concentrations in caribou organs. Therefore, representing the organ intake as 100% moose organs is a reasonable approximation.

No changes to the EIS or ERA (Appendix 10-A) were made based on the response to this IR.

IR-198 Table 1: Breakdown of Contribution of Organ Types to Total Organ Ingestion Rate

| Organ Types | La Plonge g/d | Patuanak g/d | All g/d | La Plonge % of Organs | Patuanak % of Organs | All % of Organs |
|------------------------------|------------------|-----------------|-------------|-----------------------------|----------------------------|-----------------------|
| Moose (other parts) | 2.4 | 5.7 | 4.6 | 39% | 35% | 36% |
| Moose liver | 1.8 | 4.1 | 3.3 | 29% | 25% | 26% |
| Moose kidney | 1.8 | 2.5 | 2.3 | 29% | 15% | 18% |
| Woodland caribou liver | 0.1 | 1.7 | 1.2 | 2% | 10% | 9% |
| Woodland caribou kidney | 0.05 | 1.7 | 1.1 | 1% | 10% | 9% |
| Barren-ground caribou kidney | | 0.2 | 0.1 | 0% | 1% | 1% |
| Barren-ground caribou liver | | 0.2 | 0.1 | 0% | 1% | 1% |
| Caribou (other parts) | 0.02 | 0.1 | 0.1 | 0% | 1% | 1% |
| Total Organs | 6.2 | 16.2 | 12.8 | 100% | 100% | 100% |



IR-198 Figure 1: Breakdown of Organ Types for ERFN Traditional Foods Diet

IR-198 Table 2: Ingestion Transfer Factors (d/kg fw) for Mammalian Organs

| Radionuclide | Beef Organs | Moose Organs | Woodland Caribou Organs |
|---------------------|--------------------|---------------------|--------------------------------|
| Body Weight (kg) | 600 | 400 | 180 |
| Uranium-238 | 6.90E-04 | 9.35E-04 | 1.70E-03 |
| Uranium-234 | 6.90E-04 | 9.35E-04 | 1.70E-03 |
| Thorium-230 | 6.30E-02 | 8.54E-02 | 1.55E-01 |
| Radium-226 | 9.50E-04 | 1.29E-03 | 2.34E-03 |
| Lead-210 | 2.20E-02 | 2.98E-02 | 5.43E-02 |
| Polonium-210 | 5.00E-05 | 6.78E-05 | 1.23E-04 |

IR-198 Table 3: Estimated Tissue Concentrations of Moose Organs and Woodland Caribou Organs at McGowan Lake

| Tissue Type | Units | U-238 | U-234 | Th-230 | Ra-226 | Pb-210 | Po-210 |
|-------------------------|--------------|--------------|--------------|---------------|---------------|---------------|---------------|
| Moose organs | mg/kg fw | 7.84E-02 | 7.84E-02 | 3.04E+00 | 8.76E-02 | 7.15E+00 | 1.31E-02 |
| Woodland caribou organs | mg/kg fw | 3.31E-01 | 3.31E-01 | 3.30E+00 | 5.46E-02 | 4.94E+01 | 7.50E-02 |

Attachment: IR-213

| | |
|---|---|
| Number | IR-217 |
| Dept. | CNSC |
| Project effects link | Accidents and Malfunctions |
| Reference to EIS, appendices, or supporting documentation | Sections 14.6.1 and 14.6.2 |
| Context and Rationale | <p>Context: Highway 914 crosses the Wheeler River 10 km southwest of the access road junction. A vehicle accident, including a rollover, collision, or run off road, at or near the bridge could potentially result in a release of uranium concentrate and release of fuels and chemicals into the surface water at this location. Denison believes that a release of uranium concentrate and a release of fuels and chemicals at this location would bound the releases at any other water crossing along the transportation corridor. However, no information on what other water crossings along the transportation corridor exist and how bounding scenarios 1 and 2 would bound the risk of releasing uranium concentrate and fuels and chemicals at other crossings.</p> <p>Rationale: The release of uranium concentrate and fuels and chemicals at water crossings would contaminate the water body at the crossings and pose a risk to the environment and public health.</p> |
| Information Requirement | Please provide information on all water crossings along the transportation corridor and justification why bounding scenarios 1 and 2 would bound the effects of the accidental releases of uranium concentrate and fuels and chemicals at these crossings. |

Table to support response in IR table:

Table 3-2 in Appendix A of Appendix 14-A will be updated in the final EIS to include (new) Scenario 2.4 Well Casing Yield and/or Damage:

| ID# | Accident / Malfunction | Phase | Consequence | Existing Safeguards / Design Features | L | S | RR / Significance | Screening Decision / Rationale |
|-----|--|---------|---|--|---|---|-------------------|--|
| 2.4 | Scenario 2.4 Well Casing Yield and/or Damage | Co / Op | Loss of lixiviant into the groundwater within freeze wall containment | Occupational health and safety plan Personnel training and orientation Personal protection equipment Spill management and response Secondary containment via freeze wall | 2 | 3 | Low | Risk level is low, moderate consequence event (assume localized event to ground where clean up is possible), no further assessment |

Notes: "Co" is construction
"Op" is operations
"De" is Decommissioning
"L" is likelihood
"S" is severity
"RR" is risk ranking

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Attachment: IR-214

| | |
|---|--|
| Number | IR-214 |
| Dept. | CNSC |
| Project effects link | Accidents and Malfunctions |
| Reference to EIS, appendices, or supporting documentation | Section 14.5.3 Appendix 14-A, section 3.2.3 |
| Context and Rationale | <p>Context: Hazard scenarios were identified using a systematic approach that considered the existence of sources of hazards and initiating events for the Project in consideration of Project activities and components. Details for how each of these project components and activities are considered in the initial hazard scenario identification process are provided in the accidents and malfunctions TSD (see Appendix 14-A; Ecometrix 2022).</p> <p>However, in Table 3-1 to Table 3-14 in Appendix A of Appendix 14-A, the following inconsistencies were identified:</p> <ul style="list-style-type: none"> i. consequences for the hazards ID# 1.1, 1.5, 1.7, 14.2 include occupational major injuries; however, the severity (S) is denoted as number 2 that appears to be inconsistent with consequence rating number in Figure 14.5-2 ii. Hazard ID# 1.5 has a L=2, but it is described as a highly unlikely event, which is inconsistent with the term in Figure 14.5-2 iii. Hazards ID# 3.6 and 3.7 have a L=1, but they are described as low probability event that is inconsistent with the term in Figure 14.5-2 iv. Hazards ID# 8.2, 8.3, 9.1, 10.1 to 10.5, 11.1, 11.5 have a L=1, but they are described as unlikely events, which are inconsistent with the term in Figure 14.5-2. Rationale needs to be provided how stockpile erosion is considered to have a L=1 v. Hazard ID# 12.1 has a L=2 and S=3, but it's risk ranking is moderate, which is inconsistent with the term in Figure 14.5-2 vi. Hazard ID# 13.3 has a L=2. Based on the operation experience in the similar projects in the northern Saskatchewan, ponds lining failure and leakage is a very likely event. Rationale needs to be provided to support L=2 or change the number for L. <p>Rationale: Inconsistent or inaccurate/incorrect information was included in Accidents and Malfunctions assessment.</p> |

| | |
|-------------------------|--|
| Information Requirement | Please clarify or correct all inconsistent and/or inaccurate information in Tables 3-1 to 3-14 in Appendix A of Appendix 14-A. |
|-------------------------|--|

Tables to support response to IR-214:

The updated hazard screening tables on the following pages are provided in support of the response to IR-214.

It is noted that the revisions highlighted do not affect the outcome of the screening evaluation and do not necessitate consideration of additional bounding scenarios by way or more detailed analyses.

Site Works - Summary – Nine potential scenarios have been identified. Risks have been characterized as low to moderate as it concerns environmental risks. No scenarios carried forward for quantitative assessment.

Table 3-1: Hazard Identification Evaluation – Site Works

| ID# | Accident / Malfunction | Phase | Consequence | Existing Safeguards / Design Features | L | S | RR / Significance | Screening Decision / Rationale |
|-----|--|--------------|-----------------------------|--|---|----|-------------------|--|
| 1.1 | Fall / slip | Co / Op / De | Occupational major injuries | Occupational health and safety plan Personnel training and orientation Personal protection equipment | 5 | 23 | ALARP, moderate | Best practice in worker health and safety program resulting in ALARP, no further assessment |
| 1.2 | Fall / slip | Co / Op / De | Occupational fatalities | Occupational health and safety plan Personnel training and orientation Personal protection equipment | 2 | 5 | ALARP, High | Best practice in worker health and safety program resulting in high but ALARP, no further assessment |
| 1.3 | Refuelling accident | Co / Op / De | Hydrocarbon release | Occupational health and safety plan Personnel training and orientation Personal protection equipment Spill management and response Secondary containment | 4 | 2 | Low | Overall Risk level is low, low-minor consequence event, no further assessment |
| 1.4 | Fuel storage failure | Co / Op / De | Hydrocarbon release | Occupational health and safety plan Personnel training and orientation Personal protection equipment Spill management and response Secondary containment | 1 | 3 | Low | Overall Risk level is low, highly unlikely event, no further assessment |
| 1.5 | Fuel storage and transfer fire and explosion | Co / Op / De | Occupational major injuries | Occupational health and safety plan Personnel training and orientation Personal protection equipment Fire safety plan and firefighting system | 2 | 23 | Low | Overall Risk level is low, highly-unlikely event, no further assessment |
| 1.6 | Fuel storage and transfer fire and explosion | Co / Op / De | Occupational fatalities | Occupational health and safety plan Personnel training and orientation Personal protection equipment Fire safety plan and firefighting system | 1 | 5 | ALARP, moderate | Best practice in worker health and safety program resulting in ALARP, no further assessment |
| 1.7 | Vehicle and construction equipment accident | Co / Op / De | Occupational major injuries | Occupational health and safety plan Personnel training and orientation Preventive and routine maintenance Onsite traffic control (speed limits, signage) | 4 | 2 | ALARP, moderate | Best practice in worker health and safety program resulting in ALARP, no further assessment |
| 1.8 | Vehicle and construction equipment accident | Co / Op / De | Occupational fatalities | Occupational health and safety plan Personnel training and orientation Preventive and routine maintenance Onsite traffic control | 2 | 5 | ALARP, High | Best practice in worker health and safety program resulting in high but ALARP, no further assessment |
| 1.9 | Vehicle accident | Co / Op / De | Hazardous materials spill | Occupational health and safety plan Personnel training and orientation Preventive and routine maintenance Onsite traffic control (speed limits, signage) Spill management and response | 4 | 2 | Low | Overall Risk level is low, minor consequence events, no further assessment |

Notes: "Co" is construction
"Op" is operations
"De" is Decommissioning
"L" is likelihood
"S" is severity
"RR" is risk ranking



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Editorial changes made to make terminology consistent with the hazard risk analysis matrix.

@mention or reply
- EcoMetrix

Per FIRT IR 214 updated severity to 3 (from 2) to reflect occupational injury. This change does not change the overall risk ranking of ALARP, moderate.

@mention or reply
- EcoMetrix

Per FIRT IR 214 updated severity to 3 (from 2) to reflect occupational injury. This change does not change the overall risk ranking of ALARP, moderate.

@mention or reply
- EcoMetrix

Updated severity to 3 (from 2) to reflect occupational injury. This change does not change the overall risk ranking of ALARP, moderate.

@mention or reply

Wellfield - Summary – Three potential scenarios have been identified. Risks have been characterized as low to moderate as it concerns environmental risks. No scenarios carried forward for quantitative assessment.

Table 3-2: Hazard Identification Evaluation – Drilling

| ID# | Accident / Malfunction | Phase | Consequence | Existing Safeguards / Design Features | L | S | RR / Significance | Screening Decision / Rationale |
|-----|----------------------------------|---------|---|---|---|---|-------------------|---|
| 2.1 | Drilling mud spill | Co / Op | Material spill to ground, including contaminated drill muds | Occupational health and safety plan Personnel training and orientation Personal protection equipment Spill management and response Primary and secondary containment for drilling mud | 4 | 2 | Low | Overall risk level is low, <u>low-minor</u> consequence event (assumes containment and clean up), no further assessment |
| 2.2 | Piping failure in the well field | Co / Op | Loss of lixiviant, UBS, and/or regents to ground | Occupational health and safety plan Personnel training and orientation Personal protection equipment Spill management and response Secondary containment via freeze wall | 2 | 3 | Low | Overall risk level is low, moderate consequence event (assume localized event to ground where clean up is possible prior to groundwater contamination), no further assessment |
| 2.3 | Surface flood | Co / Op | Potential for groundwater contamination | Lined collection points Site grading to collection areas Collection pond sized to accommodate PMP | 2 | 2 | Low | Overall risk level is low, <u>low-minor</u> consequence event, no further assessment |
| 2.4 | Well casing yield and/or damage | Co / Op | Loss of lixiviant into the groundwater within freeze wall containment | Occupational health and safety plan Personnel training and orientation Personal protection equipment Spill management and response Secondary containment via freeze wall | 2 | 3 | Low | Overall risk level is low, moderate consequence event (assume localized event to groundwater where cleanup is possible), no further assessment |

Notes: "Co" is construction
"Op" is operations
"De" is Decommissioning
"L" is likelihood
"S" is severity
"RR" is risk ranking


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Editorial changes made to make terminology consistent with the hazard risk analysis matrix.

Note: Table includes new scenario 2,4 FIRT IR 213.

August 16, 2023, 8:23 AM

Access Road / Land Transportation - Summary – Eight potential scenarios have been identified. Risks have been characterized as low to high as it concerns environmental risks. Two scenarios carried forward for quantitative assessment.

Table 3-3: Hazard Identification Evaluation – Access Road / Land Transportation (shaded rows are those recommended for further assessment)

| ID# | Accident / Malfunction | Phase | Consequences | Existing Safeguards / Design Features | L | S | RR / Significance | Screening Decision / Rationale |
|-----|--|--------------|---|--|---|---|-------------------|--|
| 3.1 | Vehicle accident including rollover, collision, run off road | Op | Aquatic release of radioactivity | Occupational health and safety plan Personnel training and orientation Traffic control measures Travel management plan Spill management and emergency response plan | 3 | 5 | High | Further Assessment Recommended |
| 3.2 | Vehicle accident including rollover, collision, run off road | Co / Op / De | Terrestrial release of radioactivity | Occupational health and safety plan Personnel training and orientation Traffic control measures Travel management plan Spill management and emergency response plan | 3 | 4 | ALARP, moderate | Best practice in terrestrial spill containment and cleanup resulting in ALARP, no further assessment |
| 3.3 | Vehicle accident including rollover, collision, run off road | Co / Op / De | Aquatic release of fuel, hazardous chemicals and reagents | Occupational health and safety plan Personnel training and orientation Traffic control measures Travel management plan Spill management and emergency response plan | 3 | 5 | High | Further Assessment Recommended |
| 3.4 | Vehicle accident including rollover, collision, run off road | Co / Op / De | Terrestrial release of fuel, hazardous chemicals and reagents | Occupational health and safety plan Personnel training and orientation Traffic control measures Travel management plan Spill management and emergency response plan | 3 | 4 | ALARP, moderate | Best practice in terrestrial spill containment and cleanup resulting in ALARP; Further Assessment Recommended to address interested party concerns (includes consideration of radioactivity) |
| 3.5 | Vehicle fire | Co / Op / De | Terrestrial release of hydrocarbons and fuel | Occupational health and safety plan Personnel training and orientation Travel management plan Spill and emergency response plan Spill management and emergency response plan | 1 | 4 | ALARP, moderate | Best practice in terrestrial spill containment and cleanup resulting in ALARP, no further assessment |
| 3.6 | Vehicle fire | Co / Op / De | Release of radioactivity to air | Occupational health and safety plan Personnel training and orientation Travel management plan Spill and emergency response plan Spill management and emergency response plan | 1 | 4 | ALARP, moderate | <u>Overall moderate (ALARP) low-risk, low-probability</u> highly unlikely event. Reversible and transient effect. No further assessment |
| 3.7 | Vehicle fire | Co / Op / De | Atmospheric release of particulate and combustion by-products | Occupational health and safety plan Personnel training and orientation Travel management plan Spill management and emergency response plan Fire safety plan and firefighting systems Ambient air monitoring | 1 | 3 | Low | <u>Overall low-low risk, highly unlikely-low-probability</u> event. Reversible and transient effect. No further assessment |
| 3.8 | Vehicle – Wildlife collision | Co / Op / De | Wildlife fatality | Occupational health and safety plan Personnel training and orientation Traffic control measures Travel management plan | 4 | 2 | Low | <u>Overall low risk</u> . Individual (not population) level <u>minor</u> effect, reversible and nonsignificant effect, no further assessment |

Notes: "Co" is construction
"Op" is operations
"De" is Decommissioning
"L" is likelihood
"S" is severity
"RR" is risk ranking

Airstrip - Summary – Four potential scenarios have been identified. Risks have been characterized as low to moderate as it concerns environmental risks. No scenarios carried forward for quantitative assessment.

Table 3-4: Hazard Identification Evaluation – Airstrip

| ID# | Accident / Malfunction | Phase | Consequence | Existing Safeguards / Design Features | L | S | RR / Significance | Screening Decision / Rationale |
|-----|---|--------------|--|---|---|---|-------------------|---|
| 4.1 | Fuel storage failure | Co / Op / De | Hydrocarbon release | Occupational health and safety plan Personnel training and orientation Storage inspection, maintenance Secondary containment Spill and emergency response plan | 1 | 3 | Low | Overall Risk level is low, highly unlikely event, no further assessment |
| 4.2 | Refuelling accident | Co / Op / De | Hydrocarbon release | Occupational health and safety plan Personnel training and orientation Secondary containment Spill and emergency response plan | 4 | 2 | Low | Overall Risk level is low, low-minor consequence event, no further assessment |
| 4.3 | Plane de-icing chemical release | Co / Op / De | Terrestrial release of reagent; possible aquatic release of reagent | Personnel training Containment Spill and emergency response plan | 3 | 2 | Low | Overall Risk level is low, low-minor consequence event, no further assessment |
| 4.4 | <u>Air plane</u> crash | Co / Op / De | Occupational major injuries / fatality Atmospheric release of particulate and combustion by-products Release of hydrocarbons and fuel Damage to mine infrastructure structure | Travel management plan Air traffic control Spill and emergency response plan Fire safety plan and firefighting systems Personnel training | 1 | 5 | ALARP, moderate | Low-likelihood Highly unlikely event, best practice in air traffic control resulting in ALARP, no further assessment |
| 4.5 | Ground vehicle – <u>air plane</u> collision | Co / Op / De | Occupational major injuries / fatality Atmospheric release of particulate and combustion by-products Release of hydrocarbons and fuel Damage to mine infrastructure structure | Travel management plan Air traffic control Ground traffic control Spill and emergency response plan Fire safety plan and firefighting systems Personnel training | 1 | 5 | ALARP, moderate | Low-Highly unlikely likelihood event, best practice in air / ground traffic control resulting in ALARP, no further assessment |

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"Op" is operations
"De" is Decommissioning
"L" is likelihood
"S" is severity
"RR" is risk ranking



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Editorial changes made to make terminology consistent with the hazard risk analysis matrix.

@mention or reply

Freeze plant - Summary – Five potential scenarios have been identified. Risks have been characterized as low to high as it concerns environmental risks. One scenario is carried forward for quantitative assessment.

Table 3-5: Hazard Identification Evaluation – Freeze plant (shaded rows are those recommended for further assessment)

| ID# | Accident / Malfunction | Phase | Consequence | Existing Safeguards / Design Features | L | S | RR / Significance | Screening Decision / Rationale |
|-----|------------------------------------|---------|---|---|---|---|-------------------|---|
| 5.1 | Ammonia storage and piping failure | Co / Op | Material spill | Occupational health and safety plan Personnel training and orientation Storage inspection, maintenance Secondary containment Spill and emergency response plan | 3 | 2 | Low | <u>Overall risk</u> level is low, <u>low-minor</u> consequence event, no further assessment |
| 5.2 | Loss of freeze capacity | Op | Loss of freeze wall and secondary underground containment | Freeze wall monitoring Monitoring wells outside of the freeze wall – temp, pressure Back up gensets | 1 | 5 | Moderate | Loss of containment of lixiviant outside mining chamber - Further Assessment Recommended. Denison does not believe a leak would occur however public perception of a loss of containment is of high concern and should be assessed. In practice, the mechanical failure of refrigeration system can be addressed and mitigated well before the thawing of the freeze wall which would take months. |
| 5.3 | Cooling line break | Co / Op | Release of brine below ground and potential for groundwater contamination | Occupational health and safety plan Personnel training and orientation Inspection and maintenance Remote monitoring system Spill and emergency response plan | 2 | 4 | ALARP, moderate | <u>Low likelihood</u> <u>Unlikely</u> event, best practice resulting in ALARP, no further assessment |
| 5.4 | Cooling line break | Co / Op | Release of brine on surface – potential for ground and groundwater contamination | Occupational health and safety plan Personnel training and orientation Inspection and maintenance Remote monitoring system Pipes in trenches and secondary containment Spill and emergency response plan | 2 | 2 | Low | <u>Overall Risk-risk</u> level is low, <u>low-minor</u> consequence event with appropriate response and mitigation, no further assessment |
| 5.5 | Pumps failure | Co / Op | Release of brine on surface - potential for surface and groundwater contamination | Occupational health and safety plan Personnel training and orientation Inspection and maintenance Remote monitoring system No open drain from pumphouse Spill and emergency response plan | 2 | 2 | Low | <u>Overall Risk-risk</u> level is low, <u>low-minor</u> consequence event with appropriate response and mitigation, no further assessment |

Notes: “Co” is construction
“Op” is operations
“De” is Decommissioning
“L” is likelihood
“S” is severity
“RR” is risk ranking



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@mention or reply

| Freeze wall - Summary – One potential scenario has been identified. Risks have been characterized as high as it concerns environmental risks. One scenario is carried forward for quantitative assessment. | | | | | | | | |
|--|--|-------|--|---|---|---|-------------------|--|
| Table 3-6: Hazard Identification Evaluation – Freeze wall | | | | | | | | |
| ID# | Accident / Malfunction | Phase | Consequence | Existing Safeguards / Design Features | L | S | RR / Significance | Screening Decision / Rationale |
| 6.1 | Failure of freeze wall due to seismic event / geotechnical instability | Op | Loss secondary underground containment and groundwater contamination | Freeze wall monitoring Redundancy in design Control of pump and injection wells | 2 | 4 | Moderate | Loss of containment of lixiviant outside mining chamber - Further Assessment Recommended |

Notes: “Co” is construction
“Op” is [operations](#)
“De” is Decommissioning
“L” is [likelihood](#)
“S” is [severity](#)
“RR” is risk [ranking](#)

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No changes needed.

@mention or reply

Production Plant - Summary – Seven potential scenarios have been identified. Risks have been characterized as low to high as it concerns environmental risks. Two scenarios are carried forward for quantitative assessment.

Table 3-7: Hazard Identification Evaluation – Production Plant (shaded rows are those recommended for further assessment)

| ID# | Accident / Malfunction | Phase | Consequence | Existing Safeguards / Design Features | L | S | RR / Significance | Screening Decision / Rationale |
|-----|--|-------|--|--|---|---|-------------------|--|
| 7.1 | Process vessel and piping system failure | Op | Release of sulphuric acid | Occupational health and safety plan Personnel training and orientation Inspection and maintenance Spill and emergency response plan Secondary containment Process sumps Production building is contained | 3 | 2 | Low | Overall low Moderate risk, low-minor consequence event, no further assessment |
| 7.2 | Process vessel and piping system failure | Op | Release of hydrogen peroxide and potential for fire | Occupational health and safety plan Personnel training and orientation Inspection and maintenance Spill and emergency response plan Secondary containment Process sumps Production building is contained | 3 | 2 | Low | Overall low Moderate risk, low-minor consequence event, no further assessment |
| 7.3 | Process vessel and piping system failure | Op | Release of magnesium hydroxide | Occupational health and safety plan Personnel training and orientation Inspection and maintenance Spill and emergency response plan Secondary containment Process sumps Production building is contained | 3 | 2 | Low | Overall low Moderate risk, low-minor consequence event, no further assessment |
| 7.4 | Process vessel and piping system failure, Thickener overflow | Op | Release of aqueous solution | Occupational health and safety plan Personnel training and orientation Inspection and maintenance Spill and emergency response plan Secondary containment Process sumps Production building is contained Detectable signs of exposure e.g., irritation | 3 | 2 | Low | Overall low Moderate risk, low-minor consequence event, no further assessment. ALARP |
| 7.5 | Process vessel and piping system failure | Op | Release of acidic fume from storage tank | Occupational health and safety plan Personnel training and orientation Inspection and maintenance Availability of respirators Emergency response plan will implement medical response to acute exposure to acidic fumes. Ambient monitoring Building ventilation | 3 | 2 | Low | Overall low Moderate risk, low-minor consequence event, no further assessment |
| 7.6 | Process vessel and piping system failure | Op | Release of radon from storage tank | Occupational health and safety plan Personnel training and orientation Inspection and maintenance Emergency response plan Ambient monitoring Building ventilation | 3 | 3 | Moderate | Overall moderate risk, moderate consequence event - Further Assessment Recommended |
| 7.7 | Facility fire / explosion | Op | Release of radioactivity and yellowcake powder to atmosphere | Occupational health and safety plan Personnel training and orientation Inspection and maintenance Fire safety plan and firefighting systems Emergency response plan Ambient air monitoring | 2 | 5 | High | Further Assessment Recommended. It is also noted that this scenario could be an outcome of many initiating events – the specific details associated with the event will be determined based on the most current inventory of combustible and flammable materials associated with the production plant when the analysis is completed. |
| 7.8 | Process containment and gas cleaning and filtration system failure | Op | Release of yellowcake powder to atmosphere | Inspection, testing, and maintenance program Ambient air monitoring | 3 | 4 | ALARP, moderate | The consequence is bounded by scenario 7.7. |

Notes: "Co" is construction
"Op" is operations
"De" is Decommissioning
"L" is likelihood
"S" is severity
"RR" is risk ranking



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@mention or reply

Clean Waste Rock Pads - Summary – Four potential scenarios have been identified. Risks have been characterized as low as it concerns environmental risks. No scenarios are carried forward for quantitative assessment.

Table 3-8: Hazard Identification Evaluation – Clean Waste Rock Pads

| ID# | Accident / Malfunction | Phase | Consequence | Existing Safeguards / Design Features | L | S | RR / Significance | Screening Decision / Rationale |
|-----|--|--------------|--|--|---|---|-------------------|---|
| 8.1 | Stockpile slope failure | Co / Op / De | Release of material into surrounding environment | Personnel training and orientation Inspection and maintenance | 2 | 2 | Low | Overall low risk, unlikely event due to small extent of stockpiles, no further assessment |
| 8.2 | Stockpile erosion | Co / Op / De | Release of materials into the environment | Personnel training and orientation Inspection and maintenance Single-lined pad Inspection and maintenance | 2 | 3 | Low | Overall low risk, highly unlikely event, no further assessment |
| 8.3 | Uncontrolled leachate / seepage release through runoff | Co / Op / De | Release of materials into the surface water | Personnel training and orientation Single-lined pad Inspection and maintenance Ambient monitoring Surface water management Spill management | 1 | 2 | Low | Overall low risk, highly unlikely event, no further assessment |
| 8.4 | Uncontrolled leachate / seepage release through lining failure | Co / Op / De | Release of materials into the groundwater | Personnel training and orientation Single-lined pad Inspection and maintenance Groundwater monitoring Spill response plan | 2 | 3 | Low | Overall low risk, unlikely event, no further assessment |

Notes: "Co" is construction
"Op" is operations
"De" is Decommissioning
"L" is likelihood
"S" is severity
"RR" is risk ranking

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Editorial changes made to make terminology consistent with the hazard risk analysis matrix.
@mention or reply

EcoMetrix
Though not captured by the FIRT IR the Likelihood rating of Scenarios 8.1 and 8.2 were inadvertently reversed. That's has been corrected and the revised Likelihood rating for Scenario 8.1 is "highly unlikely", score 1 and the revised Likelihood rating for Scenario 8.2 is "unlikely", score 2.
August 16, 2023, 9:11 AM
@mention or reply

EcoMetrix
Though not captured by the FIRT IR the Likelihood rating of Scenarios 8.1 and 8.2 were inadvertently reversed. That's has been corrected and the revised Likelihood rating for Scenario 8.1 is "highly unlikely", score 1 and the revised Likelihood rating for Scenario 8.2 is "unlikely", score 2.
With Specific reference FIRT IR 214(IV) it is believed that that the revised scoring "unlikely" better reflects the event likelihood. Stockpile erosion may not be uncommon but stockpile erosion that would lead to an environmental release as envisioned by the scenario in consideration of the design basis is deemed unlikely.
August 16, 2023, 9:12 AM
@mention or reply

Special / Specialized Waste Containment - Summary – Two potential scenarios have been identified. Risks have been characterized as low to moderate as it concerns environmental risks. No scenarios are carried forward for quantitative assessment.

Table 3-9: Hazard Identification Evaluation –Special / Specialized Waste Rock Pads

| ID# | Accident / Malfunction | Phase | Consequence | Existing Safeguards / Design Features | L | S | RR / Significance | Screening Decision / Rationale |
|-----|---|-------------|--|---|---|---|-------------------|--|
| 9.1 | Loss of containment from storage vessels (barrels) resulting in uncontrolled leachate release | Co / Op /De | Release of contaminants into the surface water | Personnel training and orientation Double lined with leak detection/collection Inspection and maintenance Ambient monitoring Surface water management Spill management | 1 | 3 | Low | Overall low low risk, highly unlikely event, no further assessment |
| 9.2 | Loss of containment from storage vessels (barrels) resulting in uncontrolled leachate release | Co / Op /De | Release of contaminants into the groundwater | Personnel training and orientation Double lined with leak detection/collection Inspection and maintenance Groundwater monitoring Spill response plan | 1 | 4 | ALARP, moderate | Best management practice results in ALARP, highly unlikely event, no further assessment |

Notes: "Co" is construction
"Op" is [operations](#)
"De" is Decommissioning
"L" is [likelihood](#)
"S" is [severity](#)
"RR" is risk [ranking](#)



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Editorial changes made to make terminology consistent with the hazard risk analysis matrix.

@mention or reply

Gypsum (clean) Precipitates Disposal Area - Summary – Five potential scenarios have been identified. Risks have been characterized as low as it concerns environmental risks. No scenarios are carried forward for quantitative assessment.

Table 3-10: Hazard Identification Evaluation – Gypsum (clean) Precipitates Disposal Area

| ID# | Accident / Malfunction | Phase | Consequence | Existing Safeguards / Design Features | L | S | RR / Significance | Screening Decision / Rationale |
|------|--|-------------|--|--|---|---|-------------------|--|
| 10.1 | Precipitates erosion | Co / Op /De | Release of contaminants into surrounding environment | Personnel training and orientation Single-lined pad Inspection and maintenance | 1 | 2 | Low | Overall low -low risk, highly unlikely event, no further assessment |
| 10.2 | Uncontrolled leachate / seepage release through runoff | Co / Op /De | Release of contaminants into the environment | Personnel training and orientation Single-lined pad Inspection and maintenance Surface water monitoring Surface water management Spill management and response plan | 1 | 2 | Low | Overall low -low risk, highly unlikely event, no further assessment |
| 10.3 | Uncontrolled leachate / seepage release through lining failure | Co / Op /De | Release of contaminants into the surface water | Personnel training and orientation Single-lined pad Inspection and maintenance Surface water monitoring Surface water management Spill management and response plan | 1 | 2 | Low | Overall low -low risk, highly unlikely event, no further assessment |
| 10.4 | Uncontrolled leachate / seepage release through lining failure | Co / Op /De | Release of contaminants into the groundwater | Personnel training and orientation Single-lined pad Inspection and maintenance Groundwater monitoring Spill management and response plan | 1 | 3 | Low | Overall low -low risk, highly unlikely event, no further assessment |
| 10.5 | Wind erosion | Co / Op /De | Atmospheric release of contaminants | Personnel training and orientation Erosion control measures Inspection and maintenance Ambient air monitoring Response plan | 1 | 3 | Low | Overall low -low risk, highly unlikely event, no further assessment |

Notes: "Co" is construction
"Op" is [operations](#)
"De" is Decommissioning
"L" is [likelihood](#)
"S" is [severity](#)
"RR" is risk [ranking](#)



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Editorial changes made to make terminology consistent with the hazard risk analysis matrix.

@mention or reply

Iron (contaminated) Precipitates Disposal Area – Summary – Five potential scenarios have been identified. Risks have been characterized as low to moderate as it concerns environmental risks. No scenarios are carried forward for quantitative assessment.

Table 3-11: Hazard Identification Evaluation – Iron (contaminated) Precipitates Disposal Area

| ID# | Accident / Malfunction | Phase | Consequence | Existing Safeguards / Design Features | L | S | RR / Significance | Screening Decision / Rationale |
|------|--|--------------|--|---|---|---|-------------------|---|
| 11.1 | Precipitates erosion | Co / Op / De | Release of contaminants into surrounding environment | Personnel training and orientation Double lined with leak detection/collection Inspection and maintenance | 1 | 3 | Low | Overall low -low risk, highly unlikely event, no further assessment |
| 11.2 | Uncontrolled leachate / seepage release through runoff | Co / Op / De | Release of contaminants into the environment | Personnel training and orientation Double lined with leak detection/collection Inspection and maintenance Surface water monitoring Surface water management Spill management and response plan | 1 | 5 | ALARP, moderate | Best management practice results in ALARP, highly unlikely event, no further assessment |
| 11.3 | Uncontrolled leachate / seepage release through lining failure | Co / Op / De | Release of contaminants into the surface water | Personnel training and orientation Double lined with leak detection/collection Inspection and maintenance Surface water monitoring Surface water management Spill management and response plan | 1 | 5 | ALARP, moderate | Best management practice results in ALARP, highly unlikely event, no further assessment |
| 11.4 | Uncontrolled leachate / seepage release through lining failure | Co / Op / De | Release of contaminants into the groundwater | Personnel training and orientation Double lined with leak detection/collection Inspection and maintenance Groundwater monitoring Spill management and response plan | 1 | 5 | ALARP, moderate | Best management practice results in ALARP, highly unlikely event, no further assessment |
| 11.5 | Wind erosion | Co / Op / De | Atmospheric release of contaminants | Personnel training and orientation Erosion control measures Inspection and maintenance Ambient air monitoring Response plan | 1 | 3 | Low | Overall low -low risk, highly unlikely event, no further assessment |

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"Op" is operations
"De" is Decommissioning
"L" is likelihood
"S" is severity
"RR" is risk ranking



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Editorial changes made to make terminology consistent with the hazard risk analysis matrix.

@mention or reply

Wastewater Treatment System - Summary – Three potential scenarios have been identified. Risks have been characterized as low to moderate as it concerns environmental risks. No scenarios are carried forward for quantitative assessment.

Table 3-12: Hazard Identification Evaluation – Wastewater Treatment System

| ID# | Accident / Malfunction | Phase | Consequence | Existing Safeguards / Design Features | L | S | RR / Significance | Screening Decision / Rationale |
|------|--------------------------------------|---------|--|---|---|---|----------------------------|---|
| 12.1 | Equipment / piping failure | Op / De | Contaminant and radioactivity release | Occupational health and safety plan Personnel training and orientation Piping design pressure higher than pumps shutoff pressure Inspection and maintenance Process monitoring Spill management and response | 2 | 3 | ALARP, <u>moderate/low</u> | Best management practice results in ALARP, containment of the piping within the ditches indicates no further assessment |
| 12.2 | Effluent clarifier overflow | Op / De | Contaminant and radioactivity release | Occupational health and safety plan Personnel training and orientation Inspection and maintenance Process monitoring Secondary containment Spill management and response | 2 | 3 | ALARP, <u>moderate/low</u> | Best management practice results in ALARP, no further assessment |
| 12.3 | Equipment and control system failure | Op / De | Release of reagents, Environmental contamination | Occupational health and safety plan Personnel training and orientation Inspection and maintenance Process monitoring Recirculation of off-spec water to the process Spill management and response | 2 | 3 | Low | Low risk, unlikely event, no further assessment |

Notes: "Co" is construction
"Op" is operations
"De" is Decommissioning
"L" is likelihood
"S" is severity
"RR" is risk ranking

EcoMetrix

Changes made to make overall risk ranking consistent with the hazard risk analysis matrix. Originally, scenarios 12.1 and 12.2 were "moderate" but should have been ranked "low" based on L=2 and S=3.
August 16, 2023, 8:47 AM

@mention or reply

Ponds and Retention Berms - Summary – Five potential scenarios have been identified. Risks have been characterized as low to moderate as it concerns environmental risks. No scenarios are carried forward for quantitative assessment.

Table 3-13: Hazard Identification Evaluation – Ponds and Retention Berms

| ID# | Accident / Malfunction | Phase | Consequence | Existing Safeguards / Design Features | L | S | RR / Significance | Screening Decision / Rationale |
|------|---|---------|--|---|---|---|---------------------|---|
| 13.1 | Pond overtopping | Op / De | Contaminant and radioactivity release | Personnel training and orientation Inspection and maintenance Surface water management Ponds designed for PMP/PMF Spill and emergency response plan Monitoring | 2 | 3 | Low | Overall low risk, low-probability unlikely event, no further assessment |
| 13.2 | Ponds containment or embankment failure | Op / De | Contaminant and radioactivity release | Personnel training and orientation Inspection and maintenance Surface water management Ponds designed for PMP/PMF Spill and emergency response plan Monitoring | 1 | 5 | ALARP, moderate | Best engineering practice in maintenance and inspection of the containment systems and berms. No further assessment |
| 13.3 | Ponds lining failure and leakage | Op / De | Contaminant and radioactivity release to groundwater | Personnel training and orientation Inspection and maintenance Groundwater monitoring Response plan | 2 | 3 | ALARP, moderate/low | Overall moderate/low risk, low-probability likely event with moderate consequence. Overall risk considered ALARP given engineering design and other safeguards. No further assessment recommended. |
| 13.4 | Surface flooding | Op / De | Contaminant and radioactivity release | Personnel training and orientation Inspection and maintenance Surface water management Ponds designed for PMP/PMF Spill and emergency response plan Monitoring | 1 | 3 | Low | Overall low risk, low-probability highly unlikely event, no further assessment |
| 13.5 | Wildlife entering pond | Op/De | Exposure to contaminants, drowning | Wildlife management plan Inspection Fencing | 1 | 2 | Low | Overall low/low risk, low-probability highly unlikely event, no further assessment |

Notes: "Co" is construction
"Op" is operations
"De" is Decommissioning
"L" is likelihood
"S" is severity
"RR" is risk ranking



EcoMetrix
Editorial changes made to make terminology consistent with the hazard risk analysis matrix.
@mention or reply



EcoMetrix
Per FIRT IR 214 the likelihood score has been revised from L=2 (unlikely) to L=3 (likely) and therefore overall risk has been updated to ALARP, moderate from Low.
Based on information received from manufactures and the project team's own experience it is thought the L=3 (≤1 occurrence in 10 years and >1 occurrence in 100 years) may better reflect liner performance, assuming the liner is installed based on appropriate design criteria and used as intended.
August 16, 2023, 10:34 AM
@mention or reply

Electrical System and Power Plant - Summary – Three potential scenarios have been identified. Risks have been characterized as low to moderate as it concerns environmental risks. No scenarios are carried forward for quantitative assessment.

Table 3-14: Hazard Identification Evaluation – Electrical System and Power Plant

| ID# | Accident / Malfunction | Phase | Consequence | Existing Safeguards / Design Features | L | S | RR / Significance | Screening Decision / Rationale |
|------|--|--------------|--|---|---|----|---------------------|---|
| 14.1 | Substation transformer leak | Co / Op / De | Release of mineral oil and potential for groundwater contamination | Personnel training and orientation Inspection and maintenance Spill and emergency response plan Secondary containment | 3 | 2 | Low | Overall low risk, low-minor consequence, no further assessment |
| 14.2 | Transformer, turbine, generator fire / explosion | Co / Op / De | Occupational major injuries | Personnel training and orientation Occupational health and safety program Personal protection equipment Inspection and maintenance Emergency response plan Fire safety plan and firefighting systems | 2 | 23 | ALARP, moderate/low | Best practice in worker health and safety program resulting in ALARP, no further assessment |
| 14.3 | Transformer, turbine, generator fire / explosion | Co / Op / De | Occupational fatalities | Personnel training and orientation Occupational health and safety program Personal protection equipment Inspection and maintenance Emergency response plan Fire safety plan and firefighting systems | 1 | 5 | ALARP, moderate | Best practice in worker health and safety program resulting in ALARP, no further assessment |

Notes: "Co" is construction
"Op" is operations
"De" is Decommissioning
"L" is likelihood
"S" is severity
"RR" is risk ranking

EcoMetrix ...
Per FIRT IR 214, updated severity to 3 (from 2) to reflect occupational injury.
Also, originally the overall risk ranking was ALARP, moderate - this has been revised to ALARP, low consistent with the hazard analysis risk matrix.
August 16, 2023, 9:18 AM
@mention or reply

EcoMetrix ...
Editorial changes made to make terminology consistent with the hazard risk analysis matrix. Also, change made to make overall risk ranking consistent with the hazard risk analysis matrix. Originally, scenario 14.2 was "moderate" but should have been ranked "low" based on L=2 and S=2.
August 16, 2023, 8:52 AM
@mention or reply

Fire Protection System - Summary – Two potential scenarios have been identified. Risks have been characterized as low as it concerns environmental risks. No scenarios are carried forward for quantitative assessment.

Table 3-15: Hazard Identification Evaluation – Fire Protection System

| ID# | Accident / Malfunction | Phase | Consequence | Existing Safeguards / Design Features | L | S | RR / Significance | Screening Decision / Rationale |
|------|----------------------------|--------------|-------------------------------|--|---|---|-------------------|---|
| 15.1 | Failure of fire pump | Co / Op / De | Loss of firefighting capacity | Personnel training and orientation Occupational health and safety program Personal protection equipment Inspection and maintenance Redundancy Fire safety plan and firefighting systems (including and elevated fire water tank, and a gas-powered pump for at a groundwater well) Emergency response plan | 1 | 3 | Low | <u>Overall</u> Low risk, highly unlikely event, no further assessment |
| 15.2 | Loss or lack of fire water | Co / Op / De | Loss of firefighting capacity | Personnel training and orientation Occupational health and safety program Personal protection equipment Inspection and maintenance Fire safety plan and firefighting systems Emergency response plan | 1 | 3 | Low | <u>Overall</u> Low risk, highly unlikely event, no further assessment |

Notes: "Co" is construction
"Op" is operations
"De" is Decommissioning
"L" is likelihood
"S" is severity
"RR" is risk ranking



EcoMetrix
...

Editorial changes made to make terminology consistent with the hazard risk analysis matrix.

@mention or reply

Hazardous Waste Management System - Summary – One potential scenario has been identified. Risks have been characterized as low as it concerns environmental risks. No scenarios are carried forward for quantitative assessment.

Table 3-16: Hazard Identification Evaluation – Hazardous Waste Management System

| ID# | Accident / Malfunction | Phase | Consequence | Existing Safeguards / Design Features | L | S | RR / Significance | Screening Decision / Rationale |
|------|------------------------|--------------|--|--|---|---|-------------------|--|
| 16.1 | Hazardous waste spill | Co / Op / De | Potential for surface water and soil contamination | Personnel training and orientation Occupational health and safety program Personal protection equipment Inspection and maintenance Waste management plan Emergency response plan Onsite monitoring | 2 | 2 | Low | <u>Overall</u> low risk, <u>low-minor</u> consequence event, no further assessment |

Notes: "Co" is construction
"Op" is operations
"De" is Decommissioning
"L" is likelihood
"S" is severity
"RR" is risk ranking



EcoMetrix
...

Editorial changes made to make terminology consistent with the hazard risk analysis matrix.

@mention or reply

Attachment: IR-217


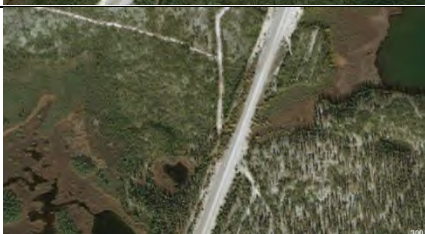


| | |
|---|---|
| Number | IR-217 |
| Dept. | CNSC |
| Project effects link | Accidents and Malfunctions |
| Reference to EIS, appendices, or supporting documentation | Sections 14.6.1 and 14.6.2 |
| Context and Rationale | <p>Context: Highway 914 crosses the Wheeler River 10 km southwest of the access road junction. A vehicle accident, including a rollover, collision, or run off road, at or near the bridge could potentially result in a release of uranium concentrate and release of fuels and chemicals into the surface water at this location. Denison believes that a release of uranium concentrate and a release of fuels and chemicals at this location would bound the releases at any other water crossing along the transportation corridor. However, no information on what other water crossings along the transportation corridor exist and how bounding scenarios 1 and 2 would bound the risk of releasing uranium concentrate and fuels and chemicals at other crossings.</p> <p>Rationale: The release of uranium concentrate and fuels and chemicals at water crossings would contaminate the water body at the crossings and pose a risk to the environment and public health.</p> |
| Information Requirement | Please provide information on all water crossings along the transportation corridor and justification why bounding scenarios 1 and 2 would bound the effects of the accidental releases of uranium concentrate and fuels and chemicals at these crossings. |

Response:





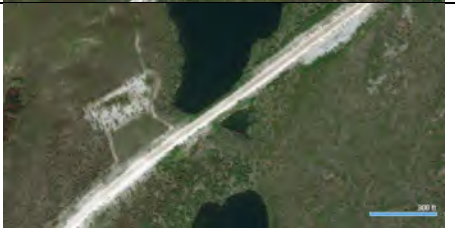

As recommended by the reviewer a review of water crossings associated with the transportation route have been identified. For reference, the analysis considers Hwy 914 south from the project site to its junction with Hwy 165. Hwy 165 was further considered east to Hwy 2 and west to Hwy 155. A total of 66 water crossings were identified as shown in Table IR-217-1, below. Coordinates (lat., long.; are provided for each of the crossings along with a basic description of each and a corresponding satellite image. For reference, in the table the designation “Highway 165W” means the location of the crossing is on Hwy 165 west of Hwy 914, beginning at the Hwy 165/155 and travelling east and the designation “Highway 165E” means the crossing is east of Hwy 914, travelling east toward Hwy 2. It is noted that most crossings are not identifiable by a specific name and are thus identified as “Unnamed creek”.

As noted by the reviewer, the potential aquatic environment release scenarios focused on the Wheeler River crossing location. This location was chosen as it represents an important location to resource users in the study area. The scenarios provide examples of the consequences of such releases to local receptors. That is, the results of the assessment of the releases at this location would be expected to be representative of crossings along the transport route since the key endpoint in the assessment is overall risk, as defined for the assessment process as probability multiplied by consequence. For reference, the crossing analysis reference above and presented in the technical memorandum has identified in excess of 100 water crossings along the transportation route as described. It is not practical to assess each of these crossings. While the specific conditions at these crossings may differ in size or nature, the results of the analysis presented can generally be applied more broadly as indicated above. The approach used is consistent with past practice for comparable assessments for uranium projects in the province.

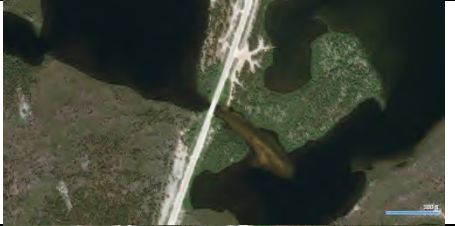


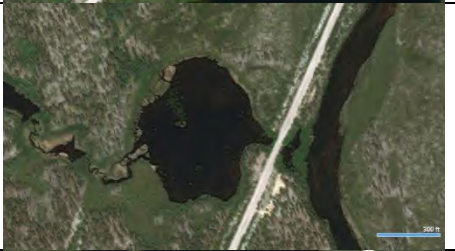


Table IR-217-1 – Water Crossings on the Wheeler River Project Transport Route

| Crossing # | Hwy | Coordinates | Name | Feature | Feature Width (m) | Image |
|------------|-----|--|---------------|----------------|-------------------|--|
| 1 | 914 | 57.439217, -105.399002 | Unnamed creek | Water crossing | 10 |  |
| 2 | 914 | 57.378448, -105.464859 | Unnamed creek | Water crossing | <2 |  |
| 3 | 914 | 57.354164, -105.485123 | Russell Lake | Lake crossing | 900 |  |
| 4 | 914 | 57.285332, -105.570038 | Unnamed creek | Water crossing | <2 |  |







Annex 1 – FIRT IR Table – Technical Review of the **Wheeler River Project** draft EIS
Denison Response – August 18th, 2023

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|----|-----|--|---------------|-----------------|-----|--|
| 5 | 914 | 57.273514, -105.591202 | Unnamed creek | Wetland complex | 100 |  |
| 6 | 914 | 57.220776, -105.685287 | Unnamed creek | Water crossing | 13 |  |
| 7 | 914 | 57.053490, -105.983330 | Unnamed creek | Wetland complex | 35 |  |
| 8 | 914 | 56.898136, -106.130302 | Unnamed creek | Water crossing | 50 |  |
| 9 | 914 | 56.882645, -106.152107 | Unnamed creek | Water crossing | 60 |  |
| 10 | 914 | 56.850391, -106.159187 | Unnamed creek | Water crossing | 10 |  |



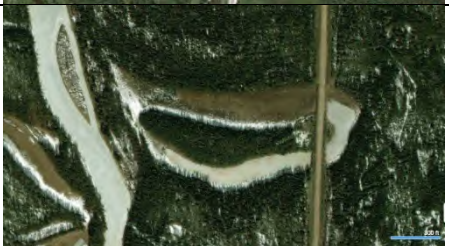
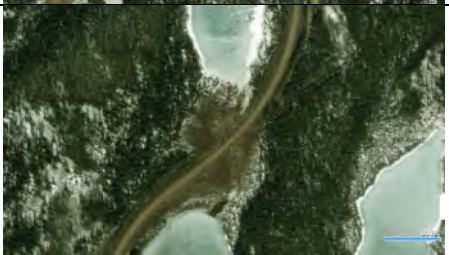
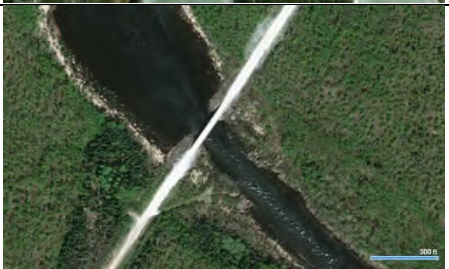
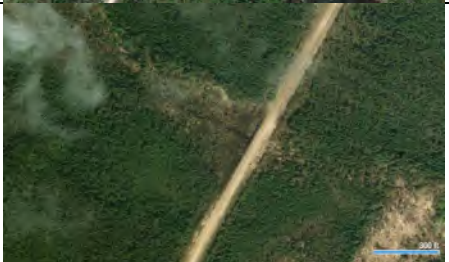
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| | | | | | | |
|----|-----|--|---------------|----------------|----|--|
| 11 | 914 | 56.793152, -106.146248 | Unnamed creek | Water crossing | 15 |  |
| 12 | 914 | 56.787197, -106.149460 | Unnamed creek | Water crossing | <2 |  |
| 13 | 914 | 56.722340, -106.165710 | Unnamed creek | Water crossing | <2 |  |
| 14 | 914 | 56.669765, -106.201149 | Unnamed creek | Water crossing | 10 |  |
| 15 | 914 | 56.600300, -106.252251 | Unnamed creek | Water crossing | <2 |  |
| 16 | 914 | 56.572754, -106.281494 | Unnamed creek | Water crossing | <2 |  |






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| | | | | | | |
|----|-----|--|---------------|----------------|----|--|
| 17 | 914 | 56.554306, -106.306236 | Unnamed creek | Water crossing | <2 |  |
| 18 | 914 | 56.539055, -106.330338 | Unnamed creek | Water crossing | 5 |  |
| 19 | 914 | 56.444473, -106.401733 | Unnamed creek | Water crossing | 10 |  |
| 20 | 914 | 56.388561, -106.512726 | Unnamed creek | Water crossing | 20 |  |
| 21 | 914 | 56.353569, -106.565643 | Unnamed creek | Water crossing | <2 |  |
| 22 | 914 | 56.329689, -106.562004 | Unnamed creek | Water crossing | 10 |  |






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|----|-----|--|-----------------|----------------|----|--|
| 23 | 914 | 56.147633, -106.613579 | Unnamed creek | Water crossing | 35 |  |
| 24 | 914 | 55.994797, -106.521835 | Unnamed creek | Water crossing | 10 |  |
| 25 | 914 | 55.967976, -106.532318 | Unnamed creek | Water crossing | 30 |  |
| 26 | 914 | 55.867905, -106.503120 | Unnamed creek | Water crossing | <2 |  |
| 27 | 914 | 55.733261, -106.565331 | Churchill River | Water crossing | 40 |  |
| 28 | 914 | 55.660831, -106.585144 | Unnamed creek | Water crossing | <2 |  |


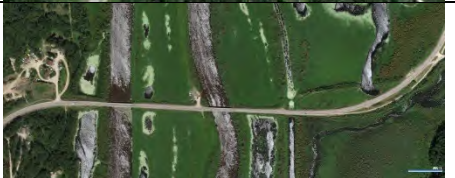


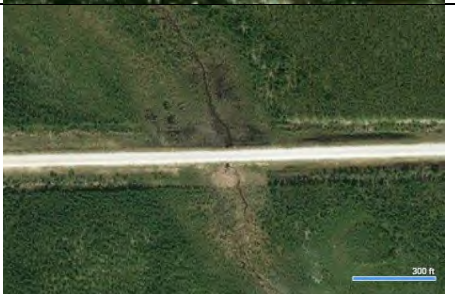

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|----|-----|--|---------------|----------------|----|--|
| 29 | 914 | 55.656418, -106.588326 | Unnamed creek | Water crossing | <2 |  |
| 30 | 914 | 55.568588, -106.603722 | Unnamed creek | Water crossing | 10 |  |
| 31 | 914 | 55.494350, -106.646774 | Unnamed creek | Water crossing | <2 |  |
| 32 | 914 | 55.504215, -106.714218 | Unnamed creek | Water crossing | 7 |  |
| 33 | 914 | 55.500674, -106.768551 | Unnamed creek | Water crossing | 5 |  |
| 34 | 914 | 55.474350, -106.836800 | Unnamed creek | Water crossing | 20 |  |



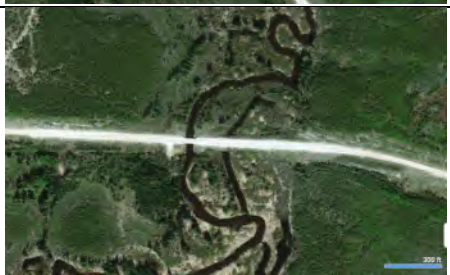



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|----|-----|--|---------------|---------------------|----|--|
| 35 | 914 | 55.465046, -106.865280 | Unnamed creek | Water crossing | <2 |  |
| 36 | 914 | 55.434074, -106.842552 | Unnamed creek | Water crossing | <2 |  |
| 37 | 914 | 55.378868, -106.833595 | Unnamed creek | Water crossing | 10 |  |
| 38 | 914 | 55.358044, -106.839149 | Unnamed creek | Water crossing | <2 |  |
| 39 | 914 | 55.282467, -106.815933 | Unnamed creek | Water crossing (2x) | 40 |  |






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|----|------|--|---------------|------------------------|-----|--|
| 40 | 165W | 55.124847, -107.681786 | Unnamed creek | Water crossing | 15 |  |
| 41 | 165W | 55.153086, -107.597933 | Beaver River | Crossing complex | 750 |  |
| 42 | 165W | 55.219022, -107.403364 | Unnamed creek | Water crossing (minor) | 3 |  |
| 43 | 165W | 55.222092, -107.214650 | Unnamed creek | Water crossing | 18 |  |
| 44 | 165W | 55.240179, -106.869717 | Unnamed creek | Water crossing (minor) | 3 |  |
| 45 | 165E | 55.229849, -106.789293 | Unnamed creek | Wetland complex | 100 |  |





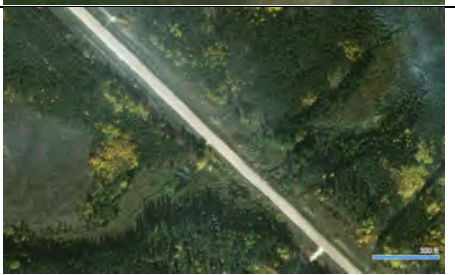

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|----|------|--|---------------|----------------------------------|----|--|
| 46 | 165E | 55.210766, -106.789518 | Unnamed creek | Water crossing | 6 |  |
| 47 | 165E | 55.190045, -106.755394 | Unnamed creek | Water crossing (one side ponded) | 60 |  |
| 48 | 165E | 55.178462, -106.686886 | Unnamed creek | Crossing complex | 13 |  |
| 49 | 165E | 55.164998, -106.635760 | Unnamed creek | Water crossing (one side ponded) | 25 |  |
| 50 | 165E | 55.147328, -106.569588 | Unnamed creek | Water crossing (minor) | 5 |  |
| 51 | 165E | 55.145846, -106.480813 | Unnamed creek | Water crossing | 10 |  |


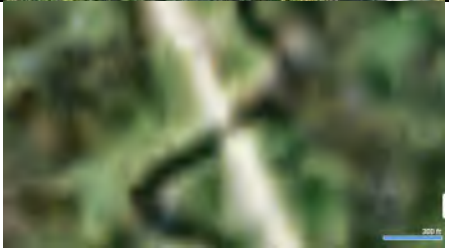

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|----|------|--|---------------|------------------------|----|--|
| 52 | 165E | 55.148323, -106.465283 | Unnamed creek | Water crossing (minor) | 3 |  |
| 53 | 165E | 55.155644, -106.419692 | Unnamed creek | Water crossing (minor) | 3 |  |
| 54 | 165E | 55.160151, -106.391546 | Unnamed creek | Wetland complex | 25 |  |
| 55 | 165E | 55.156452, -106.340823 | Unnamed creek | Water crossing | 10 |  |
| 56 | 165E | 55.159666, -106.317084 | Unnamed creek | Water crossing | 5 |  |
| 57 | 165E | 55.166328, -106.259241 | Unnamed creek | Water crossing (minor) | 2 |  |

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|----|------|--|-------------------|-------------------------|----|--|
| 58 | 165E | 55.163412, -106.206745 | Smoothstone River | Water crossing (major) | 50 |  |
| 59 | 165E | 55.122788, -106.016421 | Unnamed creek | Water crossing (minor) | 5 |  |
| 60 | 165E | 55.103940, -105.963149 | Unnamed creek | Water crossing (minor) | 3 |  |
| 61 | 165E | 55.104002, -105.949567 | Unnamed creek | Water crossing (ponded) | 70 |  |
| 62 | 165E | 55.076830, -105.859303 | Unnamed creek | Water crossing (minor) | 3 |  |
| 63 | 165E | 55.059849, -105.821333 | Unnamed creek | Water crossing (minor) | 5 |  |

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|----|------|--|----------------|-------------------------|----|--|
| 64 | 165E | 55.056275, -105.810201 | Unnamed creek | Water crossing (minor) | 3 |  |
| 65 | 165E | 54.884914, -105.748054 | Montreal River | Water crossing (major) | 20 |  |
| 66 | 165E | 54.811663, -105.671518 | Unnamed creek | Water crossing (ponded) | 38 |  |

Attachment: IR-218

| | |
|---|---|
| Number | IR-218 |
| Dept. | CNSC |
| Project effects link | Accidents and Malfunctions |
| Reference to EIS, appendices, or supporting documentation | Sections 14.6.1.1 and 14.6.1.4 |
| Context and Rationale | <p>Context: Table 14.6-1 indicates that the average flow of Wheeler River south of Russel Lake is 17,340 L/s or 17.34 m³/s. This rate is used for uranium dissolution rate calculation. However, in section 14.6.1.4, it states that the average annual flow is 24.3 m³/s. In Table 14.6-3, the last two rows appear to be added wrongly.</p> <p>It also states that sediment quality results are shown in Table 14.6-5 for post-remediation conditions. During minimum flow conditions, the affected volume is expected to be smaller, resulting in a higher sediment concentration. In comparison, higher flow conditions are expected to result in a greater footprint and lower concentrations. However, in Table 14.6-5, the average sediments concentration and porewater concentration appear to be incorrect and switched between average flow and maximum flow.</p> <p>Rationale: Inconsistent/inaccurate information provided in the EIS.</p> |
| Information Requirement | Please clarify and correct the inconsistent information on average flow rate of Wheeler River at the crossing and incorrect information in Table 14.6-3, and average sediment concentration and porewater concentration under average and maximum flow conditions in Table 14.6-5. |

Updated EIS tables to support response:

Table 14.6-5 to be revised as shown below:

| Flow | Affected Distance (m) | Average Sediment Concentration (µg/g) | Porewater Concentration (µg/L) |
|---------|-----------------------|---------------------------------------|--------------------------------|
| Minimum | 21 | 3,461 | 12 |
| Average | 33 | 3,309 2,535 | 129 |
| Maximum | 47 | 2,535 3,309 | 91 2 |

Table 8-5 to be revised as shown below:

| Flow | Affected Distance (m) | Average Sediment Concentration (µg/g) | Porewater Concentration (µg/L) |
|---------|-----------------------|---------------------------------------|--------------------------------|
| Minimum | 21 | 3,461 | 12 |
| Average | 33 | <u>3,309</u> 2,535 | <u>129</u> |
| Maximum | 47 | <u>2,535</u> 3,309 | <u>91</u> 2 |

Attachment: IR-236

| | |
|---|--|
| Number | IR-236 |
| Dept. | ECCC |
| Project effects link | Fish and fish habitat |
| Reference to EIS, appendices, or supporting documentation | Section 15.5.2, Expected Environmental Conditions |
| Context and Rationale | <p>Context: It is stated that, “Table 15.5-1 and Table 15.5-2 summarize the predicted mean values of the climate variables for the Tomblin Lake regional grid unit...”</p> <p>As per the Proponent’s description, Tomblin Lake was chosen as representative location for Wheeler when Climate Atlas was used as data source.</p> <p>Rationale: In those two tables, for the “Max 1-Day Precipitation (mm)” the historical average is given as 24.1mm. Local time series analysis for the climatic region in which Wheeler Project is located provide averages (for 1-day max precipitation) of approximately 30+ mm.</p> <p>It is the Proponent’s responsibility to keep the required database current and up to date, because the length of the time series influences all derived statistics.</p> <p>Statistical analysis of extreme events is highly dependent of the mean with extreme values reaching values 3 to 4 times higher than the mean.</p> |
| Information Requirement | <p>1. Provide a clear explanation on how the historical mean for 1-Day Max Precipitation was calculated.</p> <p>2. Compare the values obtained via various means (ex: copied from the internet, modeled via some online algorithm, derived from specialty literature), against time series analysis based on observations.</p> <p>Technical Discussion Required: Yes</p> |

Response:

During the EIS review by the FIRT, there were information requirements (IRs; mainly IR-235 and IR-236, and to a lesser extent IR-103 and IR-104) related to current and future climate precipitation, as well as the probable maximum precipitation. The information in Attachment IR-236 will be added as *Appendix D Summary of Precipitation Values Presented in the EIS* to Appendix 6-C in the final EIS. The Project design and site drainage plan are more closely linked to detailed design to support the licensing process and the precipitation information provided in the draft EIS to support an EA decision is adequate. This new appendix to Appendix 6-C serves to provide clarifications only.

The probable maximum precipitation (PMP) event used for feasibility engineering designs is 493 mm. The PMP value has been extrapolated from Key Lake data presented in the Canadian Climate Program

(1994). Denison reviewed the update to the Canadian Climate Program (1994) report provided in Atmospheric Environment Branch (1999) which shows PMP at the approximate Wheeler River Project location at 489.3 mm. Denison retained the higher of the two PMP values, i.e., 493 mm, for design purposes. As an example, during a PMP, water requiring management will report to the wellfield runoff pond which will be sized to accommodate a PMP event at the site. This pond has been sized to 38,200 m³ (*excluding a freeboard of 1 meter*). From the wellfield runoff pond, water will then be sent to the process water pond for treatment if required. In EIS Section 2.8 Project Design Features, Denison notes that “Ponds will be designed to maintain a minimum freeboard of at least 1.0 m to allow for continued functioning during a probable maximum precipitation (PMP) event.”

Tables 1 to 4 below provide a summary of precipitation information for both current / existing climate and future climate under different emissions scenarios, in order to 1) summarize precipitation data from various sections of the EIS (Section 6 including Appendix 6-C, Section 8, and Section 15) and 2) provide context on the PMP of 493 mm in comparison to precipitation values (annual precipitation, maximum 1-day precipitation, and 1:100 year, 24 hour return).

Table 1: Precipitation - Existing Climate – Comparisons of Observed Annual Average Precipitation and Maximum 24-hour Precipitation to PMP

| Precipitation-related metric | Value | Notes on Source of Data | Location in EIS and comment on how this information was used in the EIS | Commentary on metric compared to PMP (493 mm) |
|-------------------------------|---------|---|---|--|
| Annual average precipitation | 456 mm | Recorded from Key Lake in the period from 2011-2020, ECCC station 4063753 Available at: climate.weather.gc.ca | Presented in 6.1.3.1.2 Precipitation and Appendix 6-C. Provides point of comparison for selected Project PMP. | <i>PMP is similar to annual precipitation</i> |
| Annual average precipitation | 483 mm | Canadian Climate Normals 1981-2010 Station Data, Key Lake, Saskatchewan. Available at: climate.weather.gc.ca | Presented in 6.1.3.1.2 Precipitation and Appendix 6-C. Provides point of comparison for selected Project PMP. | <i>PMP is similar to annual precipitation</i> |
| Maximum 24-hour precipitation | 45.9 mm | Occurred on August 8, 2020. Recorded from Key Lake in the period from 2011-2020, ECCC station 4063753 Available at: climate.weather.gc.ca | Presented in 6.1.3.1.2 Precipitation and Appendix 6-C. Provides point of comparison for selected Project PMP. | <i>24-hr event is 10.7 x lower than PMP</i> |
| Maximum 24-hour precipitation | 72 mm | Occurred July 12, 1998. Canadian Climate Normals 1981-2010 Station Data, Key Lake, Saskatchewan. Available at: climate.weather.gc.ca | Presented in 6.1.3.1.2 Precipitation and Appendix 6-C. Provides point of comparison for selected Project PMP. | <i>24-hr event is 6.8 x lower than PMP</i> |

| Precipitation-related metric | Value | Notes on Source of Data | Location in EIS and comment on how this information was used in the EIS | Commentary on metric compared to PMP (493 mm) |
|-------------------------------|---------|--|---|---|
| 1 in 100 year, 24 hour return | 79.9 mm | Calculated using IDF_CC Tool for the Wheeler River Project. Available at: www.idf-cc-uwo.ca | 8.1.3.4 Climate Change Influenced Extreme Events and Appendix 8-B. Provides point of comparison for water management design and understanding rainfall associated with 1:100-year storms. | <i>1:100 is 6.2 x lower than PMP</i> |
| 1 in 100 year, 24 hour return | 56.4 mm | Return Period Estimate based on data from the Key Lake Mine using the IDF_CC Tool (~32 km away from Wheeler River Project). Available at: www.idf-cc-uwo.ca | 8.1.3.4 Climate Change Influenced Extreme Events and Appendix 8-B. Provides point of comparison for water management design and understanding rainfall associated with 1:100-year storms. | <i>1:100 is 8.7 x lower than PMP</i> |

Table 2: Precipitation – Future Climate - Existing and Predicted Precipitation Data for Key Lake (provided in EIS, Appendix 6-C, Table 10)

| Year | Total Annual (mm) | | | | Maximum 1-day (mm) | | | |
|--------------------------|-------------------|---------|---------|---------|--------------------|---------|---------|---------|
| | Measured | RCP 2.6 | RCP 4.5 | RCP 8.5 | Measured | RCP 2.6 | RCP 4.5 | RCP 8.5 |
| 2011-2020 | 455 | 518 | 509 | 508 | 48 | 29 | 27 | 27 |
| 2030 | | 528 | 503 | 537 | | 27 | 24 | 26 |
| 2040 | | 487 | 498 | 514 | | 28 | 29 | 24 |
| 2050 | | 504 | 524 | 520 | | 26 | 29 | 33 |
| 2060 | | 513 | 515 | 523 | | 26 | 33 | 26 |
| 2070 | | 527 | 534 | 568 | | 29 | 31 | 28 |
| 2080 | | 539 | 551 | 547 | | 30 | 33 | 28 |
| 2090 | | 543 | 545 | 548 | | 31 | 32 | 35 |
| 2100 | | 546 | 535 | 559 | | 23 | 25 | 28 |
| Overall Increase: | | 28 | 26 | 51 | | -6 | -2 | 1 |

Table 3: Precipitation – Future Climate - Historical and Future Precipitation Data (Total Annual and Maximum 1-day) for Tomblin Lake, Climate Atlas (provided in EIS, Section 15, Table 15.5-1 and 15.5-2)

| Period | Total Annual (mm) | | | Maximum 1-day (mm) | | |
|------------------------------------|-------------------|---------|---------|--------------------|---------|---------|
| | Historical | RCP 4.5 | RCP 8.5 | Measured | RCP 4.5 | RCP 8.5 |
| Historical mean (1976-2005) | 456 | | | 24.1 | | |
| Near Term (2021-2050) | | 484 | 487 | | 25.9 | 25.9 |
| Far Term (2051-2080) | | 500 | 509 | | 26.7 | 27.5 |

Table 4: Precipitation – Future Climate - Predicted Precipitation (1:100 year, 24-hour return) for Key Lake and Wheeler River Project, 2020 to 2050 using IDF_CC Tool (provided in EIS Section 8)

| Location | 1:100 year, 24-hour return |
|------------------------------|----------------------------|
| Key Lake Mine | 62.0 |
| Wheeler River Project | 88.6 |

References:

Canadian Climate Program. 1994. Point Probable Maximum Precipitation in Northern Saskatchewan. R.F. Hopkinson Scientific Services Regina Operations Building, Regina Airport. Regina, Saskatchewan. Report No. CSS – R94 – 01.

Atmospheric Environment Branch. 1999. Environment Canada Prairie and Northern Region – Point Probable Maximum Precipitation for the Prairie Provinces. Atmospheric Environment Branch, Atmospheric and Hydrologic Sciences Division. Regina, Saskatchewan. Report No. AHSD – R99 – 01.

Attachment: IR-237

| | |
|---|--|
| Number | IR-237 |
| Dept. | CNSC |
| Project effects link | EA follow-up and monitoring program |
| Reference to EIS, appendices, or supporting documentation | Appendix 16-C throughout, including Table 1.5-1: Wheeler River Monitoring and Follow-up Program Summary (p. 8-15) |
| Context and Rationale | <p>Context: CNSC’s Generic Guidelines for the Preparation of an EIS state: “The EIS should provide discussion on the follow-up program’s requirements, and include:</p> <ul style="list-style-type: none"> objectives and structure of the follow-up program and the VCs targeted by the program tabular summary and explanatory text of the main components of the program including: <ul style="list-style-type: none"> a description of each monitoring activity under that component <u>which of the two generic program objectives the activity is relevant to (e.g., verify EA predictions, determine effectiveness of mitigation measures)</u> the specific statement from the EA that goes along with that generic objective and will be the focus for that activity (e.g., program objective: verify predicted effects; environmental assessment effect: no potential adverse effects) the specific monitoring objective for that activity planned schedule <u>roles and responsibilities to be played by the proponent, regulatory agencies, Indigenous people, local and regional organizations and others in the design, implementation and evaluation of the program results</u> <u>possible involvement of independent researchers</u> <u>program funding sources</u> information management and reporting (reporting frequency, methods and format) <u>possible opportunities for the proponent to include the participation of the public and Indigenous groups, during the development and implementation of the program</u> <p><u>The follow-up program plan should be sufficiently described in the EIS to allow independent judgment as to the likelihood that it will deliver the type, quantity and quality of information required to reliably verify predicted effects (or absence of them) and confirm the effectiveness of mitigation measures.”</u> (Section 11)</p> <p>Rationale: The Summary of Monitoring and Follow-up Programs provided in Appendix 16-C contains very high-level information, and while some of the aspects detailed in the Generic EIS Guidelines are included, the aspects underlined are missing or appear incomplete.</p> <p>Further, all information from throughout the EIS should be incorporated into this Summary. For example, the EIS notes that: “Groundwater samples will be collected at least monthly and semi-annually in the wells within the freeze wall and on the freeze wall perimeter, respectively” (p. 7-109) and that “At least five to seven multi-well clusters are proposed across the mined area (Figure 7.8-2). Sampling will include KI parameters or the full suite of COPC at different times in the remediation process” (p. 7-111).</p> <p>These details (only examples) are not included in Appendix 16-C.</p> |

| | |
|-------------------------|--|
| Information Requirement | <p>It is recognized that this document will evolve over the planning process and be finalized prior to the EA Decision; however, as plans are developed and revised, CNSC staff expect that updates will be made to this document and provided with any future versions of the EIS.</p> <p>Appendix 16-C Summary of Monitoring and Follow-up Programs must include sufficient details to allow CNSC staff to determine the likelihood that it will deliver the type, quantity and quality of information required to reliably verify predicted effects (or absence of them) and confirm the effectiveness of mitigation measures. This includes concrete monitoring plans (sampling locations, frequency, etc.).</p> <p>Additionally, please incorporate any relevant information included in the EIS into this Summary.</p> |
|-------------------------|--|

Response:

Denison concurs that follow-up program documentation will evolve over the planning process and is committed to providing complete and up to date documentation as the EIS is finalized and prior to the EA Decision. Per the March 20, 2023 letter from the CNSC to Denison (Subject: Results of the Federal-Indigenous Review Team technical review of the October 21st, 2022 Draft Environmental Impact Statement Submission for the proposed Wheeler River Project), the company will be providing, as part of the final EIS documentation, a Commitments Report in order to capture all the mitigation measures, follow-up program measures and commitments that have been referenced in the EA documentation in a single location for completeness and traceability. The Commitments Report will be scoped so that it also fulfils the obligations of the commitments registry required by the Saskatchewan Ministry of Environment.

Notwithstanding the above, Denison believes that section 16-C, Summary of Monitoring and Follow-up Programs, in the draft EIS generally meets the requirements outlined in the EIS guidelines but agrees that some additional information can be provided to clarify select aspects. Specific notes per the EIS Guidelines are provided below to provide context the remainder of the response. For reference text in *italics* is taken from the EIS Guidelines; whereas text in **bold** is commentary provide by Denison. Additionally, bold text that is underlined indicates where Denison commits to revising or adding information into the EIS.

The EIS shall include a framework or preliminary program upon which EA follow-up actions will be managed throughout the life of the project. **Note from Denison – Table 1-5.1 in Appendix 16-C identifies a framework or preliminary program upon which EA follow-up actions will be managed, as well as all phases of the Project in which the proposed individual follow up programs will be executed.**

The EIS should provide discussion on the follow-up program's requirements, and include:

- *objectives and structure of the follow-up program and the VCs targeted by the program* - **Note from Denison - Table 1-5.1 in Appendix 16-C identifies the objectives of the proposed individual follow up programs, provides an overall program structure and identifies the VCs targeted by the program.**
- *tabular summary and explanatory text of the main components of the program including:*
 - o *a description of each monitoring activity under that component* - **Note from Denison - Table 1-5.1 in Appendix 16-C identifies each proposed monitoring activity for the various technical disciplines within which the environment assessment has been organized.**
 - o *which of the two generic program objectives the activity is relevant to (e.g., verify EA predictions, determine effectiveness of mitigation measures)* - **Note from**

Denison - Table 1-5.1 in Appendix 16-C generally identifies whether the proposed follow up activities are related to verifying EA predictions and/or determine effectiveness of mitigation measures (see column “Monitoring Program Objective(s)”; however, it is agreed that further clarity can be provided in this regard. In the updated version of Table 1-5.1 a further column will be added to indicate specifically whether the proposed follow up activities are related to verifying EA predictions and/or determine effectiveness of mitigation measures with rational.

- o *the specific statement from the EA that goes along with that generic objective and will be the focus for that activity (e.g., program objective: verify predicted effects; environmental assessment effect: no potential adverse effects) – Note from Denison - Table 1-5.1 in Appendix 16-C identifies the relevant section of the EIS to which each proposed follow up activity refers. however, it is agreed that further clarity can be provided in this regard. In the updated version of Table 1-5.1 a further, more specific reference to the section / subsection / statement (as appropriate) will be added to the “EIS Reference” column for greater traceability between the assessment section of the EIS for each of the technical disciplines and the proposed follow activities.*
- o *the specific monitoring objective for that activity- Note from Denison - Table 1-5.1 in Appendix 16-C identifies the objectives of the proposed individual follow up programs.*
- o *planned schedule - Note from Denison -Table 1-5.1 in Appendix 16-C identifies the phases of the Project in which the proposed individual follow up programs will be executed. It is premature in Denison’s view to develop specific “schedule” associated with all follow-up activities that are proposed. As noted in draft EIS Section 1.7.5, Licensing and Permitting, as well as in other responses to FIRT IRs, the Project is proceeding through sequential EA and licensing process. Given the sequential process to which Denison has committed it is planned that further detail will be developed to align with detailed engineering design through licensing and permitting and that this information will be available for review at that time. Denison understands that the Project cannot move forward until the appropriate Program / Plan / Procedure documentation is in place and has received approval through the regulatory process.*

roles and responsibilities to be played by the proponent, regulatory agencies, Indigenous people, local and regional organizations and others in the design, implementation and evaluation of the program results - Note from Denison – At this time and commensurate with the level of detail (i.e. concept) at which the follow up activities have been defined the proponent assumes responsibility for execution of all proposed activities. This may change as the program details are developed, and Denison presumes this is likely as it continues to work with the key Indigenous groups. It is noted however that provisions for follow up activities and monitoring are expected to be included in agreements developed between Denison and its key Indigenous partners and therefore it is inappropriate (and may remain so) that specific details regarding follow up activities be shared without the expressed consent of the agreement signatories. Regulatory agencies at the provincial and federal levels are expected to largely play a review/approval role consistent with their responsibilities under various laws/acts/licenses/permits under which the Project, and follow up activities, will be executed. At this time there are no specific plans with local and regional organizations as it pertains to the design, implementation and evaluation of the program results; but this may change in the future. Per the above, Denison will add additional detail into Table 1-5.1 in Appendix 16-C with respect to roles and responsibilities consistent with the information provided in this IR response. As noted full disclosure of such information may not be possible as it would be

subject to non-disclosure covenants between Denison and its key Indigenous partners; nevertheless more specific information will be provided as is available.

- *possible involvement of independent researchers* – **Note from Denison** – Involvement of independent researchers in follow up activities has not been identified at this time, nor has need for such been specifically flagged. This does not preclude possible involvement of independent researchers in the future; however, need for such has not been specifically flagged. As noted above, provisions for follow up activities and monitoring are expected to be included in agreements developed between Denison and its key Indigenous partners, and such follow up activities and monitoring could include independent research. The sharing of information related to this type of independent research can and would only be shared with the expressed consent of the agreement signatories. **Per the above, Denison will add narrative to the text of Appendix 16-C clarifying the role of independent research that is consistent with the understanding of such at the time the final EIS is published.**
- *program funding sources* – **Note from Denison** – As noted above, the proponent assumes responsibility for execution of all proposed follow up activities that have been identified and therefore the funding of such. Also as noted above, provisions for follow up activities and monitoring that may be included in agreements developed between Denison and its key Indigenous partners will be subject to non-disclosure covenants in those agreements. This would include information concerning any funding that may be associated with these programs. It would be inappropriate (and may remain so) that specific details regarding any funding that may be provided for follow up activities be shared without the expressed consent of the agreement signatories.
- *information management and reporting (reporting frequency, methods and format)* – **Note from Denison** – A framework for information management and reporting is provided in Section 1.2 of Appendix 16-C. As described in Section 1.2 of Appendix 16-C specific information management and reporting structures associated with follow up activities are proposed to be developed as part of the development of the Project Environmental Management System (EMS). The Project EMS will be developed during licensing and permitting and that this information, including more detailed information regarding information management and reporting (e.g., reporting frequency, methods and format) will be available for review at that time. Denison understands that the Project cannot move forward until the appropriate Program / Plan / Procedure documentation is in place and has received approval through the regulatory process.
- *possible opportunities for the proponent to include the participation of the public and Indigenous groups, during the development and implementation of the program* – **Note from Denison** – As noted above, Denison is committed to continuing the ongoing process of identifying opportunities the participation of the public and Indigenous groups as follow up activity programs evolve. There is nothing specific to share at this time but it is expected that further clarity in this respect will be provided in the near to medium terms. It is also understood that any information that can be shared only represents a snapshot in time. Since follow up activities will span the full lifecycle of the Project identification of potential opportunities for involvement is an ongoing process that will also span the full lifecycle of the Project.

Denison anticipates that the lengthy and evolving EIS review process, and consideration of the public comments received by Denison on June 27th, 2023, will bring forward additional mitigation and follow up activities. Denison will update Section 16-C, Summary of Monitoring and Follow-up Programs, per the commentary provided in response to IR-237 and will also include changes resulting from the FIRT review process and the Saskatchewan Ministry of Environment review process. This section will align with the Project's Commitment Report which will be provided as part of the final EIS documentation.

Responses to Advice to Proponent

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Advice to the Proponent | Denison Response |
|--------|---|--|---|--|---|
| AD-01 | Canadian Nuclear Safety Commission (CNSC) | Glossary sections | <p>There are terms used throughout the EIS that may either need defining, or inclusion in the glossary.</p> <ul style="list-style-type: none">· “Bounding”, “bounding case” and “bound” are used frequently throughout the EIS to describe the scope of the assessment. For example, p. 2-6 the EIS States: “Denison has bound the environmental assessment above the deposit...”· “Laydown”. P. 2-54 states: “During Construction, Denison plans to create a laydown area next to the future domestic landfill to temporarily store construction waste. Examples of materials include clean wood, plastics, metal, and concrete. The construction laydown area will not be lined, but it will have a berm surrounding the area to minimize run-on and runoff.”· “Deflagration” (p. 2-22)· “Speed of sound” The EIS states: “Deflagration means the material burns slower than the speed of sound, thus no shock waves are generated. Propellant permeability enhancement methods reach injection pressures of up to 8,000 psi and are near instantaneous over periods of milli seconds...” (p. 2-22) - Explain briefly what is meant by “speed of sound”· “Dries” (p. 2-65): “the main dries will be located in the processing plant”· “Scarified” 2-84 Laydown areas will be scarified, covered with 0.5 to 1.0 m of stockpiled overburden, and vegetated with native, self-sustaining species.· “Furblock” (p. 4-29)· “Cutlines” (p. 4-101) | <p>Add this terminology to either one of the early glossaries, or when describing the methodology, in order to help readers understand these terms (particularly non-technical readers, such as Indigenous peoples and members of the public).</p> | <p>Thank you for the advice comment. This will be addressed once the EIS is updated following the conclusion of the information requirement (IR) process.</p> |
| AD-02 | CNSC | General | <p>Mining solution and lixiviant are used interchangeably throughout the EIS. When both are used periodically, may be difficult for a member of the public to recognize that these are one in the same (mining fluid seems more often used).</p> | <p>Be consistent in how this is referred to, in order to ensure it’s clear to readers that these are one and the same.</p> | <p>Thank you for the advice comment. This will be addressed once the EIS is updated following the conclusion of the information requirement (IR) process.</p> |
| AD-03 | CNSC | Throughout the Executive Summary (ES) and draft EIS | <p>Errors in formatting and grammar were identified throughout ES and EIS. Some examples are underlined below:</p> | <p>Please correct these and any other formatting, spelling or grammatical errors.</p> | <p>Thank you for the advice comment. This will be addressed once the EIS is updated following the conclusion of the information requirement (IR) process.</p> |
| AD-04 | CNSC | Section 2.2.1 Mining (p. 2-4 to 2-5) | <p>An arial view could be useful to help a reader understand the proposed freeze wall earlier in section 2 (e.g., The shape, whether it surrounds the deposit). This is unclear but there are good images further down in the EIS (i.e., Figure 2.3-1 on p. 2-78).</p> | <p>Consider adding image to Section 2.2.1, similar to or containing aspects of Figure 2.3-1.</p> | <p>Thank you for the advice comment. This will be addressed once the EIS is updated following the conclusion of the information requirement (IR) process.</p> |

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Advice to the Proponent | Denison Response |
|--------|--|--|--|--|---|
| AD-05 | Transport Canada (TC) | Sections 2.2.3.2, 2.2.3.10, 2.2.5.1, 2.3.1.6, 8.3.4.2.2, 11.1.4.4.2, | The two water crossings over Kratchkowsky Creek and Hart Creek and the water intake and effluent discharge/intake pipeline and diffuser at Whitefish Lake may be subject to the <i>Canadian Navigable Waters Act</i> (CNWA). However, these works may be exempt from the CNWA, if they meet the requirements of the Minor Works Order. | <p>*This advice pertains to the regulatory phase.*</p> <p>It is recommended that the Proponent self-assess each work using TC’s Project Review Tool as follows: https://npp-submissions-demandes-ppn.tc.canada.ca/projectreview-outildexamenduprojet</p> <p>If the works do not fit the Minor Works Order, the Proponent has the option to either submit an application for approval to the NPP, or use the public resolution process, as these are all unscheduled waterways. The full text of the Minor Works Order is available here: https://laws-lois.justice.gc.ca/eng/regulations/SOR-2021-170/page-1.html.</p> <p>Background information on the NPP, the Minor Works Order, the application for approval process and the public resolution process are available here: https://tc.canada.ca/en/programs/navigation-protection-program/apply-npp</p> | Acknowledged and Denison will address this in the regulatory phase as highlighted. |
| AD-06 | Environment and Climate Change Canada (ECCC) | Section 2.2.3.8, Project Description | <p>In this section it is stated that: “The third step of the Industrial Wastewater Treatment Plant (IWWTP) is anticipated to further neutralize and improve the remaining water quality proposed to be achieved with further pH adjustments through agitated tanks and a clarifier with negligible solids generation expected at this stage. Several additional technologies including ion exchange are being evaluated as part of an ongoing Best Available Technology Study to be complete as part of future permitting.” ECCC would be interested in reviewing this study when it becomes available.</p> <p>Considering that the third step of the effluent treatment process in the IWWTP is still undergoing development, ECCC cannot make final conclusions regarding the efficacy of the treatment process. When final treatment technologies have been evaluated and selected, ECCC would like to review this information to allow for release to the environment.</p> | ECCC requests the opportunity to review the Best Available Technology Study and selected treatment technologies for the IWWTP when the report becomes available. | The BATEA information for the IWWTP will be included in Denison’s application to the CNSC for a license to operate. As such, ECCC can direct their review request for review to the CNSC. |
| AD-07 | TC | Section 2.2.5.3 | With respect to the proposed airstrip, under the <i>Aeronautics Act</i> , the proposed airstrip would be considered an “aerodrome”, which is defined as: “aerodrome means any area of land, water (including the frozen surface thereof) or other supporting surface used, designed, prepared, equipped or set apart for use either in whole or in part for the arrival, departure, movement or servicing of aircraft and includes any buildings, installations and equipment situated thereon or associated therewith.” Aerodromes, including the one proposed by Denison, are subject to the <i>Aeronautics Act</i> and the Canadian Aviation Regulations (CARs). | <p>*This advice pertains to the regulatory phase.*</p> <p>The proponent must notify the Minister of Transport of the proposed airstrip (aerodrome). This notification, being a summary report to the Minister of Transport, is required by section 307 of the CARs (CARs 307). CARs 307 also requires Denison to undertake consultation in the prescribed manner before it constructs the proposed aerodrome at the mine site. Details of the consultation are to be included in the above-mentioned summary report to the Minister of Transport.</p> <p>CARs 307 identifies the requirement to consult to include anyone seeking to undertake a prescribed aerodrome work at a certified or non-certified aerodrome, whether it is the creation of a new aerodrome or, at an existing aerodrome, lengthening an existing runway or making a</p> | Acknowledged and Denison will address this in the regulatory phase as highlighted. |

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Advice to the Proponent | Denison Response |
|--------|------------|--|--|--|--|
| | | | | <p>new one. The Regulation also provides minimum expectations for how the consultation should be conducted, including timelines, who to notify and under what circumstances. The intent of the Regulation is to compel consultation in advance of an aerodrome work that will result in sustained and regular impact on interested parties as identified in the Regulation. As the proposed aerodrome will not be within 4 kilometres of a city or built-up area, under CARs 307, the proponent is required to consult the following interested parties:</p> <ul style="list-style-type: none">(i) the Minister of Transport,(ii) the providers of air navigation services,(iii) the operator of a certified or registered aerodrome located within a radius of 30 nautical miles from the location of the proposed aerodrome work,(iv) the authority responsible for a protected area located within a radius of 4 000 m from the location of the proposed aerodrome work,(v) any local land use authority where the proposed aerodrome work is to be carried out, and(vi) the owner of any land bordering the land on which the proposed aerodrome work is to be carried out. <p>Proponents are encouraged to share their plans with the local land use authority before the consultation period. The local land use authority may have information about other nearby projects or developments that could impact on the proponent's plans.</p> <p>In summary, regarding the airstrip (aerodrome), the proponent must complete the consultation and file the summary report with the Minister of Transport, prior to commencing construction of the aerodrome.</p> <p>Further details can be found at: https://laws-lois.justice.gc.ca/eng/regulations/SOR-96-433/FullText.html#s-307.01.</p> <p>TC recommends that the proponent contact TC's Aerodromes Group at CASPNR- SACRPN@tc.gc.ca before starting the consultation, to ensure it is completed in accordance with CARs 307.</p> | |
| AD-08 | CNSC | Figs. 3.4-1, 4.3. 1, and where applicable throughout the EIS | Some maps in the EIS do not contain highway numbers. | Please consider including the highway numbers on the maps early in the Draft EIS when laying out the project location so the reader can become familiar with road network within northern Saskatchewan when discussions take place. | Thank you for the advice comment. This will be addressed once the EIS is updated following the conclusion of the information requirement (IR) process. |

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Advice to the Proponent | Denison Response |
|--------|------------|--|---|---|---|
| AD-09 | CNSC | Section 4, including Figures 4.3.1 and/or 4.3.2 and where applicable throughout the EIS. | The maps included in the EIS in sections do not have any Treaty boundaries. First Nation Treaties should be included on the map. Not all First Nations reserves, and boundaries are included on the map such as Cree Lake and Slush Lake, please include on map and consider adding others from the NAD. | It is recommended that Denison update the maps in these sections to include Treaty Boundaries and community locations are included on the Project location map in Figure 4.3.2 and other maps throughout the entire EIS where applicable. | Thank you for the advice comment. This will be addressed, as possible, once the EIS is updated following the conclusion of the information requirement (IR) process. |
| AD-10 | CNSC | Section 4 | Overall, CNSC believes that Denison is abiding by the communications strategies and products identified in their PIDP, but would be interested in additional information that is available. | While CNSC staff are satisfied that the proponent meets the requirements with this EIS, further clarity and detail on the strategic planning behind these communications activities would be beneficial and would further support the overall goals of the Project’s engagement activities. | Acknowledged. Further details on the Public Information Program and Public Disclosure will form part of the documentation submitted in support of the CNSC licensing for the Project. |
| AD-11 | CNSC | Section 4 Indigenous Engagement Report (IER) | There is a summary of what engagement activities will occur moving forward. However, it is not clear which engagement activities/meetings will occur during the different stages of the EA/ project life cycle. Please provide additional details upon submission of the Final EIS. | Denison should consider clarifying in the updated IER which engagement activities will occur during each stage of the project moving forward as per Reg Doc 3.2.2 before submitting the Final EIS. | <p>The engagement activities as outlined in the draft EIS are reflective of the iterative nature of engagement with respect to the Project.</p> <p>At the time of the filing of the final EIS, Denison will describe the status of engagement and future expected engagement activities to occur, which will continue to be aligned with the requirements of Reg Doc 3.2.2.</p> |
| AD-12 | CNSC | Section 4 IER | Information included in the EIS Section 4 and IER regarding engagement activities, communication and issues and concerns raised will need to be updated when the next version of the EIS is submitted. The EIS and IER will need to be updated to include information from Fall of 2022 until approximately two months prior to the submission date of the next EIS. | When re-submitting the EIS, ensure that the engagement log, issues and concerns tables and information about engagement activities done to date have been updated. No action needed only advice to update this section before submission with most up to date engagement activities including any that take place with other Indigenous Nations and communities not included in the Draft EIS. | Acknowledged. |
| AD-13 | CNSC | Section 4 IER | Denison states that validation of VC selection was completed with ERFN, the Northern Village of Beauval, the Northern Village of Pinehouse Lake, and the Northern Hamlet of Patuanak (hereafter Beauval, Pinehouse, and Hamlet of Patuanak, respectively). The EIS states that this was completed through a shared online survey. The EIS also indicates that YNLR was also included in this process. | How has Denison validated VC selection with the other Indigenous Nations and communities that have showed interest and if so, by what methods (survey’s, engagement, meetings, review of Draft sections etc.?) Did Indigenous Nations and communities select any VC’s that were not included in the EIS and if so why not? Please elaborate and provide more details in the EIS on any other methods used including engagement sessions that were completed with Indigenous Nations and communities, through in-person community workshops, VC selection approval through early review of Draft EIS sections. | <p>Section 4 of the draft EIS describes the approach taken related to the Indigenous and non-Indigenous Communities of Interest in relation to the Wheeler River Project. Denison has engaged with these entities regarding the validation of the VC selection.</p> <p>Denison has not undertaken VC validation activities with other Indigenous Nations or communities that have shown interest in the Project, owing to the systematic approach to engagement Denison has been following. This approach is consistent with the methodology presented to the CNSC by Denison in early 2020, for which confirmation was received in mid-2020 and reflected in the draft EIS.</p> <p>All activities undertaken in relation to engagement on VCs are currently described in the EIS; there are no additional details to add.</p> <p>Denison can confirm that it is unaware of additional or new VCs brought forward by other Indigenous Nations or communities that are not suitably captured within the current draft EA approach.</p> |

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| AD-14 | CNSC | Section 4.3.1, Pg 246 | On this page, Denison states that MN-S is “currently structured with a President, an Executive, a Provincial Metis Council, Regional Presidents, and Local Presidents. The wording of ‘Regional President’ is incorrect and should be changed to say, ‘Regional Director’. | Please update all wording of “Regional President” to “Regional Director” when referring to MN-S. | Thank you for the advice comment. This will be corrected in the final EIS. |
| AD-15 | ECCC | Sections 5.3.4 (Table 5.3-3); 8.1.3.3 Climate Change; 8.1.3.4 Climate Change Influenced Extreme Events; Table 15.4-1: Summary of Potential Effects of Short-term Extreme Weather Events on the Project and Associated Mitigation; Section 15.5 Climate Change. | <p>The Proponent indicates that the Project’s full lifetime is roughly 40 years (including the post- decommissioning phase) and that climate conditions are important design considerations for a number of sensitive aspects of the Project. Potential future climate changes and their potential effects on the Project and Valued Components (VCs) are described in various sections of the draft EIS. Notably, in Section 15.5.2, ensemble mean projections are provided for several climate variables for two future time periods and emissions scenarios (RCP 4.5 and 8.5). In Section 8.1.3.4, the Proponent describes possible future changes in short-duration precipitation extremes (based on Intensity Duration Frequency or IDF curves from the IDF_CC tool) and indicates that an increase in their frequency and magnitude may occur over the Project lifetime “... and may require consideration for greater storage and conveyance capacity for Project water management infrastructure” (p.8-41).</p> <p>The Proponent indicates that aspects of the Project are being designed to meet standards based on design values that appear to be derived from observed (i.e. historical) climate conditions (e.g. water management infrastructure; see Table 15.4-1). In Section 15.5.3, they indicate that an adaptive management approach will be used to address some aspects of future climate change as necessary. For example, page 15-19 of the draft EIS states that: “Denison will develop an Emergency Preparedness and Response Program for the Project to address forest fires and extreme weather that may occur. If unforeseen effects on the Project occur from longer and more severe forest fire seasons associated with climate change, or increased frequency or severity of extreme weather (e.g., ice storms, snowstorms, flooding), Denison will apply adaptive management that includes monitoring climate factors so that they can proactively mitigate or prevent adverse climate effects on the Project.” (Emphasis added).</p> | <p>ECCC recommends that when considering potential future climate change and relevant effects on the Project, the Proponent consider the range of variability from the ensemble of models (not just the ensemble mean). ECCC also recommends that the Proponent consult the 2019 Canadian Standards Association Guidance on Intensity Duration Frequency for Canadian Water Resources practitioners , which provides examples of alternative methodologies to estimate future return values for design as needed.</p> <p>In terms of adaptive management, ECCC recommends that the Proponent clearly outline what climate factors will be monitored to mitigate or prevent adverse climate-related effects. This should include information on when and how the climate factors would be monitored and under what circumstances particular adaptive management approaches would be applied.</p> | <p>Please see response to IR-15, IR-103, IR-104, IR-235, and IR-236.</p> <p>The probable maximum precipitation (PMP) value of 493 mm selected for design of water management infrastructure, such as ponds, is similar to total annual precipitation (456 mm from Key Lake station, and 483 mm from 1981-2020 climate normals).</p> <p>The selected PMP is well above (>5 times higher): 1) current/measured 24-hour maximum precipitation, 2) modelled 1 in 100 year 24-hour return for current conditions, 3) modelled 1:100 year 24 hour return for a future (2020-2050) period, 4) the predicted maximum 1-day precipitation under different emissions scenarios for the future (including RCP8.5 in the 2021-2050 period).</p> <p>For comparison to the design PMP of 493 mm:</p> <ul style="list-style-type: none">- the measured maximum 24-hour precipitation from Key Lake station was 42.9 mm and 72 mm from 1981-2020 climate normals.- the modelled existing/current 1 in 100 year, 24 hour return using the IDF_CC Tool for the Wheeler River Project site was 79.9 mm and at the Key Lake area was 56.4 mm.- the modelled future (2020-2050) climate 1 in 100 year, 24 hour return using the IDF_CC Tool for the Wheeler River Project site was 88.6 mm and at the Key Lake area was 62.0 mm.- the predicted future climate (2021-2050) under the highest CO2e emissions scenario (RCP 8.5) shows maximum 1-day precipitation of 25.9 mm. <p>The PMP is much higher (> 5 times higher) than the observed and predicted 24-hour maximum precipitation and the 1:100 year 24 hour return. Completing the design using a large PMP provides confidence that the water management infrastructure will be sufficient and function under future climates as it relates to potential changes in precipitation.</p> |
| AD-16 | CNSC | Section 5.10 (p.70) and throughout the EIS | <p>In section 5.10 of the ES, where the seven scenarios are listed, formatting is inconsistent. Likelihood is in quotes in some places, but not in all.</p> <p>Not significant is bolded inconsistently throughout the EIS. As well, in many cases noted as “not significant”, where others note “are not expected to have a significant effect”.</p> | <p>Suggest making formatting consistent if going to use quotes and bolding to highlight sections of the text. Also, validate that use of “not significant” and “are not expected to have a significant effect” are consistently used (where appropriate).</p> | <p>Thank you for the advice comment. This will be addressed, as possible, once the EIS is updated following the conclusion of the information requirement (IR) process.</p> |

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| AD-17 | ECCC | Appendix 6-A Air Quality Technical Supporting Document A.10 | Some of the off-road vehicles have an emission rating of Tier 2 but in Appendix 6-A Section A.10 the Proponent claims that “for non-road diesel combustion, Tier 4 emission factors were assumed”. Choosing an engine with a lower Tier will increase emissions in NOx significantly and the Proponent should be using the best available technologies to minimize environmental impacts. | ECCC recommends that the Proponent choose engines that meet the most stringent emission standards to the extent possible, which are Tier 4 for the compression-ignition engines, during all phases of the Project. | Please see response to IR-139. |
| AD-18 | ECCC | Appendix 6-C, Climate Baseline and GHG Emissions Report | Understanding Project emissions is important to inform analysis of a Project’s potential impact on Canada’s emissions targets and climate change commitments. ECCC notes that Section 4.0 and Appendix C: Greenhouse Gas Emissions Calculations of Appendix 6-C identifies the source of emissions and quantifies them in the construction, operation, and decommissioning phases of the Project, in accordance with the Draft Technical Guide Related to the SACC (Draft Technical Guide). While ECCC recognizes that the emissions will be relatively small in the post-decommissioning phase, the identification and quantification of the emissions in this phase is not found in the draft Environmental Impact Statement (EIS). The post- decommissioning phase is expected to last 15 years, likely going past 2050. The draft EIS does not discuss emission intensities of the Project, only the grid electricity. The draft EIS also does not discuss the Project’s potential impacts on Canada’s climate targets. | ECCC recommends that the identification of the sources of Greenhouse Gas (GHG) emissions and quantification of these emissions be described for the post-decommissioning phase, as done for the other phases. ECCC recommends the Proponent include discussion on the emission intensities of the mining of the product, following the guidance of the SACC and the Draft Technical Guide. ECCC recommends that the Proponent discuss the potential impacts that the Project may have on Canada’s ability to meet its climate-related targets, following the guidance of the SACC and the Draft Technical Guide. | The Post-Decommissioning phase only includes monitoring (physical, chemical, and biological) and regulatory site inspections. These activities are not expected to generate any significant GHG releases. Notwithstanding, the calculated GHG emissions estimates for Construction, Operation and Decommissioning are expected to be sufficiently conservative to capture any incidental GHG releases during monitoring and inspection activities. The EIS anticipated an annual average production rate of approximately 4,082 metric tonnes of U ₃ O ₈ and an annual net GHG releases of 30,702 metric tonnes CO ₂ e over the operations phase of the project. The annualized GHG intensity during operations is estimated at 7.5 tonnes of CO ₂ e / tonnes of U ₃ O ₈ . Section 2.5 of the EIS provides a summary of the anticipated GHG releases and a comparison to the nation- and province-wide GHG emissions. The project is expected to contribute less than 0.0043% to the nation-wide annual average. Given this very low contribution, the project is not expected to impact Canada’s ability to meet its climate-related objectives and targets. Also see response for AD-19 (second paragraph). |
| AD-19 | ECCC | Appendix 6-C, Climate Baseline and GHG Emissions Report | The draft EIS lacks information related to estimates of impact on carbon sinks and emissions from land-use changes. As land use shifts from a vegetated site prior to development, to an industrialized site, removal of vegetation and peat will have impacts on carbon sinks and construction emissions. Section 6, Appendix 6-C, 4.1.2 Land Use Change states that site-specific information of above- ground mass of vegetation was not available and default data from Table 20 of the Draft Technical Guide were applied. The default data is contained in this table is not applicable in this case, as they represent aboveground woody vegetation in cropland systems. ECCC recognizes that the usage of the median value of 0.51 for the carbon content is reasonable. From the information given in the draft EIS, it does not seem that the soil carbon was taken into account. In the absence of detailed information, the Proponent assumed that the area cleared would also be excavated (and drained in the case of wetland areas) which would create significant additional emissions from soil disturbances and drainage. Section 4.1.2 also states the Project involves clearing an area of | Land Use Change Regarding the lack of site-specific information of above-ground mass of vegetation, an initial site survey on-site using basic information such as site class and species would assist in determining the above-ground biomass. More specific data, such as regional data from provinces, forest companies, or literature may be available, and generic national data is available (e.g., Fo148-1-2E.pdf (publications.gc.ca), 4775.pdf (nrcan.gc.ca)). ECCC recommends that the Proponent also consider biomass that are not aboveground and confirm whether soil carbon is taken into account, as well as wetlands. Carbon Sinks ECCC recommends that the Proponent provide a quantitative and qualitative description of the Project’s impact on carbon sinks, following the guidance of the SACC and the Draft Technical Guide. | Limited site-specific data were available to characterize land use change and impacts on carbon sinks. As such, the use of default values from the SACC/IPCC in conjunction with some limited habitat/vegetation data (extracted from Chapter 9.2 Terrestrial Environment – Vegetation and Ecosystems, Listed Plant Species and Wetlands) was employed and is considered reasonable at this stage of the assessment. Please note that additional information on the land use change GHG calculations can be found in Appendix 6-C Climate Baseline and Greenhouse Gas Emissions Report. In accordance with our discussions with the CNSC, Denison is committed to re-assessing the GHG and climate change components of the EIS and other elements of the SACC once more detailed, site-specific data becomes available (i.e., detailed feasibility and engineering studies). This is expected to include more detailed study around overall GHG emissions, carbon sinks |

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| | | | approximately 169.6 hectares. There are no estimates on the impact on carbon sinks related to the Project. | | and mitigation options, best available technologies / best environmental practices, climate resiliency, net-zero carbon planning and offsetting. |
| AD-20 | NRCan | Section 7.3.1, Physical Geography | Drumlins and eskers in the region trend Northeast to Southwest as opposed to northwest to southeast as written on page 7, line 18. Correct orientations are used on page 7, line 23. | NRCan recommends revising the text. Please refer to 250 000 scale Surficial Geology Lines from Quaternary mapping, CSRS NAD83 Zone 13, Saskatchewan Geological Survey 2017. | Acknowledged. The typo in the draft EIS, Section 7.3.1 will be corrected in the final EIS. In Section 7.3.1. the text will be updated to say the following: “The most important associated topographic features in the region are the northeast to southwest trending drumlins and eskers...” See also response to IR-54. |
| AD-21 | NRCan | Section 7.3.2.3, Metacrystalline Basement Rock | Pegmatite missing from list of basement rock types. | NRCan suggests addition of pegmatite to the list of basement rock types as shown on Figure 7.3-6. | Denison will update the final EIS per NRCan’s suggestion. |
| AD-22 | NRCan | Section 7.3.3.1, Aquifer Properties, Section 7.3.2.3, Metacrystalline Basement Rock, Appendix 7A, 2.0, 2.3.1, 2.3.2 | The terms “metacrystalline” and “metagranitic gneiss” are not frequently used terms in scientific literature. Gneiss is, by definition, a metamorphic rock. | NRCan suggests revision to “Crystalline Basement rocks” or “Basement metamorphic rocks”, and “granitic gneiss” as used in Figure 7.3-6. Please refer to Oxford Dictionary of Earth Sciences. | Denison will update the final EIS per NRCan’s suggestion. |
| AD-23 | NRCan | Appendix 7A, 2.3.1, Metacrystalline basement rock | Orogeny is the process, orogen (or orogenic belt) is the feature produced by orogeny. | NRCan suggests replacing “Tran Hudson Orogeny” with Trans Hudson Orogen”. | Denison will update the final EIS per NRCan’s suggestion. |
| AD-24 | NRCan | Appendix 7A, 2.3.1, Metacrystalline basement rock | Quartzite is by definition a metamorphic rock, and the term is used later without the meta- prefix. | NRCan suggests replacement of the term “meta-quartzite” with “quartzite”. | Denison will update the final EIS per NRCan’s suggestion. |
| AD-25 | NRCan | Appendix 7A, 2.3.4, Athabasca Group Sandstones and Conglomerates | Sands are unlithified, whereas you are referring to grain sizes in this case. | In Table 2-1, NRCan suggests replacing the term “sands” with “grain sizes” under MFc and MFb descriptions. | Denison will update the final EIS per NRCan’s suggestion. |
| AD-26 | NRCan | Appendix 7A, 2.3.5, Overburden | Typo on page 2, line 7: “A grain size sample was collected in GWR-033 from approximately 9 m below ground surface, and the same consisted of 8.8% clay (less than 4 µm). | NRCan suggests revision of “same” to “sample” and clay to “clay-sized” grains. | Denison will update the final EIS per NRCan’s suggestion. |

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| AD-27 | CNSC | Section 8.2.1.3 – Spatial and Temporal Boundaries | It is noted that McGowan Lake is an identified reference lake for the Key Lake Mill site. With the establishment of the Wheeler River mine, effluent would be flowing into McGowan Lake, which could potentially interfere with Key Lake’s environmental monitoring program by compromising McGowan Lake’s baseline conditions. Depending on the loading of COPC’s into McGowan Lake and resultant water concentrations, it may no longer be accepted as an acceptable reference lake for use by Key Lake. This would require Cameco to modify their monitoring program at the Key Lake Mill. | The CNSC advises Denison to communicate with Cameco to ensure they are aware of this situation. Coordination between the two companies may be necessary to ensure Key Lakes environmental monitoring program is not compromised. It is recommended to discuss this potential issue with Cameco ahead of time to determine the best path forward. | <p>Denison will communicate with Cameco through the Saskatchewan Mining Association to highlight the timing of the start of the Project as it may relate to Cameco's use of regional lakes for reference lake purposes. McGowan Lake will no longer be suitable as a reference lake for Cameco once the Wheeler River Project starts operating, since it will be downstream of treated effluent release. Alpha Lake (LA-9 in Denison's aquatic baseline studies) will likely be outside of any influence from Denison's activities.</p> <p>Please note that Denison has previously been in communication with the Saskatchewan Ministry of Environment, Environmental Protection Branch regarding the baseline study work Denison completed as part of the Environmental Assessment process and the potential changes to McGowan lake (a Cameco's reference lake) from the proposed Wheeler Project. Reference: Email from Janna Switzer (Denison) to George Bihun (MOE) on May 12, 2020.</p> |
| AD-28 | ECCC | Section 8.2.4.2.3 Appendix 10-A, Section 3.1.1.2 | Tables 8.2-9 and 8.2-10 in Section 8.2.4.2.3 Part II_S8 Aquatic Environment and Table 3-1 in Appendix 10-A Section 3.1.1.2 demonstrate predicted maximum effluent concentrations of Constituents of Potential Concern (COPCs) and maximum predicted receiving environment concentrations. The final effluent quality discharge target for uranium is 0.057 mg/L. However, the Canadian Council of Ministers of the Environment (CCME) water short-term (acute) water quality guidelines for the protection of aquatic life is 0.033 mg/L. The proposed effluent discharge target for uranium exceeds the acute water quality guideline, indicating effluent may pose the risk of being acutely lethal to aquatic biota at end-of-pipe. While uranium is not a Schedule 4 substance with prescribed concentration limits under the Metal and Diamond Mining Effluent Regulations (MDMER), the MDMER requires the characterization of uranium concentrations in effluent under Schedule 5, and requires that all mine effluent released from final discharge points be non-acutely lethal. Under Schedule 5 Section 9(d) of the MDMER, the Proponent will likely be required to conduct selenium fish tissue sampling if average annual concentrations of selenium in effluent equals or exceeds 5 ug/L. | Discharges from the proposed Project will alter water quality in the immediate receiving area, and this may include some sublethal effects on aquatic biota, which must be minimized. It remains the Proponent’s responsibility to adhere to the MDMER to ensure that effluent at the end-of-pipe from all final discharge points be non-acutely lethal and meet requirements for prescribed deleterious substances under Schedule 4 of the regulations. | Denison fully understands its obligations with respect to the MDMER and will comply with the MDMER end of pipe effluent discharge criteria. |
| AD-29 | CNSC | Section 8.3.3 Figures 8.3.5 etc. 8.5-4 | It does not appear that aquatic baseline sampling maps for Russell Lake have LAB 1 and 2 locations showing the baseline sampling locations within Russell Lake. (Figures 8.3.5). Please update the Figures throughout aquatic environment section to include of the baseline sampling studies/ locations within Russell Lake. | Please update maps and sections in EIS to reflect aquatic baseline studies that were completed. | Thank you for the advice comment. This will be addressed, as possible, once the EIS is updated following the conclusion of the information requirement (IR) process. |

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| AD-30 | CNSC | EIS sections 8.4.3.2.4 Benthic Invertebrate Community and 8.4.7.6 Climate Change Considerations | <p>ECCC EEM guidance recommends the use of multiple reference areas as it offers the greatest statistical power to detect a meaningful difference between a reference area and an exposure area and can also give an indication of variability among reference areas. It is also important to incorporate multiple reference locations into the study design to aid in designing against spatial confounding factors.</p> <p>Section 3 of the Aquatic Environment Baseline Study Report details the similarities between benthic invertebrate communities by using the mean Bray-Curtis index between sampling locations and the median reference condition for the lake group size. It's not clear in the EIS if there are any issues expected to be able to use this data to compare project effect locations to references sites into the future, as some sampling locations are currently not very similar to the reference sites. In addition, climate change could affect the sediment and benthic communities in the future. The EIS states “the frequency and magnitude of extreme precipitation events have the potential to change water levels and flows in the RSA, which may affect sediment transport, deposition, and therefore benthic invertebrate habitat. Changes to average and upper and lower bounds of ambient temperatures may also affect aquatic habitat, which in turn may affect benthic invertebrate communities. Climate change over the life of the Project (i.e., 35 to 40 years) will be monitored as part of the Project’s environmental monitoring programs, and influences on water quality, sediment quality, and benthic invertebrates will require adaptive management to mitigate any potential effects of the Project that may be exacerbated by climate-related changes on the aquatic environment”. It is recommended to ensure that appropriate number/location of reference sites are sampled to enable any changes to sediment or benthic invertebrate communities that may be due to climate changes, and not project effects, are able to be assessed.</p> | <p>Considering climate change may change the lake conditions from baseline conditions, and that there is already natural variability between lakes that will be used as reference lakes and exposure lakes, it could become difficult to show changes to sediment/benthic invertebrates are not due to project activities, therefore there is a recommendation to ensure the current baseline data is adequate, and to consider if additional data, and addition of additional reference stations, will be needed moving forward.</p> | <p>Changes in landscape influence and lake conditions are not limited to those brought about by climate change. The preparation of a study design under the MDMER EEM program strives to ensure that a single reference area or multiple reference areas are as representative of a control condition as possible. Best practice is to undertake an analysis of candidate reference areas using the existing baseline information and investigate their utility as controls prior to project development. A preliminary EEM study can be completed that will allow for a Before-After-Control-Impact study design, that will provide the ability to monitor change not only in the exposure areas, but in the reference areas, thereby allowing for a reasonable assessment of potential mine related impacts.</p> |
| AD-31 | CNSC | Section 8.4.6.1, Residual Effects Characterization | <p>The EIS states “Local Indigenous communities have expressed direct concern with respect to mercury. Mercury has not been identified as a COPC for the Project as it is currently not present in the receiving environment (i.e., background condition) at detectable concentrations and will not be produced as part of the mine process; therefore, it will not be discharged to the aquatic environment. However, it is understood that potential nutrient enrichment-related effects are possible and can be linked to increases in mercury in the environment.” Based off concerns from Indigenous communities, and the fact that phosphate is a COPC in the effluent, and elevated concentrations of mercury were measured near the</p> | <p>Please consider adding methylmercury to the environment sampling plans (such as fish dorsal muscle) in order to confirm there are no unexpected effects of the project on levels, and to satisfy stakeholder concerns.</p> | <p>Refer to response to IR-100.</p> |

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| | | | Kratchkowsky Lake bottom, adding methylmercury to the environment sampling plans may be beneficial. | | |
| AD-32 | CNSC | Section 9.1.8.3, Appendix 10-A (ERA) section 3.2.1.5 | <p>It appears there is no consistency between the assessment of soil quality in the ERA and the baseline soil sampling program presented in the EIS. The baseline program includes 10 soil permanent sampling locations (Appendix 9-B, section 2.5). Sampling at these locations is proposed to be continued during the Operation Phase, and monitoring data will be compiled and reported annually/periodically (EIS section 9.1.8.3). Conversely, the ERA estimates and predicts concentrations of COPC in soil based on atmospheric deposition. Furthermore, the location of ecological receptors in the ERA (Figure 5-2) is different from the permanent soil sampling plot locations (Appendix 9-B, Figure 2.5-1). It is unclear why measured baseline soil quality data were not discussed in the ERA and whether future monitoring data will be considered in the ERA to verify accuracy of predicted COPC concentrations</p> | <p>Please clarify how baseline measured data on COPC concentrations in soil is considered in the current and future iterations of the ERA.</p> | <p>Baseline measured soil data were used in the ERA to characterize the existing environment. The IMPACT model was used to predict the Project contributions for the Project phases above baseline. The baseline soil concentrations used in the model are provided in Section 3.5.1 and Table 3-8 of Appendix A in Appendix 10-A (ERA).</p> <p>The ERA will be revised according to the periodic review requirements in CSA N288.6-22 which will reflect ongoing data collected from monitoring programs.</p> |
| AD-33 | CNSC | Section 9.3.3.1.2 | <p>Indigenous knowledge is summarized with regard to moose, including:</p> <ul style="list-style-type: none">· Calving sites close to the Wheeler River, with lots of muskeg in the area. A moose calving area is located in the Terrestrial RSA, southwest of the Project Area.· A wildlife corridor is used by moose, running between Cree Lake (outside and to the west of the Terrestrial RSA) and Russel Lake (in the southern portion of the Terrestrial RSA). <p>It is unclear how this information is incorporated into the residual effects assessment.</p> | <p>Please clarify how Indigenous knowledge on moose calving sites and corridors in the RSA is incorporated into the residual effects assessment for the key indicator “moose”.</p> | <p>The sites identified by IK were explicitly considered in the impact assessment as indicated by their identification as overlapping with the Terrestrial RSA as noted in the question. However, the areas were not expressly discussed in the residual effects assessment because there is no anticipated spatial overlap of those areas with direct or indirect Project effects.</p> <p>The Indigenous Knowledge provided by ERFN and SVS (2022) identifies a moose calving site (Feature 1001-08) ~ 2 km southwest, and a wildlife corridor ~6 km south of the Project Area (as depicted in Figure 4. Map B, page 16 of ERFN and SVS 2022). Both areas are within the Terrestrial RSA but outside the Wildlife LSA. The reference to “Calving sites close to the Wheeler River...” refers to a broad area that is 45 km east of the Project Area, well beyond interactions with the Project Area.</p> <p>The presence of the areas identified through IK was acknowledged in Section 9.3.3.1.2 (Information from Indigenous Knowledge, Local Knowledge, and Engagement) in Part II, Sec. 9 of the Draft EIS. The assessment (Sec. 9.3.4.2) considered alteration and/or habitat loss at the LSA and RSA scale. Section 9.3.4.2.1 (pg. 9-210) summarizes the effects on moose habitat as follows: “Habitat alteration through sensory disturbance effects (such as noise, dust deposition, and artificial light) is expected to result in reduced habitat quality and effectiveness near Project components and infrastructure reaching beyond the Project Area into the Wildlife LSA....”</p> <p>Further, Sec. 9.3.6.2.1 (Alteration and/or Loss of Habitat, pg. 9-230) identifies that an area within a 500 m radius of the Project Area will be influenced by the Project and likely make the habitat within that area less suitable for use by moose. Therefore, the effects of the Project on moose calving have been appropriately assessed and are expected to be contained within the Wildlife</p> |

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| | | | | | LSA. That affected area does not overlap with the moose calving site or the wildlife corridor identified by IK. |
| AD-34 | CNSC | Appendix 9-B | Baseline studies for birds are restricted to short time frames in one year only, for example: <ul style="list-style-type: none">· Breeding Songbird Point Count Call Survey (June 7 and 17, 2017)· Aerial Waterfowl and Raptor Stick Nest Survey (June 15 and 16, 2017) The Canadian Wildlife Service (2022) recommends: <ul style="list-style-type: none">· Consider the potential effects of projects on birds throughout the year and document the distribution and abundance of birds in all seasons. Some species may be under-represented in existing data bases due to temporally restricted periods of detectability.· Explicitly target species at risk and other focal species.· Conduct at least two years of field surveys as a national standard for major projects, so that temporal variability can be considered in future comparisons to baseline data. Reference: Canadian Wildlife Service. 2022. Guidance Regarding Data Needed to Support Assessment of Project Effects on Birds. Environment and Climate Change Canada, Gatineau, Quebec. 80 p. | Please consider conducting surveys following CWS’s recommendations or provide an explanation as to how current baseline data for birds is sufficient to characterize the existing environment. | The data collected as part of the baseline studies for birds was focused on the habitat types and areas most likely to be disturbed as a result of the Project. Conducting additional baseline surveys for waterfowl, raptors, and breeding birds is not anticipated to result in changes to the assessment outcomes and predictions made as part of the effects assessment, which was habitat-based, for avian species. The assessment methods used a conservative approach with the assumption that following the implementation of site-specific mitigation measures, the proposed Project activities would have a residual effect on these species guilds regardless of species presence on site. However, to supplement the species data that were collected as part of the baseline field program, Denison is willing to acquire additional information on species presence in the RSA from existing sources, specifically from the Saskatchewan Breeding Bird Atlas (Birds Canada). However, collection and consideration of this information is not expected to affect the findings and/or conclusions stated in the draft EIS as the assessment was habitat-based to address all species. |
| AD-35 | CNSC | Section 10, IMPACT MODEL | Denison discusses details of the IMPACT model but has not provided scenario(s) used to facilitate review. | Please consider providing CNSC with the IMPACT model scenario file(s) in the spirit of regulatory cooperation. | The intent of Appendix A to Appendix 10-A is to provide the inputs used for the IMPACT model as well as all of the characteristics for human and ecological receptors. Where site-specific data were not used in the model it can be assumed that default values from CSA N288.1-20 were used in the IMPACT model. As such, Denison does not intend to provide the scenario files. |
| AD-36 | English River First Nation (ERFN) | Section 10.1.3.2, Traditional Foods Diet (p. 10-15) | The EIS States: "The ERFN is comprised of seven reserve lands across Saskatchewan" (p. 10-15). While this is accurately reflecting a source document, the source document is incorrect. | Please update to "The ERFN is comprised of seven historical settlements that have now grown into 19 different reserves across Saskatchewan" | Thank you for the advice comment. This will be addressed, as possible, once the EIS is updated following the conclusion of the information requirement (IR) process. |

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Advice to the Proponent | Denison Response |
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| AD-37 | CNSC | Section 10.1.9, Human Health Summary and Appendix 10-A – 4.4.1 Risk Estimation | The Human Health section of the EIS, as well as the ERA, indicates that there is an exceedance for selenium for the fisher/trapper receptor, with the Project estimated to contribute to the majority of this exceedance (0.93 of the HQ). While the assessment is conservative by assuming an increase intake rate of fish solely sourced from Russel Lake, the precautionary principle should be considered to ensure in reality the HQ for selenium remains below 1, even under conservative assumptions. | Please conduct of effluent, water, and aquatic organism monitoring (as already suggested in EIS) to confirm HQ's are highly conservative in the EIS modelling and receptors remain protected. Should it be determined Se concentrations are increasing in the environment at such a rate as there may be in impact to the environment or human health, installation of a selenium removal circuit into the effluent treatment process should be considered. The proponent should ensure that the proposed wastewater treatment system design incorporates the capability for expansion or upgrades in alignment with the precautionary approach, pollution prevention, and continuous improvement. | Denison acknowledges that a robust effluent and environmental monitoring program will be developed to confirm all EIS modelling predictions. The ERA will be revised according to the periodic review requirements in CSA N288.6-22 which will reflect ongoing data collected from monitoring programs. |
| AD-38 | CNSC | Appendix 10-A (ERA) | It is unclear if measured or modelled COPC concentrations in blueberry were used in the calculations of human receptor dose. Similarly, it is unclear if measured or modelled COPC concentrations in lichen and blueberry were used in the calculations of ecological receptor dose. CSA N288.6-22, Clause 7.3.6 states that "Measured concentrations of COPCs should be used, where possible, in the exposure assessment." Please see the Clause for further information. | Please clarify if measured or modelled COPC concentrations in blueberry / lichen were used in the calculations of human and ecological receptor dose. | Measured baseline lichen data were used in the ERA to characterize the existing environment. The IMPACT model was used to predict the Project contributions for the Project phases above baseline. Measured baseline blueberry data were used for model calibration to determine if there was good agreement between measured data and modelled data. The IMPACT model was used to predict both baseline and Project contributions for blueberries. The ERA will be revised according to the periodic review requirements in CSA N288.6-22 which will reflect ongoing data collected from monitoring programs. |
| AD-39 | CNSC | Appendix 10-A (ERA), Table 2-2 | Table 2-2: Estimated Home Ranges of Selected Terrestrial Ecological Receptors Based on the reference McLoughlin et al. (2016), the Home Range for Woodland Caribou is indicated as "Expected = 80 km2" which represents the mean range sizes pooled over the two study years for calving/post-calving. The indicated Minimum (67 km2) and Maximum (267 km2), however, do not relate to the calving/post-calving stage, which is not clearly stated in Table 2-2. In contrast, these values are actually mean range size values for autumn/rut and early winter, respectively, as described in the source document on Page 83 (McLoughlin et al., 2016). It should be noted that in terms of true minimum and maximum, the source document states that individual home ranges, based on up to two years of GPS locations, varied in size from 16.2 km2 to 1363.9 km2 (Page 82 of McLoughlin et al., 2016). Reference: McLoughlin et al. 2016. Population dynamics and critical habitat of woodland caribou in the Saskatchewan Boreal Shield. Interim Project Report, 2013–2016. Department of Biology, University of Saskatchewan, Saskatoon. 162 pp. Available online at http://mcloughlinlab.ca/lab/wp-content/uploads/2019/06/2013-2016-SK-Boreal-Shield-Caribou-Project-Interim-Report-Nov-18-2016.pdf | Please provide clear details on the source of the home range values listed in Table 2-2. | Denison acknowledges the comment and will add clarification in Table 2-2 of Appendix A in Appendix 10-A that the minimum represents the autumn/rut and the maximum represents the early winter. |

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Advice to the Proponent | Denison Response |
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| AD-40 | CNSC | Appendix 10-A (ERA) section 3.2.1.5 | Although the soil type selected in the ERA for modeling of atmospheric deposition to soil is sandy soil, organic soils have been delineated and characterized (section 9.1.3.3 of the EIS) as valued component (i.e., “Organic Matter/Peat”). It is unclear if the soil quality modeling performed in the ERA is protective for soil types other than sandy soil. | Please clarify if COPC modeling based on sandy soil is protective of organic/peaty soil and provide justification. | The majority of the soil in the Project Area and LSA is considered sandy soil. Section 9.1.3.2 of the EIS states "Mineral soils are associated with upland sites and (in all likelihood) anthropogenically disturbed land that, together, correspond with >99% of the Project Area and 91.5% of the LSA (Figure 9.1-8). The predominate mineral soils within the RSA have been classified as Sandy Dystric Brunisols (Smith et al. 2011)." Organic matter/peat was included as a VC in the EIS because of the concern regarding drying and losing biological function through groundwater interactions, and not in terms of assessment of soil quality. Additionally, Section 9.1.3.3 of the EIS acknowledges that organic soils is limited in the Project Area. As such, this comment is considered not applicable. |
| AD-41 | CNSC | Appendix 10-A (ERA), Table 5-5 | Table 5-5: Complete Exposure Pathways for All Selected Ecological Receptors to be Assessed using the IMPACT Model The exposure pathway for phytoplankton is stated as “direct contact in sediment”, however, phytoplankton live suspended in the water column. It is acknowledged that in the IMPACT modelling report, phytoplankton is described with an occupancy factor of 1 in water (Table 2-5). | Please add the pathway “direct contact in water” to Table 5-5 and revise all calculations accordingly. | Table 5-5 will be revised to state “direct contact in water” for phytoplankton. No calculation changes are needed. |
| AD-42 | CNSC | Appendix 10-A (ERA), Table B.12 | Table B.12: Sample Calculation – Adult Recreational Fisher/Hunter (McGowan Lake) Dose and Risk Calculations for Selenium The source for the Terrestrial Plant Ingestion Dose for Labrador tea and blueberry is stated as “Table C.5”, however, this table could not be located. | Please provide the referred-to Table C.5 or an alternate source of information for the Terrestrial Plant Ingestion Dose for Labrador tea and blueberry. | Thank you for the advice comment. This will be addressed, as possible, once the EIS is updated following the conclusion of the information requirement (IR) process. |
| AD-43 | CNSC | Appendix 10-A (ERA), Environmental Risk Assessment for Wheeler River Technical Support Document | The ERA is prepared by Ecometrix and submitted to Denison Mines. It is unclear if the ERA submitted has been reviewed and accepted by the proponent (Denison Mines). CSA N286-12 clause 9.5.5 specifies that “the selected supplier’s technical documents that are required to be submitted shall be reviewed and accepted”. Meeting these CSA N286-12 requirements will ensure that the proponent has control of the purchased services as a future licensee applicant. | Provide clarifications if ERA documents have been reviewed and accepted by the proponent. | See response to IR-202 which indicates that Denison reviewed and accepted the ERA. This text will be added to Appendix 10-A. |

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Advice to the Proponent | Denison Response |
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| AD-44 | CNSC | Section 11 | It is not clear whether all of the interested Indigenous Nations and communities were engaged on the results and findings of the Heritage Resources Impact Assessments (HHRIA) or just ERFN? | CNSC staff would appreciate an update on any engagement activities that have taken place with regards to any of the HHRIAs for the Project, or any site or thing that is of historical, archaeological, paleontological or architectural significance as requested by other Indigenous Nations and communities to date. | <p>Denison confirms that the results of the Project-related HRIAs were discussed with ERFN, as they expressed interest in further understanding the nature of the work undertaken.</p> <p>The Saskatchewan Ministry of Parks, Culture and Sport, Heritage Conservation Branch (HCB) administers The Heritage Property Act. Regulatory approval as per section 63 of The Heritage Property Act (GS 80) was granted for the Project for the two separate HRIAs (HCB File No. 16-2102, December 14, 2017 and HCB File No. 19-933 February 12th, 2020).</p> <p>The results of the HRIAs were included and formed part of the draft EIS. Comments made by Indigenous communities on this section of the EIS will therefore be responded to accordingly by Denison, where appropriate.</p> <p>Additionally, as noted in Section 11.3.2, “The Heritage Resource Management Plan (HRMP) was informed by engagement with ERFN, who recommended that the HRMP should include a mechanism to involve Indigenous communities where appropriate (21-EN-ERFN-591.1; 21-EN-ERFN-591.2) (see Appendix 11-B).”</p> <p>The mechanism to involve Indigenous communities has been included in the HRMP and allows for general notification to Indigenous communities should an artefact be found, which provides flexibility to engage all appropriate Indigenous nations accordingly.</p> |
| AD-45 | CNSC | Section 11.1.4.5.2. Perceived Suitability/Safe Use of Resources (p. 11-59) | The EIS States: “Section 2.6.1 in Section 2 describes the extensive review of mining methods that led to the decision to adopt the ISR mining method.” (p. 11-59). This reference is not correct, as this section does not contain a review of the mining methods. | Please update this to reflect the appropriate section. | Thank you for the advice comment. This will be addressed, as possible, once the EIS is updated following the conclusion of the information requirement (IR) process. |

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Advice to the Proponent | Denison Response |
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| AD-46 | TC | Section 14.6.7.2 | <p>Transport Canada would like to clarify that although the proponent may use a third party to assist in developing emergency response assistance plans (ERAPs), it is the proponent’s responsibility to submit the ERAP application(s) to Transport Canada, per Section 7(1) of the <i>Transportation of Dangerous Goods Act, 1992</i> as follows:</p> <p>Emergency response assistance plan</p> <p>7 (1) No person shall import, offer for transport, handle or transport dangerous goods in a quantity or concentration that is specified by regulation — or that is within a range of quantities or concentrations that is specified by regulation — unless the person has an emergency response assistance plan that is approved under this section before</p> <p>(a) importing the dangerous goods;</p> <p>(b) offering the dangerous goods for transport; or</p> <p>(c) handling or transporting the dangerous goods, in the case where no other person is required to have an emergency response assistance plan under paragraph (a) or (b) in respect of that handling or transporting.</p> | <p>*This advice pertains to the regulatory phase.*</p> <p>Transport Canada notes that the sentence highlighted in yellow below is incorrect and should be revised or removed. While a contractor could assist the proponent to develop the ERAP(s), it is the responsibility of the proponent to apply to Transport Canada for approval of the plan(s).</p> <p>14.6.7.2 Design and Mitigation Considerations Principal traffic risk mitigation measures include:</p> <ul style="list-style-type: none">• traffic control measures such as speed limits;• travel management plans;• spill and emergency response planning; and• driver training. <p>Additionally, Denison considered several provisions to make sure that the effects of a terrestrial release of hazardous materials are as low as practicable. In addition to transportation mitigations listed for Scenarios 1 and 2, the following provisions were considered.</p> <ul style="list-style-type: none">• The Transportation of Dangerous Goods Act, 1992 (Government of Canada 2019) outlines the requirements for entities that transport dangerous goods to establish emergency response assistance plans. These plans list specialized personnel and equipment that are required for responding to an incident. <i>It is expected that a contractor responsible for the transportation of uranium concentrate, fuel, and hazardous chemicals would develop these plans.</i> | <p>Acknowledged. Section 14 will be updated in the final EIS to clearly state that while a contractor could assist Denison to develop the ERAP(s), it is Denison’s responsibility to apply to Transport Canada for approval of the plan(s).</p> |
| AD-47 | Health Canada (HC) | Appendix 14-A (p. 8-9) | <p>Context: No emergency response plan has been provided within the draft EIS, which states that emergency response plans will be developed in the future (Section 14 Appendix 14-A, p.8-9).</p> <p>Rationale: For any emergency event, Health Canada considers the protection of human health as a primary consideration in the development of emergency preparedness and response plans.</p> <p>This includes monitoring for human health impacts and the provision of health-related guidance. Further, this will be a requirement of the licensing process.</p> <p>The proponent should ensure that the emergency response plans consider the protection of all relevant potential human receptors that could be impacted by an onsite or project-related off- site accident involving the release of chemical and/or radiological substances.</p> | <p>It is recommended that Denison develop an emergency response plan in consultation with potentially affected communities and stakeholders that includes, but is not limited to, the following:</p> <ol style="list-style-type: none">1. All relevant contact information of the communities, especially related to km 160 of Hwy 914, which is the location of a cultural camp that has been established by the English River First Nation and km 67 of Hwy 914 that is a gathering location for the Kineepik Metis Local associated with the Northern Village of Pinehouse.2. Description of the mechanisms for communication with communities in case of an emergency.3. Description of the partnership with and the training of local communities and local responders (see Section 14 Appendix 14-B, p.1).4. Description of mutual aid agreements with neighboring industries/municipalities, where appropriate. | <p>Denison acknowledges the comment and thanks Health Canada for the recommendations as to the development of its Emergency Response Plan.</p> <p>As noted in the draft EIS, Denison has committed to the development of an Emergency Preparedness and Response Program as a component of its Environmental Management System (EMS). The objectives of the program are generically consistent with the recommendations that have been provided and Denison, as it has demonstrated to date, is committed to meaningful engagement with communities of interest and will solicit input and advice during all aspects of program development.</p> <p>For reference it is noted that as it concerns its EMS framework documentation hierarchy it is expected that three levels of documentation will be developed – Programs, Plans and Procedures. The emergency preparedness and response documentation will follow this hierarchy and input from interested parties will be solicited during all phase of program/plan/procedure development. Denison intends to develop this documentation as it advances through the licensing phase of Project realization.</p> |

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| AD-48 | ECCC | Appendix 16-C, Summary of Monitoring and Follow-up Programs | Appendix 16-C does not include consideration of any monitoring and follow-up programs regarding GHGs. | ECCC recommends that the Proponent consider developing a GHG follow-up program to measure and compare actual GHG emissions against the draft EIS estimates, including reporting the Project’s actual emissions and updating the emissions estimates as needed. | Denison anticipates being subject to ECCC’s reporting requirements for emitters over 10,000 tonnes CO2e and the information is collected under section 26 of the Canadian Environmental Protection Act. This was noted in the draft EIS, Section 2.5 Greenhouse Gas Emissions. |
| AD-49 | ECCC | Appendix 16-A Summary of Residual Effects Appendix 16-B Summary of Cumulative Effects | ECCC notes that GHG mitigation measures have not been considered for the Project. Furthermore, the Project’s lifetime is expected to extend into 2050 and beyond. Consistent with the information requirements of the SACC, and aligning with Canada’s commitment to achieve net-zero GHG emissions by 2050, the Proponent should provide a credible plan that describes how the Project will achieve net-zero emissions by 2050. | ECCC recommends that the draft EIS include an assessment of potential GHG mitigation measures throughout all phases of the Project. This could include a Best Available Technologies / Best Environmental Practices (BAT/BEP) Determination, as described in Section 3.2 of the Draft Technical Guide. ECCC also recommends that the Proponent provide a credible Net-Zero Plan on how to achieve the target of 0 kt CO2 eq/year, for the year 2050 and beyond, following the guidance of the SACC and the Draft Technical Guide. | <p>GHGs were not included as a VC or KI in the draft EIS and as such, there are no specific GHG-related mitigation measures in Appendix 16. However, many of the mitigation measures for the VC Air Quality related to combustion products would also be associated with a reduction in the Project’s Scope 1 emissions. As noted in the draft EIS, Section 2.5, at this stage in the Project Denison will look for opportunities to optimize energy management and improve the energy intensity of the Project where practical. Also see response for AD-19 (second paragraph).</p> <p>Denison will consider the option of preparing a climate resiliency assessment with consideration to best available technologies / environmental practices (BAT/BEP) as well as a net-zero plan as the Project advances. Section 2.5 of the EIS provides a summary of the anticipated GHG releases and a comparison to the nation- and province-wide GHG emissions. The project is expected to contribute less than 0.0043% to the nation-wide annual average. Given this very low contribution, the project is not expected to impact Canada’s ability to meet its climate-related objectives and targets.</p> |

Annex 2

Federal Indigenous Review Team (FIRT) – Advice to the Proponent for the Wheeler River Environmental Impact Statement (EIS) November 2023

**The [March 2023 Advice to the Proponent table](#) with Denison’s responses are available below

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Advice to the Proponent |
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| AD-50 | Environment and Climate Change Canada (ECCC) | Section 2.2.1.4.2, Wellfield Operation Section 2.2.1.4.2.2, Secondary Containment of Mining Solution – Pumping | Providing a report or memo by the Proponent’s consultant Newmans Geotechnique Inc. as a public record will more effectively explain the “information on the freeze wall integrity and basis for the design, which relies on site field data and lived experience from several exiting [sic] Saskatchewan mining operations”, than a summary (attachment IR-10) of the material presented by Greg Newman during the meeting with the FIRT on April 19, 2023. | The response from the Proponent in IR-10 is accepted based on the meeting between ECCC, Denison and the CNSC, as well as the Proponent’s consultant and the presentation by Greg Newman (Newmans Geotechnique Inc.) as well as the summary of the meeting noted in attachment IR-10. However, the Proponent should provide a public record of the consultant’s memo or a report that explains the details of the freeze wall containment and monitoring that were provided during the April 19, 2023 meeting instead of the summary provided by the Proponent in attachment IR-10. |
| AD-51 | Canadian Nuclear Safety Commission (CNSC) | Section 8.3.3 and 8.5, Aquatic Environment and Fish health | Denison has committed to additional baseline data gather as part of their response to IR-107. | Also related to IR-120 and IR-125, CNSC staff recommend Russell Lake be included in this baseline collection to increase the robustness of the established baseline in the final EIS. |
| AD-52 | CNSC | Section 8.3.3.1, Methodology and Metrics | Denison has indicated that exposure to other pre-existing stressors could result in abnormal conditions or deformation(s) in existing population, but the extent of existing conditions should be evaluated to ascertain whether the rate is increasing as a result of proposed activities once in operation. | Related to IR-121, CNSC staff recommend that Denison add text to EIS to reflect that no gross abnormalities in fish were observed during field work. |
| AD-53 | CNSC | Section 8.3.8, Monitoring and Follow-up | Section 8.3.8 of the EIS states: "Changes in fish communities/populations will be assessed through comparison of Construction, Operation, and Decommissioning results to pre-development." Tracking changes in fish communities / populations in reference lakes over time should be conducted, as reference lakes can be used to differentiate natural temporal variation with potential project impacts. Denison has committed to inclusion of reference lakes in study designs used to assess changes in fish communities / populations over time. | Related to IR-122, CNSC staff recommend that Denison strengthen discussion of reference lakes, and their use, in EIS. |
| AD-54 | CNSC | Section 9 Various pages in section 11.1, Land and Indigenous Resource Use Section 12 Section 14 | The increased road traffic (14-18 trucks per day during construction/operations) may have indirect impact on ungulates, furbearers and wood land caribou presence/absence for traditional and subsistence hunting have been raised to CNSC staff when meeting with Indigenous Nations and communities and are presented in the EIS. | Related to IR-128, Denison should have follow-up discussions with the Ministry of Saskatchewan Highways, Indigenous Nations and communities (including KML and ERFN) and stakeholders regarding adding additional pull-outs to the highway to ensure safety for northern residents. |
| AD-55 | ECCC | Section 9.2.5.2.7, Waste and HazardousMaterials Management | Vehicles and equipment with engines adhering to Tier 4 emission standards should be employed where feasible in order to minimize emissions. Regardless of engine tier used, best management practices should be followed, including proper maintenance of engines and anti-idling measures. | Related to IR-139, the Proponent should commit to following best management practices regarding the use of vehicles and equipment, including proper maintenance of engines and anti-idling measures. |
| AD-56 | ECCC | Section 9.3.1.3.1, Spatial Boundaries for Ungulates, | The EIS and the IR response did not provide sufficient information to understand how the Regional Study Area (RSA) boundaries for caribou were determined. | Related to IR-137, An assessment typically involves setting a geographic area for the assessment for the direct and indirect effects of a proposed project; this area is sometimes referred to as the Local Study Area (LSA). ECCC advises that the LSA is |

¹ Unless otherwise stated, the section noted refers to the draft EIS

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| | | Furbearers and Woodland Caribou | | <p>likely to extend beyond the Project footprint and a 500m buffer. ECCC demonstrated that the application of a 500m buffer to mapped anthropogenic features best represents the combined effects of increased predation and avoidance on caribou population trends at the national scale (Environment Canada, 2011). However, adverse effects of projects including predator and prey access to undisturbed areas, reduction in connectivity, and sensory disturbance to individuals of boreal caribou can vary and extend several kilometers depending on project activities and ecological context. The LSA should at the minimum capture the above-mentioned effects.</p> <p>A Proponent will also set a geographic area for the assessment within which the cumulative effects of the proposed Project are possible; this is sometimes referred to as the RSA. Typically the range(s) is(are) the proper scale to assess cumulative effects. However, assessing cumulative effects may require a different approach for large continuous ranges than for smaller discrete ranges. The impact of disturbance that may be concentrated in part of a large continuous range may be masked given the size of the range. For large continuous range it may be relevant to assess cumulative effects at the scale of the range but also at a smaller scale.</p> <p>The Proponent should consult with experts of the relevant jurisdiction in order to determine the local and regional study area, and provide a justification of the extent of the study areas in the impact statement.</p> |
| AD-57 | ECCC | Section 9.4.5.2.1 Work Timing Windows and Habitat Disturbance | <p>In their response to IR-167, the Proponent states: “Site clearing and other works that involve disturbance of vegetation and/or soil will be completed during least-risk timing windows for migratory birds and SAR (i.e., winter), where practical, to avoid disturbance during sensitive time periods. It is noted that additional information related to timing windows and species as it concerns Project activities has been provided in response to IR-134.</p> <p>Pre-clearing surveys will be conducted and set-back buffers implemented, as needed. The pre-clearance surveys will be completed prior to all clearing events, regardless of the time of year / season when clearing is set to occur. If nests or tree cavities should be encountered during pre-construction surveys or ongoing monitoring activities, any subsequent Project activities will be in accordance with the 2022 Migratory Birds Regulations.”</p> <p>ECCC does not recommend the use of nest searches or pre-clearing surveys for active bird nests during the breeding season as a mitigation. Instead, ECCC recommends that clearing and grubbing activities not be conducted during the breeding bird season.</p> <p>ECCC does not recommend active nest searches in most cases and for most species, in part because there is a great degree of difficulty associated with reliably detecting nests and a high likelihood of disturbing or damaging active nests while searching.</p> <p>Exceptions to the general nesting period exist, and these include interannual variation and nest searches for certain species which may breed outside of these general periods. Under the MBCA it is prohibited to destroy a nest with a live bird or viable egg, even if this occurs outside of what might be considered a normal nesting period.</p> | <p>Related to IR-167, provide details on how vegetation clearing related to site development will be conducted to avoid harm to migratory birds and species at risk (SAR).</p> |
| AD-58 | HC | Section 10.1.4.2.1 (p. 10-22) Appendix 10-A (ERA): Appendix B | Section 6 of the Draft EIS contains Table 6.1-1 (p. 6-7), which lists radionuclides as a key indicator for air quality. | <p>Related to IR-177, consider rewording Table 6.1-1 to “radon” instead of “radionuclides” to avoid confusion.</p> |

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| | | Table B.9, Ref. 19-2638 Section 6, Table 6.1-1 (p. 6-7) | Only uranium and radon are considered in Section 6, and Section 10 Table B.9 does not include doses from uranium progeny in air. | |
| AD-59 | CNSC | Section 10.1.6.1.1, Human Receptors Selection and Characterization | <p>Within the Human Health assessment, offsite receptors during the operation period are only considered downstream of Whitefish Lake. The only identified concern was for Se to the Fisher/Trapper located at Russel Lake. This section cites Indigenous Knowledge as informing the receptor selection and location.</p> <p>While the assessment is fairly conservative in the assumptions made on intake and receptor habits, it stands to reason that if the trapper receptor was located closer to the operation, such as at McGowan or Whitefish Lakes, this exceedance of Se could be more pronounced.</p> <p>In terms of maintaining a conservative assessment, if the most vulnerable receptor can be shown to be protected at the point of highest expected COPC concentration, it can be concluded that this receptor would be protected further away from the project. Considering this, why was the hunter/trapper receptor not also assessed at Whitefish or McGowan Lake? Was Indigenous Knowledge specific in mentioning Whitefish or McGowan Lakes were not used for the activities carried out by identified receptors?</p> | <p>Denison has addressed IR-180, but has not considered the suggestion for establishment of additional treatment technologies of COPCs.</p> <p>CNSC staff maintains that there may be the need to establish additional treatment for effluent should environmental monitoring during operation indicate COPC's are accumulating in the environment beyond what is anticipated in the EIS.</p> <p>This is a firm reminder that this will be evaluated as part of the licensing phase of the project, should it proceed.</p> |
| AD-60 | CNSC | Section 11, Perceived Risks to Lands and Resources | <p>The EIS states: “Resource users may also experience changes in their perception of the quality of resources for consumption such as the palatability of fish or wildlife or have apprehensions about the safety of resources for consumption. These changes may affect the patterns of ILRU during all Project phases including Post Decommissioning. The ERFN refer to this indicator as a “psycho-social’ effect, meaning that even if people know their fears are “<i>perceived fears, the fear ... is real and has real impacts on ERFN members’ perception of their overall health and well-being</i>” (ERFN and SVS 2022a).” (p. 11-11)</p> <p>CNSC’s Generic Guidelines for the Preparation of an EIS state: “The EIS will document specific suggestions raised by Indigenous groups for mitigating the effects of changes to the environment on Indigenous peoples (section 5(1)(c) of CEAA 2012). For the mitigation measures intended to address the effects of changes to the environment for Indigenous peoples, the Proponent must discuss the residual effects with the Indigenous groups prior to submitting the EIS.” These changes may affect the patterns of ILRU during all Project phases including Post Decommissioning.</p> | <p>Related to IR-207, as Denison continues to work with Indigenous Communities of Interest on community specific monitoring regimes, please provide additional information in the IER on any updates on engagement activities to date that have taken place with KML and ERFN and any other Indigenous Nations and communities who utilize the area, with respect to follow-up monitoring plans that are being developed to support the Project licensing and permitting.</p> <p>If Denison has made commitments with respect to this, this is information that should also be included in the commitments report.</p> |
| AD-61 | CNSC | Various sections of the EIS, including: Section 9 Section 10 Section 11, including Section 11.1.4.3.1 (p. 11-46) Section 12 Section 16 | <p>ERFN indicated they are concerned about declining moose populations from an influx of hunters; more people may be accessing the area year after year, and worried populations may be affected by the Project (21-EN-ERFN-473.13).</p> <p>Further, the EIS highlights that: “Vehicle collisions are the most likely source of direct mortality for moose. Effective mitigation measures (e.g., breaks in snowbanks; speed limits; and exclusion fencing around contaminated waste pads and ponds) will be implemented to reduce moose mortality.” (p. 11-46)</p> <p>To address potential concerns specific to Project related effects to wildlife species of interest to the Indigenous Communities of Interest, Denison has committed to collaborating with ERFN and KML on a monitoring regime suited to each of their interests and needs.</p> | Related to IR-129, Denison needs to ensure that the proposed monitoring regime with ERFN, KML and other Indigenous Nations who utilize the area are included in the commitments table for future EIS submissions. |
| AD-62 | CNSC | Various sections of the EIS, including: Section 8 Section 9 | IR-238 requested that Denison provide additional information to demonstrate whether Indigenous Nations and communities were engaged directly on the potential mitigation and monitoring measures to address the concerns raised regarding potential impacts of the Project on the potential or established Indigenous and/or treaty rights. | Related to IR-238, If Denison has made commitments with respect to engagement activities with Indigenous Nations and communities on potential , this is information that should be included in the commitments report. |

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Advice to the Proponent |
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| | | Section 10 Section 11 Section 12 Section 15 Section 16 Appendix 16-C (p. 3) | As well, it requested that Denison provide a rationale if this engagement has not been completed. As the Project develops, please provide concrete actions Denison will take in the follow-up and monitoring programs to engage Indigenous Peoples to alleviate concerns and incorporate their interests, and when this engagement is planned to take place. | |
| AD-63 | ECCC | Appendix 6-C Climate Baseline and GHG Emissions Report | ECCC recommended that the identification of the sources of GHG emissions and quantification of these emissions be described for the post-decommissioning phase, as was done for the other phases. ECCC recommended that the Proponent discuss the potential impacts that the Project may have on Canada’s ability to meet its climate-related targets, following the guidance of the Strategic Assessment of Climate Change (SACC) and the Draft Technical Guide Related to the Strategic Assessment of Climate Change: Guidance on quantification of net GHG emissions, impact on carbon sinks, mitigation measures, net-zero plan and upstream GHG assessment. | Related to AD-18 , ECCC recommends the identification of the sources of GHG emissions and quantification of these emissions be described for the post decommissioning phase. This information will be useful for future development of a net-zero plan. |
| AD-64 | ECCC | Appendix 6-C Climate Baseline and Greenhouse Gas Emissions Report | ECCC noted that more specific data, such as regional data from provinces, forest companies, or literature may be available. The use of Table 20 of the draft Technical Guide does not apply. ECCC recommended that the Proponent also consider biomass that are not aboveground and confirm whether soil carbon is taken into account, as well as wetlands. ECCC recommended that the Proponent provide a quantitative and qualitative description of the Project’s impact on carbon sinks, following the guidance of the SACC and the draft Technical Guide. | Related to AD-19 , ECCC recommends that the Proponent revisit the land use calculation provided in the draft Environmental Impact Statement as the use of Table 20 of the draft Technical Guide for the above ground mass of vegetation species is not appropriate. This table is for above-ground woody vegetation in cropland systems which does not apply in this instance. A simple site survey would determine above-ground biomass on site using basic information such as site class and species. More specific data, such as regional data from provinces, forest companies, or literature may be available, while generic national data is available (e.g., Biomass Estimates for Major Boreal Forest Species in West-Central Canada (publications.gc.ca), Canada’s Forest Biomass Resources: Deriving Estimates from Canada’s Forest Inventory (nrcan.gc.ca)). ECCC reiterates the advice that the Proponent provide information regarding the consideration of biomass that are not above ground, specifically whether soil carbon and wetlands are taken into account. ECCC also restates the advice that the Proponent provide a quantitative and qualitative description of the Project’s impact on carbon sinks, following the guidance of the SACC and the draft Technical Guide. |
| AD-65 | CSNC | Appendix 7-A, Section 4.3.3, Hydrochemistry by Hydrostratigraphic Unit Appendix 7-C, Section 3.5 | In response to IR-82, Denison highlights the importance of the S redox couple (S(2-)/S(6+)) near the ore zone. | Related to IR-82, CNSC staff recommend that Denison consider the inclusion of hydrogen sulfide test kits for in-field measurements of H2S to supplement qualitative interpretations (e.g., absence of "rotten egg" odor associated with sulfide) relating to redox conditions. |
| AD-66 | ECCC | Appendix 7-C, Numerical Modelling: Post Decommissioning Evaluation,Section 2.3.1.4, Desilicified Zone | The Proponent states in both the EIS and their response that a hydraulic conductivity value of 5x10 ⁻⁶ m/s was uniformly assigned to the model layers representing the Desilicified Zone. They additionally state that this value is consistent with packer and pumping tests screened in this unit that have interpreted hydraulic conductivity values ranging from 1x10 ⁻⁶ to 3x10 ⁻⁵ m/s (Appendix C), with a geomean of 6.0x10 ⁻⁶ m/s. In their IR response, the Proponent stated that the hydraulic conductivity used as the model base case (5x10 ⁻⁶ m/s) is similar enough to the geometric mean value (6x10 ⁻⁶ m/s) that no consequential change to the model would occur if the geometric mean were to be used. The use of the value of 5x10 ⁻⁶ m/s as the model base case was not substantiated. | Related to IR-89, while repeat modelling using the geometric mean hydraulic conductivityof 6x10 ⁻⁶ m/s is not required, include a statement in the EIS to indicate that the geometric mean hydraulic conductivity was not used in the model and providing justification for using the value of 5x10 ⁻⁶ m/s instead. |

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| | | | ECCC accepts the response to Part 1 of the IR as the Proponent has stated that 5x10 ⁻⁶ m/s and 6x10 ⁻⁶ m/s are similar enough hydraulic conductivities that redoing modelling with the geometric mean is not expected to consequentially change outputs for either the PHREEQC orFEFLOW model. However, the reasoning for selecting the value of 5x10 ⁻⁶ m/s was not clear. | |
| AD-67 | Health Canada (HC) | Appendix 10-A, Section 3.2.1.3.1, p.3.43-3.44 | <p>Inappropriate use of an outdated standard in assessing health and environmental effect(s) from short-term exposure to nitrogen dioxide (NO₂).</p> <p>The Draft EIS technical supporting document (Appendix 10-A) appears to misinterpret Health Canada’s 2016 Human Health Risk Assessment for Ambient Nitrogen Dioxide (NO₂) in setting its screening criteria and evaluating the health impacts from exposure to Nitrogen Dioxide. The document states:</p> <p><i>“Health Canada published a national one-hour maximum acceptable level of 400 µg/m³ for NO₂ in ambient air using a risk assessment approach (Health Canada, 2016b). This value considers sensitive human populations.”</i></p> <p>This statement is inaccurate.</p> <p>As indicated in Health Canada’s 2016 publication, this value (400 µg/m³) refers to the National Ambient Air Quality Objective (NAAQO) for NO₂, developed in the 1970s. The Canadian Ambient Air Quality Standards (CAAQS) were later developed in consideration of both human health and the environment to replace existing Canada-wide standards, including the NAAQOs, and in many cases are the most stringent Canadian air quality standard, guideline or objective.</p> <p>The new CAAQS for NO₂ also recognizes that there is no population health threshold for human health effects; therefore, any increase in exposure will result in an incremental population risk (Environment Canada and Health Canada, 2012; CCME, 2000). In other words, NO₂ is considered to be a non-threshold substances, meaning that health effects may occur at any level of exposure. Therefore, guideline values should not be construed as limits to which polluting up to is allowed.</p> | <p>The CAAQS are recommended as the most stringent air quality standard for assessing health and environmental effect(s) from short-term exposure to NO₂ in the project.</p> <p>The CAAQS are generally calculated for specific multi-year averages and for a particular statistical form so that extreme and unpredictable events do not drive risk management. However, if the data is not available for comparison to a full CAAQS timeframe, Health Canada suggests using model results for at least one calendar year to allow for a basic comparison with the CAAQS statistical form. The modelling results should be able to indicate the frequency of CAAQS exceedances, which can be used in the discussion as to whether any anticipated human health impacts are anticipated</p> <p>Modelled predictions within an air quality assessment’s study area should be compared to the most stringent air quality standards, guidelines or objectives applicable to the region that may be affected by project activities. In this case, CAAQS are the most stringent levels and CAAQS are not restricted to applications only within the context of the Air Quality Management System (AQMS). Evaluation against the CAAQS may be considered in determining the nature and severity of the project’s impact on air quality levels and the resulting mitigation measures that may be required to maintain good air quality levels or to prevent an exceedance of the CAAQS.</p> <p>As health effects can occur even at levels of exposure below the limits set out in the CAAQS, they should not be viewed as “pollute-up-to” levels. It should be acknowledgeable that health risks exist below the guidelines. In addition, the principles of keeping clean areas clean and continuous improvement are operative, thus proposed mitigation measures should not be confined to meeting the standards, but should also be targeted towards reducing population exposure to CACs associated with the proposed project.</p> <p>This advice is also relevant to IR-190 and may be of use in responding to that request for a comparison of the predicted maximum concentrations to the most protective applicable air quality standards available (i.e., CAAQS).</p> |
| AD-68 | ECCC | Appendix 16-A Summary of Residual Effects Appendix 16-B Summary of Cumulative Effects | <p>ECCC recommended the inclusion of an assessment of potential GHG mitigation measures throughout all phases of the Project including a Best Available Technologies / Best Environmental Practices (BAT/BEP) Determination, as described in Section 3.2 of the draft Technical Guide.</p> <p>ECCC also recommended the development of a credible Net-Zero Plan on how to achieve the target of 0 kt CO₂ eq/year, for the year 2050 and beyond, following the guidance of the SACC and the draft Technical Guide.</p> | Related to AD-49 , ECCC notes the comment provided by the Proponent stating, “Denison will consider the option of preparing a climate resiliency assessment with consideration to best available technologies / environmental practices (BAT/BEP) as well as a net-zero plan as the Project advances”. ECCC continues to recommend that the Proponent align with best practices by including in the EIS a Best Available Technologies / Best Environmental Practices (BAT/BEP) Determination and a credible Net-Zero Plan on how to achieve the target of 0 kt CO ₂ eq/year, for the year 2050 and beyond, following the guidance of the SACC and the draft Technical Guide. |
| AD-69 | CNSC | Appendix 16-C | The EIS and the Summary of Monitoring and Follow-up Programs provided in Appendix 16-C contains very high-level information. It is not clear which monitoring programs will be employed | For the next draft EIS submission, the evergreen Commitments Table should be updated to include: |

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| | | | <p>to demonstrate regulatory compliance, and compliance with the commitments Denison has made to its Indigenous and non-Indigenous Stakeholders.</p> <p>The CNSC’s Generic Guidelines for the Preparation of an Environmental Impact Statement (EIS), also state: “The EIS will then describe mitigation measures that are specific to each environmental effect identified. Measures will be written as specific commitments that clearly describe how the proponent intends to implement them and the environmental outcome the mitigation is designed to address.</p> <p>CNSC staff requested in the March 2023 letter to Denison (e-Doc 6991467) a Commitments Table for the Wheeler River EIS. This letter requested information of all commitments made by Denison with detailed information such as:</p> <ul style="list-style-type: none">✓ details of the commitment✗ which phase(s) of the project will the commitment be carried out (e.g., all phases)✓ where the commitment is referenced (which document, table, etc. and where it can be found)✗ how this commitment will be tracked (project EA follow-up program, site-wide programs, etc.) <p>Several commitments to Indigenous Nations and communities from the August 2023 submission appear to be missing from this table and should be included in the next submission.</p> | <ul style="list-style-type: none">• which phase(s) of the project will the commitment be carried out (e.g., all phases)• how this commitment will be tracked (project EA follow-up program, site-wide programs, etc.) and;• all commitments to Indigenous Nations and communities |
| AD-70 | ECCC | Appendix 16-C Summary of Monitoring & Follow-up Programs | ECCC recommended that the Proponent consider developing a GHG follow-up program to measure and compare actual GHG emissions against the EIS estimates, including reporting the Project’s actual emissions and updating the emissions estimates as needed. | Related to AD-48 , ECCC acknowledges that the Project will likely be required to report annually per section 46 of the Canadian Environmental Protection Act as the annual emissions are likely to be over 10,000 tonnes of CO2e. However, ECCC’s suggestion incorporates additional components to align with the goal outlined in Appendix 16-C of the draft EIS to “assess the environmental performance of the project relative to the predictive assessment that has been completed in support of the environmental assessment process”. This would involve comparing actual vs. estimated emissions following the terms of the SACC’s net GHG emissions equation and evaluating the effectiveness of GHG-related mitigation measures. |
| AD-71 | ECCC | Conceptual Caribou Management Plan | Section 4.2.1 of the Conceptual Caribou Management Plan states that "The Project components are also west of the known home range of woodland caribou (based on tracking data received by the Ministry of Environment; Figure 4-2), although the absence of data does not mean the absence of caribou and Denison has observed caribou in the area." Calculation of home range is normally based on statistical analyses of telemetry data. Home range cannot be inferred from telemetry points and incidental observations from a map | Related to IR-149, the Conceptual Caribou Management Plan should be corrected to remove the reference to caribou home range. |

Federal Indigenous Review Team (FIRT) – Advice to the Proponent for the Wheeler River Environmental Impact Statement (EIS) March 2023

** The new [November 2023 Advice to Proponent table](#) is available above

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| AD-01 | Canadian Nuclear Safety | Glossary sections | There are terms used throughout the EIS that may either need defining, or inclusion in the glossary. | Add this terminology to either one of the early glossaries, or when describing the methodology, in order to help readers understand | Thank you for the advice comment. This will be addressed once the EIS is updated following the conclusion of the information requirement (IR) process. |

² Unless otherwise stated, the section noted refers to the draft EIS

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| | Commission (CNSC) | | <ul style="list-style-type: none">“Bounding”, “bounding case” and “bound” are used frequently throughout the EIS to describe the scope of the assessment. For example, p. 2-6 the EIS States: “Denison has bound the environmental assessment above the deposit...”“Laydown”. P. 2-54 states: “During Construction, Denison plans to create a laydown area next to the future domestic landfill to temporarily store construction waste. Examples of materials include clean wood, plastics, metal, and concrete. The construction laydown area will not be lined, but it will have a berm surrounding the area to minimize run-on and runoff.”“Deflagration” (p. 2-22)“Speed of sound” The EIS states: “Deflagration means the material burns slower than the speed of sound, thus no shock waves are generated. Propellant permeability enhancement methods reach injection pressures of up to 8,000 psi and are near instantaneous over periods of milli seconds...” (p. 2-22) - Explain briefly what is meant by “speed of sound”“Dries” (p. 2-65): “the main dries will be located in the processing plant”“Scarified” 2-84 Laydown areas will be scarified, covered with 0.5 to 1.0 m of stockpiled overburden, and vegetated with native, self-sustaining species.“Furblock” (p. 4-29)“Cutlines” (p. 4-101) | these terms (particularly non-technical readers, such as Indigenous peoples and members of the public). | |
| AD-02 | CNSC | General | Mining solution and lixiviant are used interchangeably throughout the EIS. When both are used periodically, may be difficult for a member of the public to recognize that these are one in the same (mining fluid seems more often used). | Be consistent in how this is referred to, in order to ensure it’s clear to readers that these are one and the same. | Thank you for the advice comment. This will be addressed once the EIS is updated following the conclusion of the information requirement (IR) process. |
| AD-03 | CNSC | Throughout the Executive Summary (ES) and draft EIS | Errors in formatting and grammar were identified throughout ES and EIS. Some examples are underlined below: <ul style="list-style-type: none">“often referred to as “the final uranium product (yellowcake” (ES, p.16)“Whitefish Lake;;” (ES, p.47)“Forest fires are common throughout most of northern Saskatchewan, however, and are an important natural disturbance of northern boreal forest ecosystems” (p.72)“Other comments that the process reminded them of fracking, which carried a negative connotation...” incomplete sentence (EIS, p. 2-3) | Please correct these and any other formatting, spelling or grammatical errors. | Thank you for the advice comment. This will be addressed once the EIS is updated following the conclusion of the information requirement (IR) process. |

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| | | | <ul style="list-style-type: none">“.During this phase, water taking will mainly be used by the processing plant and wellfield remediation and to support the potable water plant and wash bay.” (EIS, p. 8-29)“In McGowan Lake, meanmercury concentrations in Northern Pike” (EIS, p. 8-224)“Flows and water levels in lakes and rivers within the LSA will realize some adverse change (reduction) as a result of overprinting drainage areas reporting specifically to Whitefish Lake and water taking from this same waterbody.” (8-38)“Residual effects characteristics specific to Fish Health are defined in Table 8.5-6 with evaluation of residual effects provided in ” (EIS, p. 8-242)“Potential Project residual effects on the Fish Health VC are primarily related to c the controlled” (EIS, p. 8-249)“...resulting in a moderate level of uncertainty..” (EIS, p. 9-47)“...the assessment. Error! Reference source not found. Provides a summary of unique identification numbers referenced within Section 10.1.” (10-10)“Kineepik Métis Local #9 have also note how the Project...” (EIS, p. 11-57)“But do not compose the same volume of consumption” (EIS, p. 11-56) – should this be comprise?“Phoenix Infrastructure. I In total, approximately 284 ha” (EIS, p. 11-156) <p>Please note, this list is not exhaustive.</p> | | |
| AD-04 | CNSC | Section 2.2.1 Mining (p. 2-4 to 2-5) | An arial view could be useful to help a reader understand the proposed freeze wall earlier in section 2 (e.g., The shape, whether it surrounds the deposit). This is unclear but there are good images further down in the EIS (i.e., Figure 2.3-1 on p. 2-78). | Consider adding image to Section 2.2.1, similar to or containing aspects of Figure 2.3-1. | Thank you for the advice comment. This will be addressed once the EIS is updated following the conclusion of the information requirement (IR) process. |
| AD-05 | Transport Canada (TC) | Sections 2.2.3.2, 2.2.3.10, 2.2.5.1, 2.3.1.6, 8.3.4.2.2, 11.1.4.4.2, | The two water crossings over Kratchkowsky Creek and Hart Creek and the water intake and effluent discharge/intake pipeline and diffuser at Whitefish Lake may be subject to the <i>Canadian Navigable Waters Act</i> (CNWA). However, these works may be exempt from the CNWA, if they meet the requirements of the Minor Works Order. | <p>*This advice pertains to the regulatory phase.*</p> <p>It is recommended that the Proponent self-assess each work using TC’s Project Review Tool as follows: https://npp-submissions-demandes-ppn.tc.canada.ca/projectreview-outildexamenduprojet</p> <p>If the works do not fit the Minor Works Order, the Proponent has the option to either submit an application for approval to the NPP, or use the public resolution process, as these are all unscheduled waterways. The full text of the Minor Works Order is available here: https://laws-lois.justice.gc.ca/eng/regulations/SOR-2021-170/page-1.html.</p> | Acknowledged and Denison will address this in the regulatory phase as highlighted. |

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| | | | | Background information on the NPP, the Minor Works Order, the application for approval process and the public resolution process are available here: https://tc.canada.ca/en/programs/navigation-protection-program/apply-npp | |
| AD-06 | Environment and Climate Change Canada (ECCC) | Section 2.2.3.8, Project Description | <p>In this section it is stated that: “The third step of the Industrial Wastewater Treatment Plant (IWWTP) is anticipated to further neutralize and improve the remaining water quality proposed to be achieved with further pH adjustments through agitated tanks and a clarifier with negligible solids generation expected at this stage. Several additional technologies including ion exchange are being evaluated as part of an ongoing Best Available Technology Study to be complete as part of future permitting.” ECCC would be interested in reviewing this study when it becomes available.</p> <p>Considering that the third step of the effluent treatment process in the IWWTP is still undergoing development, ECCC cannot make final conclusions regarding the efficacy of the treatment process. When final treatment technologies have been evaluated and selected, ECCC would like to review this information to allow for release to the environment.</p> | ECCC requests the opportunity to review the Best Available Technology Study and selected treatment technologies for the IWWTP when the report becomes available. | The BATEA information for the IWWTP will be included in Denison’s application to the CNSC for a license to operate. As such, ECCC can direct their review request for review to the CNSC. |
| AD-07 | TC | Section 2.2.5.3 | <p>With respect to the proposed airstrip, under the <i>Aeronautics Act</i>, the proposed airstrip would be considered an “aerodrome”, which is defined as:</p> <p>“aerodrome means any area of land, water (including the frozen surface thereof) or other supporting surface used, designed, prepared, equipped or set apart for use either in whole or in part for the arrival, departure, movement or servicing of aircraft and includes any buildings, installations and equipment situated thereon or associated therewith.”</p> <p>Aerodromes, including the one proposed by Denison, are subject to the <i>Aeronautics Act</i> and the Canadian Aviation Regulations (CARs).</p> | <p>*This advice pertains to the regulatory phase.*</p> <p>The proponent must notify the Minister of Transport of the proposed airstrip (aerodrome). This notification, being a summary report to the Minister of Transport, is required by section 307 of the CARs (CARs 307). CARs 307 also requires Denison to undertake consultation in the prescribed manner before it constructs the proposed aerodrome at the mine site. Details of the consultation are to be included in the above-mentioned summary report to the Minister of Transport.</p> <p>CARs 307 identifies the requirement to consult to include anyone seeking to undertake a prescribed aerodrome work at a certified or non-certified aerodrome, whether it is the creation of a new aerodrome or, at an existing aerodrome, lengthening an existing runway or making a new one. The Regulation also provides minimum expectations for how the consultation should be conducted, including timelines, who to notify and under what circumstances. The intent of the Regulation is to compel consultation in advance of an aerodrome work that will result in sustained and regular impact on interested parties as identified in the Regulation.</p> <p>As the proposed aerodrome will not be within 4 kilometres of a city or built-up area, under CARs 307, the proponent is required to consult the following interested parties:</p> | Acknowledged and Denison will address this in the regulatory phase as highlighted. |

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| | | | | <p>(i) the Minister of Transport,</p> <p>(ii) the providers of air navigation services,</p> <p>(iii) the operator of a certified or registered aerodrome located within a radius of 30 nautical miles from the location of the proposed aerodrome work,</p> <p>(iv) the authority responsible for a protected area located within a radius of 4 000 m from the location of the proposed aerodrome work,</p> <p>(v) any local land use authority where the proposed aerodrome work is to be carried out, and</p> <p>(vi) the owner of any land bordering the land on which the proposed aerodrome work is to be carried out.</p> <p>Proponents are encouraged to share their plans with the local land use authority before the consultation period. The local land use authority may have information about other nearby projects or developments that could impact on the proponent's plans.</p> <p>In summary, regarding the airstrip (aerodrome), the proponent must complete the consultation and file the summary report with the Minister of Transport, prior to commencing construction of the aerodrome.</p> <p>Further details can be found at: https://laws-lois.justice.gc.ca/eng/regulations/SOR-96-433/FullText.html#s-307.01.</p> <p>TC recommends that the proponent contact TC's Aerodromes Group at CASPNR-SACRPN@tc.gc.ca before starting the consultation, to ensure it is completed in accordance with CARs 307.</p> | |
| AD-08 | CNSC | Figs. 3.4-1, 4.3. 1, and where applicable throughout the EIS | Some maps in the EIS do not contain highway numbers. | Please consider including the highway numbers on the maps early in the Draft EIS when laying out the project location so the reader can become familiar with road network within northern Saskatchewan when discussions take place. | Thank you for the advice comment. This will be addressed once the EIS is updated following the conclusion of the information requirement (IR) process. |
| AD-09 | CNSC | Section 4, including Figures 4.3.1 and/or 4.3.2 and where applicable throughout the EIS. | The maps included in the EIS in sections do not have any Treaty boundaries. First Nation Treaties should be included on the map. Not all First Nations reserves, and boundaries are included on the map such as Cree Lake and Slush Lake, please include on map and consider adding others from the NAD. | It is recommended that Denison update the maps in these sections to include Treaty Boundaries and community locations are included on the Project location map in Figure 4.3.2 and other maps throughout the entire EIS where applicable. | Thank you for the advice comment. This will be addressed, as possible, once the EIS is updated following the conclusion of the information requirement (IR) process. |

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| AD-10 | CNSC | Section 4 | Overall, CNSC believes that Denison is abiding by the communications strategies and products identified in their PIDP, but would be interested in additional information that is available. | While CNSC staff are satisfied that the proponent meets the requirements with this EIS, further clarity and detail on the strategic planning behind these communications activities would be beneficial and would further support the overall goals of the Project’s engagement activities. | Acknowledged. Further details on the Public Information Program and Public Disclosure will form part of the documentation submitted in support of the CNSC licensing for the Project. |
| AD-11 | CNSC | Section 4 Indigenous Engagement Report (IER) | There is a summary of what engagement activities will occur moving forward. However, it is not clear which engagement activities/meetings will occur during the different stages of the EA/ project life cycle. Please provide additional details upon submission of the Final EIS. | Denison should consider clarifying in the updated IER which engagement activities will occur during each stage of the project moving forward as per Reg Doc 3.2.2 before submitting the Final EIS. | The engagement activities as outlined in the draft EIS are reflective of the iterative nature of engagement with respect to the Project. At the time of the filing of the final EIS, Denison will describe the status of engagement and future expected engagement activities to occur, which will continue to be aligned with the requirements of Reg Doc 3.2.2. |
| AD-12 | CNSC | Section 4 IER | Information included in the EIS Section 4 and IER regarding engagement activities, communication and issues and concerns raised will need to be updated when the next version of the EIS is submitted. The EIS and IER will need to be updated to include information from Fall of 2022 until approximately two months prior to the submission date of the next EIS. | When re-submitting the EIS, ensure that the engagement log, issues and concerns tables and information about engagement activities done to date have been updated. No action needed only advice to update this section before submission with most up to date engagement activities including any that take place with other Indigenous Nations and communities not included in the Draft EIS. | Acknowledged. |
| AD-13 | CNSC | Section 4 IER | Denison states that validation of VC selection was completed with ERFN, the Northern Village of Beauval, the Northern Village of Pinehouse Lake, and the Northern Hamlet of Patuanak (hereafter Beauval, Pinehouse, and Hamlet of Patuanak, respectively). The EIS states that this was completed through a shared online survey. The EIS also indicates that YNLR was also included in this process. | How has Denison validated VC selection with the other Indigenous Nations and communities that have showed interest and if so, by what methods (survey’s, engagement, meetings, review of Draft sections etc.?) Did Indigenous Nations and communities select any VC’s that were not included in the EIS and if so why not? Please elaborate and provide more details in the EIS on any other methods used including engagement sessions that were completed with Indigenous Nations and communities, through in-person community workshops, VC selection approval through early review of Draft EIS sections. | Section 4 of the draft EIS describes the approach taken related to the Indigenous and non-Indigenous Communities of Interest in relation to the Wheeler River Project. Denison has engaged with these entities regarding the validation of the VC selection. Denison has not undertaken VC validation activities with other Indigenous Nations or communities that have shown interest in the Project, owing to the systematic approach to engagement Denison has been following. This approach is consistent with the methodology presented to the CNSC by Denison in early 2020, for which confirmation was received in mid-2020 and reflected in the draft EIS. All activities undertaken in relation to engagement on VCs are currently described in the EIS; there are no additional details to add. Denison can confirm that it is unaware of additional or new VCs brought forward by other Indigenous Nations or communities that are not suitably captured within the current draft EA approach. |
| AD-14 | CNSC | Section 4.3.1, Pg 246 | On this page, Denison states that MN-S is “currently structured with a President, an Executive, a Provincial Metis Council, Regional Presidents, and Local Presidents. The wording of ‘Regional President’ is incorrect and should be changed to say, ‘Regional Director’. | Please update all wording of “Regional President” to “Regional Director” when referring to MN-S. | Thank you for the advice comment. This will be corrected in the final EIS. |
| AD-15 | ECCC | Sections 5.3.4 (Table 5.3-3); 8.1.3.3 Climate | The Proponent indicates that the Project’s full lifetime is roughly 40 years (including the post-decommissioning phase) and that climate conditions are important design considerations for a number of | ECCC recommends that when considering potential future climate change and relevant effects on the Project, the Proponent consider the range of variability from the ensemble of models (not just the | Please see response to IR-15, IR-103, IR-104, IR-235, and IR-236. The probable maximum precipitation (PMP) value of 493 mm |

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| | | Change; 8.1.3.4 Climate Change Influenced Extreme Events; Table 15.4-1: Summary of Potential Effects of Short-term Extreme Weather Events on the Project and Associated Mitigation; Section 15.5 Climate Change. | <p>sensitive aspects of the Project. Potential future climate changes and their potential effects on the Project and Valued Components (VCs) are described in various sections of the draft EIS. Notably, in Section 15.5.2, ensemble mean projections are provided for several climate variables for two future time periods and emissions scenarios (RCP 4.5 and 8.5). In Section 8.1.3.4, the Proponent describes possible future changes in short-duration precipitation extremes (based on Intensity Duration Frequency or IDF curves from the IDF_CC tool) and indicates that an increase in their frequency and magnitude may occur over the Project lifetime “... and may require consideration for greater storage and conveyance capacity for Project water management infrastructure” (p.8-41).</p> <p>The Proponent indicates that aspects of the Project are being designed to meet standards based on design values that appear to be derived from observed (i.e. historical) climate conditions (e.g. water management infrastructure; see Table 15.4-1). In Section 15.5.3, they indicate that an adaptive management approach will be used to address some aspects of future climate change as necessary. For example, page 15-19 of the draft EIS states that: “Denison will develop an Emergency Preparedness and Response Program for the Project to address forest fires and extreme weather that may occur. If unforeseen effects on the Project occur from longer and more severe forest fire seasons associated with climate change, or increased frequency or severity of extreme weather (e.g., ice storms, snowstorms, flooding), Denison will apply adaptive management that includes monitoring climate factors so that they can proactively mitigate or prevent adverse climate effects on the Project.” (Emphasis added).</p> | <p>ensemble mean). ECCC also recommends that the Proponent consult the 2019 Canadian Standards Association Guidance on Intensity Duration Frequency for Canadian Water Resources practitioners , which provides examples of alternative methodologies to estimate future return values for design as needed.</p> <p>In terms of adaptive management, ECCC recommends that the Proponent clearly outline what climate factors will be monitored to mitigate or prevent adverse climate-related effects. This should include information on when and how the climate factors would be monitored and under what circumstances particular adaptive management approaches would be applied.</p> | <p>selected for design of water management infrastructure, such as ponds, is similar to total annual precipitation (456 mm from Key Lake station, and 483 mm from 1981-2020 climate normals).</p> <p>The selected PMP is well above (>5 times higher): 1) current/measured 24-hour maximum precipitation, 2) modelled 1 in 100 year 24-hour return for current conditions, 3) modelled 1:100 year 24 hour return for a future (2020-2050) period, 4) the predicted maximum 1-day precipitation under different emissions scenarios for the future (including RCP8.5 in the 2021-2050 period).</p> <p>For comparison to the design PMP of 493 mm:</p> <p>- the measured maximum 24-hour precipitation from Key Lake station was 42.9 mm and 72 mm from 1981-2020 climate normals.</p> <p>- the modelled existing/current 1 in 100 year, 24 hour return using the IDF_CC Tool for the Wheeler River Project site was 79.9 mm and at the Key Lake area was 56.4 mm.</p> <p>- the modelled future (2020-2050) climate 1 in 100 year, 24 hour return using the IDF_CC Tool for the Wheeler River Project site was 88.6 mm and at the Key Lake area was 62.0 mm.</p> <p>- the predicted future climate (2021-2050) under the highest CO2e emissions scenario (RCP 8.5) shows maximum 1-day precipitation of 25.9 mm.</p> <p>The PMP is much higher (> 5 times higher) than the observed and predicted 24-hour maximum precipitation and the 1:100 year 24 hour return. Completing the design using a large PMP provides confidence that the water management infrastructure will be sufficient and function under future climates as it relates to potential changes in precipitation.</p> |
| AD-16 | CNSC | Section 5.10 (p.70) and throughout the EIS | <p>In section 5.10 of the ES, where the seven scenarios are listed, formatting is inconsistent. Likelihood is in quotes in some places, but not in all.</p> <p>Not significant is bolded inconsistently throughout the EIS.</p> <p>As well, in many cases noted as “not significant”, where others note “are not expected to have a significant effect”.</p> | <p>Suggest making formatting consistent if going to use quotes and bolding to highlight sections of the text.</p> <p>Also, validate that use of “not significant” and “are not expected to have a significant effect” are consistently used (where appropriate).</p> | <p>Thank you for the advice comment. This will be addressed, as possible, once the EIS is updated following the conclusion of the information requirement (IR) process.</p> |
| AD-17 | ECCC | Appendix 6-A Air Quality Technical Supporting Document A.10 | <p>Some of the off-road vehicles have an emission rating of Tier 2 but in Appendix 6-A Section A.10 the Proponent claims that “for non-road diesel combustion, Tier 4 emission factors were assumed”. Choosing an engine with a lower Tier will increase emissions in NOx</p> | <p>ECCC recommends that the Proponent choose engines that meet the most stringent emission standards to the extent possible, which are Tier 4 for the compression-ignition engines, during all phases of the Project.</p> | <p>Please see response to IR-139.</p> |

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| | | | significantly and the Proponent should be using the best available technologies to minimize environmental impacts. | | |
| AD-18 | ECCC | Appendix 6-C, Climate Baseline and GHG Emissions Report | <p>Understanding Project emissions is important to inform analysis of a Project’s potential impact on Canada’s emissions targets and climate change commitments.</p> <p>ECCC notes that Section 4.0 and Appendix C: Greenhouse Gas Emissions Calculations of Appendix 6-C identifies the source of emissions and quantifies them in the construction, operation, and decommissioning phases of the Project, in accordance with the Draft Technical Guide Related to the SACC (Draft Technical Guide). While ECCC recognizes that the emissions will be relatively small in the post-decommissioning phase, the identification and quantification of the emissions in this phase is not found in the draft Environmental Impact Statement (EIS). The post- decommissioning phase is expected to last 15 years, likely going past 2050.</p> <p>The draft EIS does not discuss emission intensities of the Project, only the grid electricity. The draft EIS also does not discuss the Project’s potential impacts on Canada’s climate targets.</p> | <p>ECCC recommends that the identification of the sources of Greenhouse Gas (GHG) emissions and quantification of these emissions be described for the post-decommissioning phase, as done for the other phases.</p> <p>ECCC recommends the Proponent include discussion on the emission intensities of the mining of the product, following the guidance of the SACC and the Draft Technical Guide.</p> <p>ECCC recommends that the Proponent discuss the potential impacts that the Project may have on Canada’s ability to meet its climate-related targets, following the guidance of the SACC and the Draft Technical Guide.</p> | <p>The Post-Decommissioning phase only includes monitoring (physical, chemical, and biological) and regulatory site inspections. These activities are not expected to generate any significant GHG releases. Notwithstanding, the calculated GHG emissions estimates for Construction, Operation and Decommissioning are expected to be sufficiently conservative to capture any incidental GHG releases during monitoring and inspection activities.</p> <p>The EIS anticipated an annual average production rate of approximately 4,082 metric tonnes of U₃O₈ and an annual net GHG releases of 30,702 metric tonnes CO₂e over the operations phase of the project. The annualized GHG intensity during operations is estimated at 7.5 tonnes of CO₂e / tonnes of U₃O₈.</p> <p>Section 2.5 of the EIS provides a summary of the anticipated GHG releases and a comparison to the nation- and province-wide GHG emissions. The project is expected to contribute less than 0.0043% to the nation-wide annual average. Given this very low contribution, the project is not expected to impact Canada’s ability to meet its climate-related objectives and targets.</p> <p>Also see response for AD-19 (second paragraph).</p> |
| AD-19 | ECCC | Appendix 6-C, Climate Baseline and GHG Emissions Report | <p>The draft EIS lacks information related to estimates of impact on carbon sinks and emissions from land-use changes. As land use shifts from a vegetated site prior to development, to an industrialized site, removal of vegetation and peat will have impacts on carbon sinks and construction emissions.</p> <p>Section 6, Appendix 6-C, 4.1.2 Land Use Change states that site-specific information of above-ground mass of vegetation was not available and default data from Table 20 of the Draft Technical Guide were applied. The default data is contained in this table is not applicable in this case, as they represent aboveground woody vegetation in cropland systems.</p> <p>ECCC recognizes that the usage of the median value of 0.51 for the carbon content is reasonable.</p> <p>From the information given in the draft EIS, it does not seem that the soil carbon was taken into account. In the absence of detailed information, the Proponent assumed that the area cleared would also be excavated (and drained in the case of wetland areas) which would create significant additional emissions from soil disturbances and drainage.</p> <p>Section 4.1.2 also states the Project involves clearing an area of approximately 169.6 hectares. There are no estimates on the impact on carbon sinks related to the Project.</p> | <p>Land Use Change Regarding the lack of site-specific information of above-ground mass of vegetation, an initial site survey on-site using basic information such as site class and species would assist in determining the above-ground biomass. More specific data, such as regional data from provinces, forest companies, or literature may be available, and generic national data is available (e.g., Fo148-1-2E.pdf (publications.gc.ca), 4775.pdf (nrcan.gc.ca)).</p> <p>ECCC recommends that the Proponent also consider biomass that are not aboveground and confirm whether soil carbon is taken into account, as well as wetlands.</p> <p><i>Carbon Sinks</i> ECCC recommends that the Proponent provide a quantitative and qualitative description of the Project’s impact on carbon sinks, following the guidance of the SACC and the Draft Technical Guide.</p> | <p>Limited site-specific data were available to characterize land use change and impacts on carbon sinks. As such, the use of default values from the SACC/IPCC in conjunction with some limited habitat/vegetation data (extracted from Chapter 9.2 Terrestrial Environment – Vegetation and Ecosystems, Listed Plant Species and Wetlands) was employed and is considered reasonable at this stage of the assessment. Please note that additional information on the land use change GHG calculations can be found in Appendix 6-C Climate Baseline and Greenhouse Gas Emissions Report.</p> <p>In accordance with our discussions with the CNSC, Denison is committed to re-assessing the GHG and climate change components of the EIS and other elements of the SACC once more detailed, site-specific data becomes available (i.e., detailed feasibility and engineering studies). This is expected to include more detailed study around overall GHG emissions, carbon sinks and mitigation options, best available technologies / best environmental practices, climate resiliency, net-zero carbon planning and offsetting.</p> |

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| AD-20 | NRCan | Section 7.3.1, Physical Geography | Drumlins and eskers in the region trend Northeast to Southwest as opposed to northwest to southeast as written on page 7, line 18. Correct orientations are used on page 7, line 23. | NRCan recommends revising the text. Please refer to 250 000 scale Surficial Geology Lines from Quaternary mapping, CSRS NAD83 Zone 13, Saskatchewan Geological Survey 2017. | Acknowledged. The typo in the draft EIS, Section 7.3.1 will be corrected in the final EIS. In Section 7.3.1. the text will be updated to say the following: “The most important associated topographic features in the region are the northeast to southwest trending drumlins and eskers...” See also response to IR-54. |
| AD-21 | NRCan | Section 7.3.2.3, Metacrystalline Basement Rock | Pegmatite missing from list of basement rock types. | NRCan suggests addition of pegmatite to the list of basement tock types as shown on Figure 7.3-6. | Denison will update the final EIS per NRCan’s suggestion. |
| AD-22 | NRCan | Section 7.3.3.1, Aquifer Properties, Section 7.3.2.3, Metacrystalline Basement Rock, Appendix 7A, 2.0, 2.3.1, 2.3.2 | The terms “metacrystalline” and “metagranitic gneiss” are not frequently used terms in scientific literature. Gneiss is, by definition, a metamorphic rock. | NRCan suggests revision to “Crystalline Basement rocks” or “Basement metamorphic rocks”, and “granitic gneiss” as used in Figure 7.3-6. Please refer to Oxford Dictionary of Earth Sciences. | Denison will update the final EIS per NRCan’s suggestion. |
| AD-23 | NRCan | Appendix 7A, 2.3.1, Metacrystalline basement rock | Orogeny is the process, orogen (or orogenic belt) is the feature produced by orogeny. | NRCan suggests replacing “Tran Hudson Orogeny” with Trans Hudson Orogen”. | Denison will update the final EIS per NRCan’s suggestion. |
| AD-24 | NRCan | Appendix 7A, 2.3.1, Metacrystalline basement rock | Quartzite is by definition a metamorphic rock, and the term is used later without the meta-prefix. | NRCan suggests replacement of the term “meta-quartzite” with “quartzite”. | Denison will update the final EIS per NRCan’s suggestion. |
| AD-25 | NRCan | Appendix 7A, 2.3.4, Athabasca Group Sandstones and Conglomerates | Sands are unlithified, whereas you are referring to grain sizes in this case. | In Table 2-1, NRCan suggests replacing the term “sands” with “grain sizes” under MFc and MFb descriptions. | Denison will update the final EIS per NRCan’s suggestion. |
| AD-26 | NRCan | Appendix 7A, 2.3.5, Overburden | Typo on page 2, line 7: “A grain size sample was collected in GWR-033 from approximately 9 m below ground surface, and the same consisted of 8.8% clay (less than 4 µm). | NRCan suggests revision of “same” to “sample” and clay to “clay-sized” grains. | Denison will update the final EIS per NRCan’s suggestion. |
| AD-27 | CNSC | Section 8.2.1.3 – Spatial and Temporal Boundaries | It is noted that McGowan Lake is an identified reference lake for the Key Lake Mill site. With the establishment of the Wheeler River mine, effluent would be flowing into McGowan Lake, which could potentially interfere with Key Lake’s environmental monitoring program by compromising McGowan Lake’s baseline conditions. Depending on the loading of COPC’s into McGowan Lake and resultant water concentrations, it may no longer be accepted as an acceptable reference lake for use by Key Lake. This would require Cameco to modify their monitoring program at the Key Lake Mill. | The CNSC advises Denison to communicate with Cameco to ensure they are aware of this situation. Coordination between the two companies may be necessary to ensure Key Lakes environmental monitoring program is not compromised. It is recommended to discuss this potential issue with Cameco ahead of time to determine the best path forward. | Denison will communicate with Cameco through the Saskatchewan Mining Association to highlight the timing of the start of the Project as it may relate to Cameco's use of regional lakes for reference lake purposes. McGowan Lake will no longer be suitable as a reference lake for Cameco once the Wheeler River Project starts operating, since it will be downstream of treated effluent release. Alpha Lake (LA-9 in Denison's aquatic baseline studies) will likely be outside of any influence from Denison's activities. |

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| | | | | | Please note that Denison has previously been in communication with the Saskatchewan Ministry of Environment, Environmental Protection Branch regarding the baseline study work Denison completed as part of the Environmental Assessment process and the potential changes to McGowan lake (a Cameco's reference lake) from the proposed Wheeler Project. Reference: Email from Janna Switzer (Denison) to George Bihun (MOE) on May 12, 2020. |
| AD-28 | ECCC | Section 8.2.4.2.3 Appendix 10-A, Section 3.1.1.2 | <p>Tables 8.2-9 and 8.2-10 in Section 8.2.4.2.3 Part II_S8 Aquatic Environment and Table 3-1 in Appendix 10-A Section 3.1.1.2 demonstrate predicted maximum effluent concentrations of Constituents of Potential Concern (COPCs) and maximum predicted receiving environment concentrations.</p> <p>The final effluent quality discharge target for uranium is 0.057 mg/L. However, the Canadian Council of Ministers of the Environment (CCME) water short-term (acute) water quality guidelines for the protection of aquatic life is 0.033 mg/L. The proposed effluent discharge target for uranium exceeds the acute water quality guideline, indicating effluent may pose the risk of being acutely lethal to aquatic biota at end-of-pipe. While uranium is not a Schedule 4 substance with prescribed concentration limits under the Metal and Diamond Mining Effluent Regulations (MDMER), the MDMER requires the characterization of uranium concentrations in effluent under Schedule 5, and requires that all mine effluent released from final discharge points be non-acutely lethal.</p> <p>Under Schedule 5 Section 9(d) of the MDMER, the Proponent will likely be required to conduct selenium fish tissue sampling if average annual concentrations of selenium in effluent equals or exceeds 5 ug/L.</p> | Discharges from the proposed Project will alter water quality in the immediate receiving area, and this may include some sublethal effects on aquatic biota, which must be minimized. It remains the Proponent's responsibility to adhere to the MDMER to ensure that effluent at the end-of-pipe from all final discharge points be non-acutely lethal and meet requirements for prescribed deleterious substances under Schedule 4 of the regulations. | Denison fully understands its obligations with respect to the MDMER and will comply with the MDMER end of pipe effluent discharge criteria. |
| AD-29 | CNSC | Section 8.3.3 Figures 8.3.5 etc. 8.5-4 | It does not appear that aquatic baseline sampling maps for Russell Lake have LAB 1 and 2 locations showing the baseline sampling locations within Russell Lake. (Figures 8.3.5). Please update the Figures throughout aquatic environment section to include of the baseline sampling studies/ locations within Russell Lake. | Please update maps and sections in EIS to reflect aquatic baseline studies that were completed. | Thank you for the advice comment. This will be addressed, as possible, once the EIS is updated following the conclusion of the information requirement (IR) process. |
| AD-30 | CNSC | EIS sections 8.4.3.2.4 Benthic Invertebrate Community and 8.4.7.6 Climate Change Considerations | <p>ECCC EEM guidance recommends the use of multiple reference areas as it offers the greatest statistical power to detect a meaningful difference between a reference area and an exposure area and can also give an indication of variability among reference areas. It is also important to incorporate multiple reference locations into the study design to aid in designing against spatial confounding factors.</p> <p>Section 3 of the Aquatic Environment Baseline Study Report details the similarities between benthic invertebrate communities by using the mean Bray-Curtis index between sampling locations and the</p> | Considering climate change may change the lake conditions from baseline conditions, and that there is already natural variability between lakes that will be used as reference lakes and exposure lakes, it could become difficult to show changes to sediment/benthic invertebrates are not due to project activities, therefore there is a recommendation to ensure the current baseline data is adequate, and to consider if additional data, and addition of additional reference stations, will be needed moving forward. | Changes in landscape influence and lake conditions are not limited to those brought about by climate change. The preparation of a study design under the MDMER EEM program strives to ensure that a single reference area or multiple reference areas are as representative of a control condition as possible. Best practice is to undertake an analysis of candidate reference areas using the existing baseline information and investigate their utility as controls prior to project development. A preliminary EEM study can be completed that will allow for a Before-After-Control-Impact study design, that will provide the ability to monitor change not only in |

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| | | | <p>median reference condition for the lake group size. It’s not clear in the EIS if there are any issues expected to be able to use this data to compare project effect locations to references sites into the future, as some sampling locations are currently not very similar to the reference sites.</p> <p>In addition, climate change could affect the sediment and benthic communities in the future. The EIS states “the frequency and magnitude of extreme precipitation events have the potential to change water levels and flows in the RSA, which may affect sediment transport, deposition, and therefore benthic invertebrate habitat. Changes to average and upper and lower bounds of ambient temperatures may also affect aquatic habitat, which in turn may affect benthic invertebrate communities. Climate change over the life of the Project (i.e., 35 to 40 years) will be monitored as part of the Project’s environmental monitoring programs, and influences on water quality, sediment quality, and benthic invertebrates will require adaptive management to mitigate any potential effects of the Project that may be exacerbated by climate-related changes on the aquatic environment”. It is recommended to ensure that appropriate number/location of reference sites are sampled to enable any changes to sediment or benthic invertebrate communities that may be due to climate changes, and not project effects, are able to be assessed.</p> | | <p>the exposure areas, but in the reference areas, thereby allowing for a reasonable assessment of potential mine related impacts.</p> |
| AD-31 | CNSC | Section 8.4.6.1, Residual Effects Characterization | The EIS states “Local Indigenous communities have expressed direct concern with respect to mercury. Mercury has not been identified as a COPC for the Project as it is currently not present in the receiving environment (i.e., background condition) at detectable concentrations and will not be produced as part of the mine process; therefore, it will not be discharged to the aquatic environment. However, it is understood that potential nutrient enrichment-related effects are possible and can be linked to increases in mercury in the environment.” Based off concerns from Indigenous communities, and the fact that phosphate is a COPC in the effluent, and elevated concentrations of mercury were measured near the Kratchkowsky Lake bottom, adding methylmercury to the environment sampling plans may be beneficial. | Please consider adding methylmercury to the environment sampling plans (such as fish dorsal muscle) in order to confirm there are no unexpected effects of the project on levels, and to satisfy stakeholder concerns. | Refer to response to IR-100. |
| AD-32 | CNSC | Section 9.1.8.3, Appendix 10-A (ERA) section 3.2.1.5 | It appears there is no consistency between the assessment of soil quality in the ERA and the baseline soil sampling program presented in the EIS. The baseline program includes 10 soil permanent sampling locations (Appendix 9-B, section 2.5). Sampling at these locations is proposed to be continued during the Operation Phase, and monitoring data will be compiled and reported annually/periodically (EIS section 9.1.8.3). | Please clarify how baseline measured data on COPC concentrations in soil is considered in the current and future iterations of the ERA. | Baseline measured soil data were used in the ERA to characterize the existing environment. The IMPACT model was used to predict the Project contributions for the Project phases above baseline. The baseline soil concentrations used in the model are provided in Section 3.5.1 and Table 3-8 of Appendix A in Appendix 10-A (ERA). |

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| | | | Conversely, the ERA estimates and predicts concentrations of COPC in soil based on atmospheric deposition. Furthermore, the location of ecological receptors in the ERA (Figure 5-2) is different from the permanent soil sampling plot locations (Appendix 9-B, Figure 2.5-1). It is unclear why measured baseline soil quality data were not discussed in the ERA and whether future monitoring data will be considered in the ERA to verify accuracy of predicted COPC concentrations | | The ERA will be revised according to the periodic review requirements in CSA N288.6-22 which will reflect ongoing data collected from monitoring programs. |
| AD-33 | CNSC | Section 9.3.3.1.2 | <p>Indigenous knowledge is summarized with regard to moose, including:</p> <ul style="list-style-type: none">• Calving sites close to the Wheeler River, with lots of muskeg in the area. A moose calving area is located in the Terrestrial RSA, southwest of the Project Area.• A wildlife corridor is used by moose, running between Cree Lake (outside and to the west of the Terrestrial RSA) and Russel Lake (in the southern portion of the Terrestrial RSA). <p>It is unclear how this information is incorporated into the residual effects assessment.</p> | Please clarify how Indigenous knowledge on moose calving sites and corridors in the RSA is incorporated into the residual effects assessment for the key indicator “moose”. | <p>The sites identified by IK were explicitly considered in the impact assessment as indicated by their identification as overlapping with the Terrestrial RSA as noted in the question. However, the areas were not expressly discussed in the residual effects assessment because there is no anticipated spatial overlap of those areas with direct or indirect Project effects.</p> <p>The Indigenous Knowledge provided by ERFN and SVS (2022) identifies a moose calving site (Feature 1001-08) ~ 2 km southwest, and a wildlife corridor ~6 km south of the Project Area (as depicted in Figure 4. Map B, page 16 of ERFN and SVS 2022). Both areas are within the Terrestrial RSA but outside the Wildlife LSA. The reference to “Calving sites close to the Wheeler River...” refers to a broad area that is 45 km east of the Project Area, well beyond interactions with the Project Area.</p> <p>The presence of the areas identified through IK was acknowledged in Section 9.3.3.1.2 (Information from Indigenous Knowledge, Local Knowledge, and Engagement) in Part II, Sec. 9 of the Draft EIS. The assessment (Sec. 9.3.4.2) considered alteration and/or habitat loss at the LSA and RSA scale. Section 9.3.4.2.1 (pg. 9-210) summarizes the effects on moose habitat as follows: “Habitat alteration through sensory disturbance effects (such as noise, dust deposition, and artificial light) is expected to result in reduced habitat quality and effectiveness near Project components and infrastructure reaching beyond the Project Area into the Wildlife LSA....”</p> <p>Further, Sec. 9.3.6.2.1 (Alteration and/or Loss of Habitat, pg. 9-230) identifies that an area within a 500 m radius of the Project Area will be influenced by the Project and likely make the habitat within that area less suitable for use by moose. Therefore, the effects of the Project on moose calving have been appropriately assessed and are expected to be contained within the Wildlife LSA. That affected area does not overlap with the moose calving site or the wildlife corridor identified by IK.</p> |
| AD-34 | CNSC | Appendix 9-B | Baseline studies for birds are restricted to short time frames in one year only, for example: | Please consider conducting surveys following CWS’s recommendations or provide an explanation as to how current | The data collected as part of the baseline studies for birds was focused on the habitat types and areas most likely to be disturbed as a result of the Project. Conducting additional baseline surveys for |

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| | | | <ul style="list-style-type: none">Breeding Songbird Point Count Call Survey (June 7 and 17, 2017)Aerial Waterfowl and Raptor Stick Nest Survey (June 15 and 16, 2017) <p>The Canadian Wildlife Service (2022) recommends:</p> <ul style="list-style-type: none">Consider the potential effects of projects on birds throughout the year and document the distribution and abundance of birds in all seasons. Some species may be under-represented in existing data bases due to temporally restricted periods of detectability.Explicitly target species at risk and other focal species.Conduct at least two years of field surveys as a national standard for major projects, so that temporal variability can be considered in future comparisons to baseline data. <p>Reference: Canadian Wildlife Service. 2022. Guidance Regarding Data Needed to Support Assessment of Project Effects on Birds. Environment and Climate Change Canada, Gatineau, Quebec. 80 p.</p> | baseline data for birds is sufficient to characterize the existing environment. | waterfowl, raptors, and breeding birds is not anticipated to result in changes to the assessment outcomes and predictions made as part of the effects assessment, which was habitat-based, for avian species. The assessment methods used a conservative approach with the assumption that following the implementation of site-specific mitigation measures, the proposed Project activities would have a residual effect on these species guilds regardless of species presence on site. However, to supplement the species data that were collected as part of the baseline field program, Denison is willing to acquire additional information on species presence in the RSA from existing sources, specifically from the Saskatchewan Breeding Bird Atlas (Birds Canada). However, collection and consideration of this information is not expected to affect the findings and/or conclusions stated in the draft EIS as the assessment was habitat-based to address all species. |
| AD-35 | CNSC | Section 10, IMPACT MODEL | Denison discusses details of the IMPACT model but has not provided scenario(s) used to facilitate review. | Please consider providing CNSC with the IMPACT model scenario file(s) in the spirit of regulatory cooperation. | The intent of Appendix A to Appendix 10-A is to provide the inputs used for the IMPACT model as well as all of the characteristics for human and ecological receptors. Where site-specific data were not used in the model it can be assumed that default values from CSA N288.1-20 were used in the IMPACT model. As such, Denison does not intend to provide the scenario files. |
| AD-36 | English River First Nation (ERFN) | Section 10.1.3.2, Traditional Foods Diet (p. 10-15) | <p>The EIS States: "The ERFN is comprised of seven reserve lands across Saskatchewan" (p. 10-15)</p> <p>While this is accurately reflecting a source document, the source document is incorrect.</p> | Please update to "The ERFN is comprised of seven historical settlements that have now grown into 19 different reserves across Saskatchewan" | Thank you for the advice comment. This will be addressed, as possible, once the EIS is updated following the conclusion of the information requirement (IR) process. |
| AD-37 | CNSC | Section 10.1.9, Human Health Summary and Appendix 10-A – 4.4.1 Risk Estimation | The Human Health section of the EIS, as well as the ERA, indicates that there is an exceedance for selenium for the fisher/trapper receptor, with the Project estimated to contribute to the majority of this exceedance (0.93 of the HQ). While the assessment is conservative by assuming an increase intake rate of fish solely sourced from Russel Lake, the precautionary principle should be considered to ensure in reality the HQ for selenium remains below 1, even under conservative assumptions. | <p>Please conduct of effluent, water, and aquatic organism monitoring (as already suggested in EIS) to confirm HQ's are highly conservative in the EIS modelling and receptors remain protected.</p> <p>Should it be determined Se concentrations are increasing in the environment at such a rate as there may be in impact to the environment or human health, installation of a selenium removal circuit into the effluent treatment process should be considered. The proponent should ensure that the proposed wastewater treatment system design incorporates the capability for expansion or upgrades in alignment with the precautionary approach, pollution prevention, and continuous improvement.</p> | Denison acknowledges that a robust effluent and environmental monitoring program will be developed to confirm all EIS modelling predictions. The ERA will be revised according to the periodic review requirements in CSA N288.6-22 which will reflect ongoing data collected from monitoring programs. |
| AD-38 | CNSC | Appendix 10-A (ERA) | It is unclear if measured or modelled COPC concentrations in blueberry were used in the calculations of human receptor dose. Similarly, it is unclear if measured or modelled COPC concentrations | Please clarify if measured or modelled COPC concentrations in blueberry / lichen were used in the calculations of human and ecological receptor dose. | Measured baseline lichen data were used in the ERA to characterize the existing environment. The IMPACT model was used to predict the Project contributions for the Project phases above baseline. |

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ² | Context and Rationale | Advice to the Proponent | Denison Response |
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| | | | <p>in lichen and blueberry were used in the calculations of ecological receptor dose.</p> <p>CSA N288.6-22, Clause 7.3.6 states that “Measured concentrations of COPCs should be used, where possible, in the exposure assessment.” Please see the Clause for further information.</p> | | <p>Measured baseline blueberry data were used for model calibration to determine if there was good agreement between measured data and modelled data. The IMPACT model was used to predict both baseline and Project contributions for blueberries. The ERA will be revised according to the periodic review requirements in CSA N288.6-22 which will reflect ongoing data collected from monitoring programs.</p> |
| AD-39 | CNSC | Appendix 10-A (ERA), Table 2-2 | <p>Table 2-2: Estimated Home Ranges of Selected Terrestrial Ecological Receptors</p> <p>Based on the reference McLoughlin et al. (2016), the Home Range for Woodland Caribou is indicated as “Expected = 80 km2” which represents the mean range sizes pooled over the two study years for calving/post-calving.</p> <p>The indicated Minimum (67 km2) and Maximum (267 km2), however, do not relate to the calving/post-calving stage, which is not clearly stated in Table 2-2. In contrast, these values are actually mean range size values for autumn/rut and early winter, respectively, as described in the source document on Page 83 (McLoughlin et al., 2016). It should be noted that in terms of true minimum and maximum, the source document states that individual home ranges, based on up to two years of GPS locations, varied in size from 16.2 km2 to 1363.9 km2 (Page 82 of McLoughlin et al., 2016).</p> <p>Reference: McLoughlin et al. 2016. Population dynamics and critical habitat of woodland caribou in the Saskatchewan Boreal Shield. Interim Project Report, 2013–2016. Department of Biology, University of Saskatchewan, Saskatoon. 162 pp. Available online at http://mcloughlinlab.ca/lab/wp-content/uploads/2019/06/2013-2016-SK-Boreal-Shield-Caribou-Project-Interim-Report-Nov-18-2016.pdf</p> | <p>Please provide clear details on the source of the home range values listed in Table 2-2.</p> | <p>Denison acknowledges the comment and will add clarification in Table 2-2 of Appendix A in Appendix 10-A that the minimum represents the autumn/rut and the maximum represents the early winter.</p> |
| AD-40 | CNSC | Appendix 10-A (ERA) section 3.2.1.5 | <p>Although the soil type selected in the ERA for modeling of atmospheric deposition to soil is sandy soil, organic soils have been delineated and characterized (section 9.1.3.3 of the EIS) as valued component (i.e., “Organic Matter/Peat”). It is unclear if the soil quality modeling performed in the ERA is protective for soil types other than sandy soil.</p> | <p>Please clarify if COPC modeling based on sandy soil is protective of organic/peaty soil and provide justification.</p> | <p>The majority of the soil in the Project Area and LSA is considered sandy soil. Section 9.1.3.2 of the EIS states "Mineral soils are associated with upland sites and (in all likelihood) anthropogenically disturbed land that, together, correspond with >99% of the Project Area and 91.5% of the LSA (Figure 9.1-8). The predominate mineral soils within the RSA have been classified as Sandy Dystric Brunisols (Smith et al. 2011)." Organic matter/peat was included as a VC in the EIS because of the concern regarding drying and losing biological function through groundwater interactions, and not in terms of assessment of soil quality. Additionally, Section 9.1.3.3 of the EIS acknowledges that organic soils is limited in the Project Area. As such, this comment is considered not applicable.</p> |
| AD-41 | CNSC | Appendix 10-A (ERA), Table 5-5 | <p>Table 5-5: Complete Exposure Pathways for All Selected Ecological Receptors to be Assessed using the IMPACT Model</p> | <p>Please add the pathway “direct contact in water” to Table 5-5 and revise all calculations accordingly.</p> | <p>Table 5-5 will be revised to state “direct contact in water” for phytoplankton. No calculation changes are needed.</p> |

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ² | Context and Rationale | Advice to the Proponent | Denison Response |
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| | | | The exposure pathway for phytoplankton is stated as “direct contact in sediment”, however, phytoplankton live suspended in the water column. It is acknowledged that in the IMPACT modelling report, phytoplankton is described with an occupancy factor of 1 in water (Table 2-5). | | |
| AD-42 | CNSC | Appendix 10-A (ERA), Table B.12 | <p>Table B.12: Sample Calculation – Adult Recreational Fisher/Hunter (McGowan Lake) Dose and Risk Calculations for Selenium</p> <p>The source for the Terrestrial Plant Ingestion Dose for Labrador tea and blueberry is stated as “Table C.5”, however, this table could not be located.</p> | Please provide the referred-to Table C.5 or an alternate source of information for the Terrestrial Plant Ingestion Dose for Labrador tea and blueberry. | Thank you for the advice comment. This will be addressed, as possible, once the EIS is updated following the conclusion of the information requirement (IR) process. |
| AD-43 | CNSC | Appendix 10-A (ERA), Environmental Risk Assessment for Wheeler River Technical Support Document | <p>The ERA is prepared by Ecometrix and submitted to Denison Mines. It is unclear if the ERA submitted has been reviewed and accepted by the proponent (Denison Mines).</p> <p>CSA N286-12 clause 9.5.5 specifies that “the selected supplier’s technical documents that are required to be submitted shall be reviewed and accepted”.</p> <p>Meeting these CSA N286-12 requirements will ensure that the proponent has control of the purchased services as a future licensee applicant.</p> | Provide clarifications if ERA documents have been reviewed and accepted by the proponent. | See response to IR-202 which indicates that Denison reviewed and accepted the ERA. This text will be added to Appendix 10-A. |
| AD-44 | CNSC | Section 11 | It is not clear whether all of the interested Indigenous Nations and communities were engaged on the results and findings of the Heritage Resources Impact Assessments (HHRIA) or just ERFN? | CNSC staff would appreciate an update on any engagement activities that have taken place with regards to any of the HHRIAs for the Project, or any site or thing that is of historical, archaeological, paleontological or architectural significance as requested by other Indigenous Nations and communities to date. | <p>Denison confirms that the results of the Project-related HRIAs were discussed with ERFN, as they expressed interest in further understanding the nature of the work undertaken.</p> <p>The Saskatchewan Ministry of Parks, Culture and Sport, Heritage Conservation Branch (HCB) administers The Heritage Property Act. Regulatory approval as per section 63 of The Heritage Property Act (GS 80) was granted for the Project for the two separate HRIAs (HCB File No. 16-2102, December 14, 2017 and HCB File No. 19-933 February 12th, 2020).</p> <p>The results of the HRIAs were included and formed part of the draft EIS. Comments made by Indigenous communities on this section of the EIS will therefore be responded to accordingly by Denison, where appropriate.</p> <p>Additionally, as noted in Section 11.3.2, “The Heritage Resource Management Plan (HRMP) was informed by engagement with ERFN, who recommended that the HRMP should include a mechanism to involve Indigenous communities where appropriate (21-EN-ERFN-591.1; 21-EN-ERFN-591.2) (see Appendix 11-B).”</p> |

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ² | Context and Rationale | Advice to the Proponent | Denison Response |
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| | | | | | The mechanism to involve Indigenous communities has been included in the HRMP and allows for general notification to Indigenous communities should an artefact be found, which provides flexibility to engage all appropriate Indigenous nations accordingly. |
| AD-45 | CNSC | Section 11.1.4.5.2. Perceived Suitability/Safe Use of Resources (p. 11-59) | <p>The EIS States: “Section 2.6.1 in Section 2 describes the extensive review of mining methods that led to the decision to adopt the ISR mining method.” (p. 11-59).</p> <p>This reference is not correct, as this section does not contain a review of the mining methods.</p> | Please update this to reflect the appropriate section. | Thank you for the advice comment. This will be addressed, as possible, once the EIS is updated following the conclusion of the information requirement (IR) process. |
| AD-46 | TC | Section 14.6.7.2 | <p>Transport Canada would like to clarify that although the proponent may use a third party to assist in developing emergency response assistance plans (ERAPs), it is the proponent’s responsibility to submit the ERAP application(s) to Transport Canada, per Section 7(1) of the <i>Transportation of Dangerous Goods Act, 1992</i> as follows:</p> <p>Emergency response assistance plan</p> <p>7 (1) No person shall import, offer for transport, handle or transport dangerous goods in a quantity or concentration that is specified by regulation — or that is within a range of quantities or concentrations that is specified by regulation — unless the person has an emergency response assistance plan that is approved under this section before</p> <p>(a) importing the dangerous goods;</p> <p>(b) offering the dangerous goods for transport; or</p> <p>(c) handling or transporting the dangerous goods, in the case where no other person is required to have an emergency response assistance plan under paragraph (a) or (b) in respect of that handling or transporting.</p> | <p>*This advice pertains to the regulatory phase.*</p> <p>Transport Canada notes that the sentence highlighted in yellow below is incorrect and should be revised or removed. While a contractor could assist the proponent to develop the ERAP(s), it is the responsibility of the proponent to apply to Transport Canada for approval of the plan(s).</p> <p>14.6.7.2 Design and Mitigation Considerations</p> <p>Principal traffic risk mitigation measures include:</p> <ul style="list-style-type: none">• traffic control measures such as speed limits;• travel management plans;• spill and emergency response planning; and• driver training. <p>Additionally, Denison considered several provisions to make sure that the effects of a terrestrial release of hazardous materials are as low as practicable. In addition to transportation mitigations listed for Scenarios 1 and 2, the following provisions were considered.</p> <p>• The <i>Transportation of Dangerous Goods Act, 1992</i> (Government of Canada 2019) outlines the requirements for entities that transport dangerous goods to establish emergency response assistance plans. These plans list specialized personnel and equipment that are required for responding to an incident. It is expected that a contractor responsible for the transportation of uranium concentrate, fuel, and hazardous chemicals would develop these plans.</p> | Acknowledged. Section 14 will be updated in the final EIS to clearly state that while a contractor could assist Denison to develop the ERAP(s), it is Denison’s responsibility to apply to Transport Canada for approval of the plan(s). |
| AD-47 | Health Canada (HC) | Appendix 14-A (p. 8-9) | <p>Context: No emergency response plan has been provided within the draft EIS, which states that emergency response plans will be developed in the future (Section 14 Appendix 14-A, p.8-9).</p> <p>Rationale: For any emergency event, Health Canada considers the protection of human health as a primary consideration in the</p> | <p>It is recommended that Denison develop an emergency response plan in consultation with potentially affected communities and stakeholders that includes, but is not limited to, the following:</p> <p>1. All relevant contact information of the communities, especially related to km 160 of Hwy 914, which is the location of a cultural</p> | <p>Denison acknowledges the comment and thanks Health Canada for the recommendations as to the development of its Emergency Response Plan.</p> <p>As noted in the draft EIS, Denison has committed to the development of an Emergency Preparedness and Response</p> |

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ² | Context and Rationale | Advice to the Proponent | Denison Response |
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| | | | <p>development of emergency preparedness and response plans. This includes monitoring for human health impacts and the provision of health-related guidance. Further, this will be a requirement of the licensing process.</p> <p>The proponent should ensure that the emergency response plans consider the protection of all relevant potential human receptors that could be impacted by an onsite or project-related off-site accident involving the release of chemical and/or radiological substances.</p> | <p>camp that has been established by the English River First Nation and km 67 of Hwy 914 that is a gathering location for the Kineepik Metis Local associated with the Northern Village of Pinehouse.</p> <p>2. Description of the mechanisms for communication with communities in case of an emergency.</p> <p>3. Description of the partnership with and the training of local communities and local responders (see Section 14 Appendix 14-B, p.1).</p> <p>4. Description of mutual aid agreements with neighboring industries/municipalities, where appropriate.</p> | <p>Program as a component of its Environmental Management System (EMS). The objectives of the program are generically consistent with the recommendations that have been provided and Denison, as it has demonstrated to date, is committed to meaningful engagement with communities of interest and will solicit input and advice during all aspects of program development.</p> <p>For reference it is noted that as it concerns its EMS framework documentation hierarchy it is expected that three levels of documentation will be developed – Programs, Plans and Procedures. The emergency preparedness and response documentation will follow this hierarchy and input from interested parties will be solicited during all phase of program/plan/procedure development. Denison intends to develop this documentation as it advances through the licensing phase of Project realization.</p> |
| AD-48 | ECCC | Appendix 16-C, Summary of Monitoring and Follow-up Programs | Appendix 16-C does not include consideration of any monitoring and follow-up programs regarding GHGs. | ECCC recommends that the Proponent consider developing a GHG follow-up program to measure and compare actual GHG emissions against the draft EIS estimates, including reporting the Project’s actual emissions and updating the emissions estimates as needed. | Denison anticipates being subject to ECCC’s reporting requirements for emitters over 10,000 tonnes CO2e and the information is collected under section 26 of the Canadian Environmental Protection Act. This was noted in the draft EIS, Section 2.5 Greenhouse Gas Emissions. |
| AD-49 | ECCC | Appendix 16-A Summary of Residual Effects Appendix 16-B Summary of Cumulative Effects | ECCC notes that GHG mitigation measures have not been considered for the Project. Furthermore, the Project’s lifetime is expected to extend into 2050 and beyond. Consistent with the information requirements of the SACC, and aligning with Canada’s commitment to achieve net-zero GHG emissions by 2050, the Proponent should provide a credible plan that describes how the Project will achieve net-zero emissions by 2050. | <p>ECCC recommends that the draft EIS include an assessment of potential GHG mitigation measures throughout all phases of the Project. This could include a Best Available Technologies / Best Environmental Practices (BAT/BEP) Determination, as described in Section 3.2 of the Draft Technical Guide.</p> <p>ECCC also recommends that the Proponent provide a credible Net-Zero Plan on how to achieve the target of 0 kt CO2 eq/year, for the year 2050 and beyond, following the guidance of the SACC and the Draft Technical Guide.</p> | <p>GHGs were not included as a VC or KI in the draft EIS and as such, there are no specific GHG-related mitigation measures in Appendix 16. However, many of the mitigation measures for the VC Air Quality related to combustion products would also be associated with a reduction in the Project’s Scope 1 emissions. As noted in the draft EIS, Section 2.5, at this stage in the Project Denison will look for opportunities to optimize energy management and improve the energy intensity of the Project where practical. Also see response for AD-19 (second paragraph).</p> <p>Denison will consider the option of preparing a climate resiliency assessment with consideration to best available technologies / environmental practices (BAT/BEP) as well as a net-zero plan as the Project advances. Section 2.5 of the EIS provides a summary of the anticipated GHG releases and a comparison to the nation- and province-wide GHG emissions. The project is expected to contribute less than 0.0043% to the nation-wide annual average. Given this very low contribution, the project is not expected to impact Canada’s ability to meet its climate-related objectives and targets.</p> |



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Wheeler River Project

February 21, 2024: On February 10, 2024, Denison Mines Corp. (Denison) re-submitted a draft EIS package for the proposed Wheeler River Project to the Canadian Nuclear Safety Commission (CNSC). CNSC staff conducted a completeness check and determined that outstanding IRs have passed completeness and supporting submissions are adequate to proceed to the EIS Technical Review. More information can be found in the [February 21, 2024 letter to Denison](#), and [completeness check table](#).

The next phase of technical review by the Federal Indigenous Review Team will run from February 21, 2024 to May 20, 2024. Subject Matter experts will review the responses to IRs provided by Denison, which includes the following documents:

- [Wheeler River Project: Denison's Responses to Information Requests from the Federal and Indigenous Review Team \(February 21, 2024\)](#)

- Wheeler River Project: Draft Environmental Impact Statement (February 21, 2024)
- Update to Indigenous Engagement Activities for the Wheeler River Project - draft EIS
- Wheeler River Project Commitments Table - draft EIS

Document reference number: 103

Date modified: 2024-02-23



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Wheeler River Project

Public Notice – Technical Review for the Wheeler River Project EIS Submission

October 11, 2024: Following Denison's February 10th submission of responses to Information Requests (IRs) and the revised Environmental Impact Statement package, on February 20, 2024, CNSC staff found the submission to contain the required information to proceed with an additional round of review by the Federal-Indigenous Review Team (FIRT). This 90-day review was intended to conclude by May 20, 2024.

When the review initially started, Denison requested the opportunity to discuss the outcome of the review process, to discuss the paths to resolution with relevant FIRT members, where elements of IRs remained unresolved. On May 24th and 31st, 2024, CNSC staff shared draft reviews of

responses to IRs with Denison, and on June 28th, 2024, a draft Advice to Proponent table. Of the 256 IRs (238 original and 18 follow-up), 24 IRs were not accepted. From June 5th to 14th, CNSC and Denison held 5 hybrid and 3 virtual meetings to discuss unresolved IRs. Between July 2nd and 8th, Denison provided supplementary responses for further review by the FIRT. The activities that have occurred between May and October have resulted in a significantly extended review period. Following these meetings and supplemental submissions, the FIRT's technical review found that the submission does not fully meet EA regulatory requirements. Currently, 6 IRs remain not accepted and 5 IRs are under CNSC staff review.

The results of this review, along with the supplemental information provided throughout the June meetings and July submissions, have all been posted to the Registry:

- [Cover Letter - CNSC to Denison - Results of the Federal Indigenous Technical Review of the Wheeler River Project Submission \(2024-10-11\)](#)
- [Annex 1 – FIRT - Wheeler River Draft Review of Responses to IRs - Draft Table \(2024-05-24\)](#)
- [Annex 2 – FIRT - Wheeler River Draft Review of Responses to IRs - Draft Table \(2024-05-31\)](#)
- [Annex 3 – FIRT – Wheeler River Advice to Proponent Table - Draft Table \(2024-06-28\)](#)
- [Annex 4 - Joint FIRT-Denison IR Technical Meetings for Wheeler River – Meeting minutes and presentations \(2024-06\)](#)
- [Annex 5 – Wheeler River – Combined Supplementary Submissions from Denison \(2024-07\)](#)
- [Annex 6 - Information Requests for the Wheeler River Project Submission \(2024-10-11\)](#)
- [Annex 7 - FIRT Advice to Proponent for the Wheeler River Project Submission \(2024-10-11\)](#)

CNSC staff expect Denison to submit complete revised responses to all IRs. It is expected that along with each response, Denison clearly indicate what changes will be made to the EIS and supporting documents, to be validated upon a future submission of a Final EIS. Following a submission that meets all outstanding regulatory requirements for the EA, CNSC staff will signal that a Final EIS can be submitted. CNSC staff expect that supplementary documentation that has been revised over the course of recent months will accompany the Final EIS package, including a revised Commitment Register and IER. Once the revised EIS meets regulatory standards, CNSC staff will develop an EA report.

The following documents were also provided by Denison during this review period, on July 17, 2024. These have been posted to the Registry:

- [Indigenous Engagement Report \(2024-07-17\)](#).
- [Indigenous Engagement Report - Appendix B: Records of Engagement \(2024-07-17\)](#).
- [Commitments Register Version 2 \(2024-07-17\)](#).

Document reference number: 112

Date modified: 2024-10-17



October 11, 2024

Ms. Janna Switzer
Vice President, Environment Sustainability & Regulatory
Denison Mines Corp.
jswitzer@denisonmines.com

Subject: Results of the Federal-Indigenous Review Team technical review of the February 10, 2024 responses to Information Requests for the proposed Wheeler River Project

Dear Mrs. Switzer,

On February 10, 2024, Denison Mines Corp. (Denison) submitted responses to Information Requests (IRs) for the Wheeler River Project [1]. On February 20, 2024, CNSC staff found the submission to contain the required information to proceed with the Federal-Indigenous Review Team (FIRT) technical review of the responses to IRs [2].

Extended Review Period

The FIRT's initial review of Denison's responses to IRs was intended to conclude by May 20, 2024. When the review initially started, Denison requested the opportunity to discuss the outcome of the review process, to discuss the paths to resolution with relevant FIRT members, where elements of IRs remained unresolved.

On May 24 and May 31, 2024, CNSC staff shared draft reviews of responses to IRs [3-4], enclosed here as Annexes 1 and 2. On June 28, 2024, CNSC staff shared a draft of the Advice to Proponent table [5], enclosed as Annex 3. This review concluded that of the 256 IRs (238 original and 18 follow-up IRs), 24 IRs remained not accepted. Between June 5 and June 14, 2024 CNSC and Denison held 5 hybrid and 3 virtual meetings to discuss the IRs with unresolved elements [6].

Following these meetings, between June 27 and July 8, 2024 Denison provided informal supplementary responses to outstanding IRs, for further review by relevant FIRT subject matter experts (SMEs) [7]. For transparency purposes, these submissions will be posted to the [Canadian Impact Assessment Registry](#) (the Registry) in one combined package, along with the meeting minutes from these meetings, enclosed as Annexes 4 and 5.

On July 17th, Denison also provided an updated version of the Commitments Table, Indigenous Engagement Report and responses to comments from the Public and Indigenous comment period [8]. The documents from this supplemental submission are also being posted to the Registry.

Although this review has resulted in a significantly extended review period, the CNSC entered into these discussions in good faith, with the intention of demonstrating a commitment to finding a path to resolution on IRs and progressing the process.

Outcome of the EIS Technical Review

Following further discussions between Denison, CNSC and the FIRT, CNSC staff have concluded that the information provided in the February 10th submission, and additional supplemental information provided to date does not fully address the regulatory requirements for the environmental assessment (EA). Currently, 6 IRs remain not accepted, for which further information is required, and 5 IRs remain under review by CNSC staff, for which conclusions are forthcoming. Of the 5 that remain under review, 3 IRs are anticipated to result in proposed EA conditions that must be met in order for Denison to proceed with the proposed project, should a positive EA decision be rendered.

This review has also concluded that of the original 256 IRs, 20 IRs contain elements that will be further assessed as part of the licensing technical review of the licence application [9], and 10 IRs contain elements that will be resolved for the purposes of the EA process, through commitments. The updated table of IRs is provided in the enclosed Annex 6 [10].

Additional information is provided in an Advice to Proponent table, which contains guidance and advice that Denison should take into consideration when responding to IRs and revising the draft EIS. This is included in the enclosed Annex 7 [11].

Expectations and Next Steps

On October 15, 2024 or shortly thereafter, CNSC staff will post the aforementioned documents to the Registry for the [Wheeler River Project \(Reference number: 80178\)](#).

CNSC staff expect Denison to submit complete responses to all outstanding IRs and advice to proponent comments. It is expected that along with each response, Denison clearly indicate what changes will be made to the EIS and supporting documents, to be validated upon a future submission of a Final EIS.

Denison's engagement on this project has been ongoing and it is expected that the Indigenous Engagement Report (IER) reflects this progress, within two months of a submission date. However, recognizing that the IER was last submitted in July 2024 [7], whether a revised IER is required with the next submission will depend on the timing of the submission. This is something to be discussed with CNSC staff once Denison has determined when they plan to next submit.

Following a submission that meets all outstanding regulatory requirements for the EA, CNSC staff will signal that a Final EIS can be submitted. CNSC staff expect that supplementary documentation that has been revised over the course of recent months will accompany the Final EIS package, including a revised Commitment Register and IER.

It is important to note, a number of IRs accepted during this stage of review contain assurances that certain information will be contained in the Final EIS, thus acceptance is conditional and will be validated by the FIRT once all IRs have been resolved and the Final EIS provided. A failure to include the assured information may result in the rejection of the Final EIS and a revised Final EIS will be required.

CNSC staff are available and willing to meet with Denison to discuss the path forward and to clarify expectations for the IR responses.

Should you have any questions, please do not hesitate to contact me, directly by phone at 343-540-6213 or by email at Jessica.Way@cnsccsn.gc.ca.

Sincerely,

- Original Signed By -

Jessica Way
Environmental Review Specialist
Environmental Review Division

c.c.:

CNSC: N. Kwamena, P. Burton, K. Gorzkowski, R. Noakes

Denison: K. Himbeault, B. England, C. Inglis-McQuay, R. Nagel

References:

- [1] Letter, J. Switzer (Denison) to J. Way (CNSC), *Wheeler River Project - Submission of Draft Environmental Impact Statement*, February 10, 2024 (e-doc [7222575](#))
- [2] Letter, J. Way (CNSC) to J. Switzer (Denison), *Outcome of CNSC Staff Completeness Check of the February 10, 2024 Responses to Federal-Indigenous Review Team Information Requests for the Wheeler River Project*, February 21, 2024 (e-doc [7222570](#))
- [3] Email, J. Way (CNSC) to J. Switzer (Denison), Annex 1, *Wheeler River Draft Review of Responses to IRs - Draft Table*, May 24, 2024 (e-doc [7360930](#))
- [4] Email, J. Way (CNSC) to J. Switzer (Denison), Annex 2, RE:[**]*Wheeler River Draft Review of Responses to IRs - Draft Table*, May 31, 2024 (e-doc [7360931](#))
- [5] Email, J. Way (CNSC) to B. England (Denison), Annex 3, RE: *Summary Conclusions*, June 28, 2024 (e-doc [7379620](#))
- [6] Meeting Minutes, Annex 4, *Joint FIRT-Denison IR Technical Meetings for Wheeler River*, June 2024 (e-doc [7305870](#))
- [7] Annex 5, *Combined Supplementary Submissions from Denison*, June-July 2024 (e-doc [7379990](#))
- [8] Letter, J. Switzer (Denison) to J. Way (CNSC), *Denison's Completion of Responses to the Consolidated Comments from Indigenous Nations and Communities and the Public Comments*, July 17, 2024 (e-doc [7325554](#))
- [9] Letter, R. Nagel to D. Saumure, *Denison Mines Corp. Application for the Wheeler River Operation*, July 4, 2023 (e-doc [7079884](#))
- [10] Annex 6, Federal and Indigenous Review Team, *Wheeler River Project – Information Requests – Submission #4*, October 11, 2024 (e-doc [7253536](#))
- [11] Annex 7, Federal and Indigenous Review Team, *Wheeler River Project – Advice to Proponent – Submission #4*, October 11, 2024 (e-doc [7253543](#))

Annex 1

Draft Federal Indigenous Review Team (FIRT) Review of Denison Responses to Information Requests (IRs) and Supporting Documents Received February 10, 2024

| Original IR# | Follow-Up IR # | SME | Project Effects Link | Reference to EIS, appendices, or supporting documentation | Context and Rationale | Information Requirement (IR) | Rationale for Status | Status |
|--------------|----------------|---|---|---|--|---|----------------------|----------|
| IR-01 | - | English River First Nation (ERFN) | Current use of lands and resources for traditional purposes | General | <p>Context: Denison has not gone far enough in terms of learning from and incorporating information from ERFN provided in the <i>Traditional Knowledge Study and Health and Socio-Economic Study Report</i>. It appears Denison put a disproportionate amount of reliance on the views and interests of one ERFN land user. While we applaud the efforts of Denison to seek feedback from ERFN land users directly and to work closely with such land users, ERFN's rights and interests in the region of the Project (and the potential of the Project to adversely impact such rights and interests) extend well beyond that of just one land user.</p> <p>Rationale: It is important for the Proponent and regulators to understand that while the rights and interests of individual ERFN members are important to consider, the Elders and elected leaders of ERFN represent the collective rights and interests of ERFN as a Nation. The results of the scoping study indicated that ERFN holds firmly established rights to the area where the planned project is located. Numerous studies conducted over several decades have examined ERFN's relationship and connection to land use and occupancy of the region where the proposed mine is located from traditional land use, subsistence harvesting, ecological, and and sociocultural and economic perspective.</p> | <p>The draft EIS should be revised to reflect the totality of ERFN TK and land use information.</p> <p>Denison and CNSC must continue to work with ERFN to ensure that impacts on ERFN rights are appropriately and fully considered, mitigated, and accommodated.</p> | | Accepted |
| IR-02 | - | Canadian Nuclear Safety Commission (CNSC) | Mitigation Measures | General Appendix 16-C | <p>Context: Denison's 2019 Wheeler River Terms of Reference states: "The EIA will also discuss the monitoring programs required to demonstrate regulatory compliance and compliance with the commitments Denison has made to its Indigenous and non-Indigenous Stakeholders."</p> <p>The CNSC's Generic Guidelines for the Preparation of an Environmental Impact Statement (EIS), also state: "The EIS will then describe mitigation measures that are specific to each environmental effect identified. Measures will be written as specific commitments that clearly describe how the Proponent intends to implement them and the environmental outcome the mitigation is designed to address.</p> <p>Rationale: The EIS and the Summary of Monitoring and Follow-up Programs provided in Appendix 16-C contains very high-level information. It is not clear which monitoring programs will be employed to demonstrate regulatory compliance, and compliance with the commitments Denison has made to its Indigenous and non-Indigenous Stakeholders.</p> | <p>CNSC staff expect Denison to provide a comprehensive list of commitments along with the next version of the EIS, including any commitments made to Indigenous Nations and communities and other stakeholders (As committed in the Wheeler River Terms of reference, and as noted in the November 28th, 2022 email from CNSC staff to Denison: <i>Future Submission of a Commitments Table for Wheeler River EIS</i>).</p> | | Accepted |

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| IR-03 | - | CNSC | Site preparation | Section 1.3.2 Temporal Boundaries Appendix 10-A (ERA) | Context: The EIS and TSD-ERA provide assessment on the Project timeframe, including construction, operation, and decommissioning phases. Rational: The site preparation phase is not included in the timeframe (EIS and TSD-ERA). As per REGDOC 2.9.1, the sub-section 4.1.1 Complexity of the environmental risk assessment requirements states that “The applicant or licensee shall identify facility characteristics and activities that may interact with the environment during the relevant phase of the facility or activity’s lifecycle (for example, site preparation, construction, operation, and decommissioning.” | Please provide an assessment of those facility characteristics and activities that may interact with the environment during the site preparation phase, along with an assessment of their potential effects, in order to reflect the entire lifecycle or provide a rationale for its exclusion. | | Accepted |
| IR-04 | - | Environment and Climate Change Canada (ECCC) | Fish and fish habitat | Section 2, Project Description Section: Glossary | Context: The Proponent defines ‘clean waste rock’ as “Waste rock generated as sandstone cuttings and core from drilling activities associated with well and freeze hole development that does not have uranium containing materials”. ECCC notes that the use of the term “Clean Waste Rock” could be misunderstood to mean that the waste rock is devoid of any contaminant. Even when the waste rock referred to as “clean waste rock” does not contain uranium materials, it could contain other metals or contaminants that could have adverse environmental effects. It is also not clear whether the “clean waste rock” is characterized for Acid Rock Drainage/Metal Leaching (ARD/ML) given that some portion of the basement rock is to be drilled out to anchor the freeze walls and may have ARD/ML potential. Rationale: The current definition of ‘clean waste rock’ in the draft EIS could lead to inappropriate handling and disposal if it is assumed to be devoid of any metals or other contaminants that might negatively affect the environment. | Provide a clear and more detailed definition of the term ‘clean waste rock’. | | Accepted |
| IR-05 | - | CNSC | Change to an environmental component due to hazardous contaminants | Section 2.2.1.2 | Context: Water volumes for mud/diamond drilling is listed as minimal as the mud will be re-used. The mud is identified as a mixture of water, clay, and environmentally friendly polymers that clean out the cuttings and help to keep the drilling bit cool. Rationale: Although the mud for drilling will be re-used, there could be environmental impacts should there be an accident while drilling. | Please identify the components of the environmentally friendly polymers for the drilling mud and potential environmental impacts should the mud not be recovered. | | Accepted |
| IR-06 | - | CNSC | Geology and groundwater | Section 2.2.1.4, Wellfield for In Situ Recovery Mining | Context: This Section of the EIS indicates that a tracer test was completed in 2021 and a feasibility field test was initiated in 2022. No information from these tests is included in the EIS and no reporting timelines are provided. | 1. Please provide a summary of the results of field tests (i.e., tracer tests, wellfield leach tests, and remediation trials) in the EIS, or provide a technical supporting document with this | | Accepted |

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| | | | | | <p>Rationale: Guidance from the IAEA (2001) and best practices highlighted by regulatory regimes in other countries such as the United States (IAEA, 2016) and Australia (Geoscience Australia, 2010) indicates that single and multi-well trial (feasibility) testing for mining and remediation techniques should be carried out before a licence for full-scale operations can be granted. This is part of the requirement for Proponents to demonstrate to government authorities that all potential risks have been considered during the life of operation and post-remediation of the mine.</p> <p>Additionally, Section 8.5.2 of the Generic EIS Guidelines states: “Units may be characterized as aquifers or aquitards, and unit descriptions should include their geochemical characteristics, vertical and lateral permeabilities, transport mechanism (diffusion versus advection) and the directions of groundwater flow”,</p> <p>And that “The applicant or licensee should present a conceptual and numerical hydrogeological model that discusses the hydrostratigraphy and groundwater flow systems”.</p> <p>Outcomes from the tracer test inform model parameters such as effective porosity (see IR-78), dispersion, and dispersivity (see IR-96). The wellfield leach tests and remediation trails ultimately inform environmental monitoring during site activities, and the source term for the groundwater model. This source term represents the contaminants which flow through the desilicified zone into Whitefish Lake, which represents a source of contamination considered in the ERA.</p> <p>References: [1] International Atomic Energy Agency (IAEA). 2001. Manual of Acid in Site Leach Uranium Mining Technology. IAEA-TECDOC-1239. Vienna. 283 p. [2] International Atomic Energy Agency (IAEA). 2016. In Situ Leach Uranium Mining: An Overview of Operations. IAEA Nuclear Energy Series No. NF-T-1.4. Vienna. 76 p. [3] Commonwealth of Australia (Geoscience Australia). 2010. Australia’s in situ recovery uranium mining best practice guide. ISBN 978-1-921672-95-8. Canberra. 33 p.</p> | <p>information, and ensure the documentation is appropriately referenced in the EIS.</p> <p>2. Please indicate how outcomes from these field tests inform the design of In Situ Recovery. This information should include:</p> <ul style="list-style-type: none">• feasibility of meeting remediation targets.• groundwater flow conditions and validation of flow models.• mobilization of contaminants (e.g., Al, Se or V).• potential for free gas evolution/two-phase flow.• identifying composition of lixiviant and production solutions.• success despite presence of >2% carbonate minerals (siderite, FeCO3) in the ore zone (see Table 4-3 of Appendix 7-A).• site-specific data to parameterize, validate, and refine solute transport models (hydraulic conductivity, effective porosity, dispersivity, diffusion, etc.). <p>3. Please provide further information of proposed operations including % recovery, uranium concentrations, optimal liquid/solid ratios, anticipated reagent consumption, etc.</p> | | |
| IR-06 | IR-06-R1 | CNSC | Geology and groundwater | Section 2.2.1.4, Wellfield for In Situ Recovery Mining | <p>Context: This Section of the EIS indicates that a tracer test was completed in 2021 and a feasibility field test was initiated in 2022. No information from these tests is included in the EIS and no reporting timelines are provided.</p> | <p>1. Please provide a summary of the results of field tests (i.e., tracer tests, wellfield leach tests, and remediation trials) in the EIS, or provide a technical supporting document with this information, and ensure the documentation is appropriately referenced in the EIS.</p> | | Accepted |

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| | | | | | <p>Rationale: Guidance from the IAEA (2001) and best practices highlighted by regulatory regimes in other countries such as the United States (IAEA, 2016) and Australia (Geoscience Australia, 2010) indicates that single and multi-well trial (feasibility) testing for mining and remediation techniques should be carried out before a licence for full-scale operations can be granted. This is part of the requirement for Proponents to demonstrate to government authorities that all potential risks have been considered during the life of operation and post-remediation of the mine.</p> <p>Additionally, Section 8.5.2 of the Generic EIS Guidelines states: “Units may be characterized as aquifers or aquitards, and unit descriptions should include their geochemical characteristics, vertical and lateral permeabilities, transport mechanism (diffusion versus advection) and the directions of groundwater flow”,</p> <p>And that “The applicant or licensee should present a conceptual and numerical hydrogeological model that discusses the hydrostratigraphy and groundwater flow systems”.</p> <p>Outcomes from the tracer test inform model parameters such as effective porosity (see IR-78), dispersion, and dispersivity (see IR-96). The wellfield leach tests and remediation trails ultimately inform environmental monitoring during site activities, and the source term for the groundwater model. This source term represents the contaminants which flow through the desilicified zone into Whitefish Lake, which represents a source of contamination considered in the ERA.</p> <p>References: [1] International Atomic Energy Agency (IAEA). 2001. Manual of Acid in Site Leach Uranium Mining Technology. IAEA-TECDOC-1239. Vienna. 283 p. [2] International Atomic Energy Agency (IAEA). 2016. In Situ Leach Uranium Mining: An Overview of Operations. IAEA Nuclear Energy Series No. NF-T-1.4. Vienna. 76 p. [3] Commonwealth of Australia (Geoscience Australia). 2010. Australia’s in situ recovery uranium mining best practice guide. ISBN 978-1-921672-95-8. Canberra. 33 p.</p> | <p>2. Please indicate how outcomes from these field tests inform the design of In Situ Recovery. This information should include:</p> <ul style="list-style-type: none">• feasibility of meeting remediation targets.• groundwater flow conditions and validation of flow models.• mobilization of contaminants (e.g., Al, Se or V).• potential for free gas evolution/two-phase flow.• identifying composition of lixiviant and production solutions.• success despite presence of >2% carbonate minerals (siderite, FeCO3) in the ore zone (see Table 4-3 of Appendix 7-A).• site-specific data to parameterize, validate, and refine solute transport models (hydraulic conductivity, effective porosity, dispersivity, diffusion, etc.). <p>3. Please provide further information of proposed operations including % recovery, uranium concentrations, optimal liquid/solid ratios, anticipated reagent consumption, etc.</p> | | |
| IR-07 | - | ECCC | Fish and fish habitat | Section 2.2.1.4.2, Wellfield Operation Section 2.2.1.4.2.2, Secondary | <p>Context: The description in Sections 2.2.1.4.2 and 2.2.1.4.2.2 refer to the differential rates of injection and withdrawal, which implies that more solution will be withdrawn through the recovery well than volume of mining solution injected. According to the description of the site, a freeze wall will create a barrier between</p> | Clarify where the extra groundwater will come from to sustain this differential rate of injection and withdrawals during operation and if this extra water has been accounted for in the model and the amount of water that ends up in the receiving environment. | | Accepted |

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| | | | | Containment of Mining Solution – Pumping | <p>the uranium deposit to be mined and outside the isolated area to prevent inflow of groundwater from the sandstone outside the freeze wall. Secondly, it was indicated that the basement rock below the uranium deposit will prevent infusion of groundwater from below.</p> <p>The Proponent stated that inward hydraulic gradient will be created by recovering more solution than is being injected. In general, the wellfield will operate to draw a minimum of 1% more solution out of the wellfield compared to solutions injected in. This will help avoid increased subsurface pressures from injection pressure build up within the deposit.</p> <p>Rationale: It is not clear where the extra groundwater will come from that will sustain this differential rate of injection and withdrawals as the freeze wall and bedrock basement will isolate the injection well from groundwater.</p> <p>If it is assumed that there is limited amount of groundwater present in the sandstone layer above the uranium deposit, that amount of groundwater in the sandstone layer is finite and will be exhausted at some point. Therefore, it is not clear where the extra groundwater will come from. If the extra volume of water is not accounted for in the modelling, that would ultimately affect the volume of water that ends up in the receiving environment and likewise the amount of contaminants contained.</p> | | | |
| IR-08 | - | ECCC | Change to an environmental component due to radiological contaminants | Section 2.2.1.4.2.2 Project Description | <p>Context: This section describes how an inward hydraulic gradient will be created within the mining area as a secondary containment method for control of mining solution. While the process is described, there is no information on contingency measures in place for pump failure or system maintenance solutions. There is also no information on how quickly the hydraulic gradient, and therefore secondary containment, would be compromised if any pumps stopped working. It is also unclear how primary containment (i.e., well design) failure, such as physical/mechanical issues compromising casings, would affect the creation of the hydraulic gradient and secondary containment as well.</p> <p>Rationale: It is important to have contingency planning in place in the event that there are any issues with the hydraulic gradient and secondary containment system for control of the acidic mining solution.</p> <p>There is no information in this section on how the hydraulic gradient (i.e., secondary containment) would be maintained if a well or pump (i.e., Primary containment) experienced problems.</p> | Provide further information regarding how the inward hydraulic gradient system functions, with particular focus on how the hydraulic gradient and secondary containment will be maintained if any wells or pumps were compromised. | | Accepted |

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| IR-09 | - | CNSC | Geology and Groundwater | Section 2.2.1.4.2.2 | <p>Context: This section indicates that mining solution within the mining area can primarily be controlled by maintaining an inward hydraulic gradient. The inward hydraulic gradient will be created by recovering more solution than is being injected.</p> <p>Rationale: If, for some reason, the recovered solution is much more than that being injected, an excessive drawdown could be created. If, by accident, mining solution is leaking into the upper sandstone aquifer through crack in injection/recovery well casing at the same time, it would be challenging to remediate the upper sandstone aquifer in dry conditions (due to excessive drawdown).</p> | Please clarify if any measure will be implemented to avoid excessive drawdown and develop contingency measures to address such accident. | | Accepted |
| IR-10 | - | ECCC | Fish and fish habitat | Section 2.2.1.4.2.3, Tertiary Containment of Mining Solution - Freeze Wall | <p>Context: The Proponent stated that as a tertiary means of containment for the mining area, the uranium deposit is proposed to be surrounded by a freeze wall that extends from the surface to the basement rock, isolating the mining area from regional groundwater. Current plans are for the freeze wall to be a minimum of 10 m thick, be installed 25 m away from the uranium deposit, and extend 30 m into the basement rock (Figure 2.2-6).</p> <p>As explained in Section 2.2.1.4.2.2, mining solution will be injected into the ore zone under pressure and will likely react, not just with the uranium in the ore zone, but also the binding or cementing material in the sandstone. This means that some portion of the sandstone above the uranium layer and perhaps some portions of the freeze wall will dissolve, thereby creating more void than just the thickness of the uranium layer or horizon. The void may affect the integrity of the freeze wall as containment.</p> <p>Rationale: It is not clear how the Proponent will monitor the freeze wall to verify whether portions of the freeze wall are being dissolved in the mining process and how it plans to verify the integrity of the freeze wall as a containment for the mining solution. In addition, if the dissolution reaction of the uranium ore is exothermic, then the heat generated may also affect the integrity of the freeze wall.</p> | <p>1. Explain how the integrity of the freeze wall will be maintained as a means of containment that prevents migration of the mining solution out of the ore zone into the receiving environment.</p> <p>2. Demonstrate that the mining solution injected under pressure will not compromise the integrity of the freeze wall as a containment.</p> <p>3. Demonstrate how both exothermic and chemical reactions of the mining solution used to dissolve the uranium ore will not compromise the integrity of the freeze wall as a containment.</p> <p>Technical Discussion Required: Yes. ECCC would like to better understand the chemical constituents that compose the mining solution and the chemical reactions that it will cause.</p> | The Proponent’s response is accepted but see AD-50 in the Advice to Proponent table. | Accepted |
| IR-11 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 2.2.3 Project Description | <p>Context: It is unclear how much contact water may be produced during the drilling of the mine well field during the construction phase of the proposed Project. Figure 2.2-14 indicates that no water will be produced during the drilling process in the construction phase. In Section 2.2.1.2 both mud rotary drilling and diamond drilling are proposed for the creation of wells. Both processes require water, however only mud rotary drilling produces liquid mud that is then reused in the drilling process.</p> | Provide further information on potential wastewater produced during the construction phase from drilling processes, and if proposed infrastructure can contain any water produced. | | Accepted |

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| | | | | | <p>Rationale: It is unclear if the liquid mud produced during drilling can be reused indefinitely with further water additions, or if this eventually becomes the clean sand grain cutting and how it will be disposed of (i.e., liquid or solid waste). If the mud produced from drilling is classified as liquid waste and disposed of as contact water, it is not clear if this is accounted for in the site water management plan and water balance during the construction phase. Contact water from well drilling during the construction phase has not been quantified or accounted for in Figure 2.2-1, and therefore it is unclear if proposed infrastructure during the construction phase has the capacity to contain this waste stream in addition to the waste streams currently outlined in Figure 2.2-1.</p> | | | |
| IR-12 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 2.2.3, Project Description | <p>Context: There is not enough information provided within the draft EIS and site water infrastructure designs to determine if the infrastructure will sufficiently contain mine site contact and non-contact water runoff. It is unclear how water management will occur during all proposed Project stages at the Project airstrip, which is located away from the main Project site. No information has been provided regarding water that may come into contact with fuels and oils from machinery on the air strip, how and where that contaminated water will be treated, and how surface runoff around the airstrip will be managed. Additionally, it is unclear if contaminants from heavy machinery on roads have been considered during runoff collection plans throughout the mine Project site. Water management at the airstrip and roads can have impacts on surface water quality and sediment quality and contaminants (e.g., Hydrocarbons) from these sources should be considered in overall site water management plans.</p> <p>In Section 2.2.3.1 a site drainage plan for contact and non-contact water has been provided in Figure 2.2-17, and water balances have been provided for the different Project phases in Figures 2.2-14 to 2.2-16. In Section 2.2.3.4 a volume of 30,000m3 for the process water pond is provided, and it is stated that the process water pond has the capacity to contain Probable Maximum Precipitation (PMP) event estimated to be 483.3mm while allowing for 1.0m of freeboard. However, there are no estimates on the total volume of water that may be drained from the overall site infrastructure (i.e., the well field, processing areas, etc.) during a 24-hr PMP event. Additionally, in Figure 2.2.17 culvert locations are provided, however there is no further information on culvert designs, flow ratings and capacity for PMP events.</p> <p>Rationale: In order to be able to understand site water management and flood risk potential, more information needs to be</p> | <p>1. Provide information on how contact and non-contact water from the site airstrip will be managed. Include information on potential contaminant characterization and loadings and an assessment of risk to the environment.</p> <p>2. Provide further information on how potential contaminants in runoff from roads have been considered in the site water management. Include information on potential contaminant characterization and loadings and an assessment of risk to the environment.</p> <p>3. Provide estimated volumes of water to be drained from overall site infrastructure (such as the mine terrace, airstrip, camp area etc.), during a 24-hr PMP event.</p> <p>4. Provide additional information on culvert designs and conveyance capacity for PMP events.</p> | <p>Item one of the IR has been accepted, but a follow-up item of advice can be found within the Advice to the Proponent table [reference to come].</p> <p>There is outstanding information required to resolve item two. The Proponent did provide the requested proposed water management structures in Attachment IR-12; however, for the road to airstrip and the airstrip, the water management strategy does not include any containment structures or information about runoff quality.</p> <p>Deleterious substances may be contained in non-contact water from all site infrastructure, including the airstrip, roads, and the camp area. This information is required in order to make a determination on significant adverse effects, as it relates to potential impacts to water quality and fish, which are assessed as part of the EA process. The Proponent should confirm that the proposed water management structures, for the roads, camp pad, operation, substation and airstrip, will be included in the Final EIS. The Proponent should also describe how quality of runoff from infrastructure will be monitored, and what proposed mitigation and management measures will be taken if necessary.</p> <p><i>With regards to items three and four, these have been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> <p>Denison is expected to address the following:</p> <ol style="list-style-type: none">From FIRT’s Information Request Rationale (2023-12-05): CNSC requests that Denison use a PMP value that is estimated using historical rainfall data that includes the most up to date meteorological data or provide justification on the validity of the current PMP.From Denison submission of responses to IRs (2023-08-18): Details related to culvert design and conveyance capacity are being developed as part of ongoing engineering activities. Culverts will be a designed with a sufficient size and length to convey water around the site during a PMP event. | Not Accepted |

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| | | | | | provided regarding the site water infrastructure designs and capture volumes during PMP events. This information will aid ECCC in understanding how contact and non-contact water will be conveyed throughout the site. Runoff from roads and the site airstrip will contain contaminants from vehicles, heavy machinery, aircrafts and de-icing practices. Additional information on the runoff collection systems and expected contaminant concentrations for the site airstrip and roads is needed to determine if the receiving environment and aquatic and terrestrial receptors are protected. | | | |
| IR-12 | IR-12-R1A | ECCC | Change to an environmental component due to hazardous contaminants | Section 2.2.3, Project Description Proponent response to IR-12 | <p>Context: Runoff water from site infrastructure such as the airstrip and roads may be categorized as non-contact water because it does not come into contact with contaminants of potential concern (COPCs) directly from mining operations infrastructure. However, it still has the potential to contain deleterious substances from mine-related activities such as operation of vehicles, including heavy machinery and aircraft, spills, fire management practices, and snow removal practices. The <i>Metal and Diamond Mining Effluent Regulations</i> (MDMER) pursuant to the <i>Fisheries Act</i> requires all mine effluent and seepage from the mine site that contains deleterious substances be discharged through a final discharge point. This includes deleterious substances in non-contact water from all site infrastructure including the airstrip, roads, and camp area.</p> <p>Rationale: All mine effluent and seepage that contains deleterious substances must be discharged through a final discharge point. This includes site non-contact water which has the potential to contain deleterious substances such as those released from vehicles, machinery, aircrafts, spills, and de-icing practices. The Proponent has not included how non-contact water runoff from site infrastructure will be captured within site water management planning. To understand the potential effects of contaminants from non-contact water on the surrounding environment, site water management planning needs to be updated to include the capture of non-contact water.</p> | <p>1. Update site water management plans to include management of potentially deleterious substances contained in non-contact water from all site infrastructure.</p> <p>2. Provide updated estimates of water volumes to be drained and managed from overall site infrastructure (including runoff from roads, airstrip, camp area, etc.) during the different Project phases. Include updated information on water treatment flows, capacity and effluent discharge during normal operations, and a 24-hr Probable Maximum Precipitation (PMP) Event.</p> | <p>The Proponent has not adequately answered either part of the IR.</p> <p>An updated site water management plan that includes the management of all water that has been in contact with project infrastructure and updated estimates of water volumes to be drained and managed from overall site infrastructure (including runoff from roads, airstrip, camp area, etc.) are required to understand the potential effects of contaminants on the surrounding environment. The Proponent should include updated information on water treatment, flows, capacity and effluent discharge during normal operations, and a 24-hr Probable Maximum Precipitation (PMP) Event.</p> | Not Accepted |
| IR-12 | IR-12-R1B | ECCC | Water Quality - Change to an environmental component due to hazardous contaminants | Section 2.2.3, Project Description Proponent response to IR-12 | <p>Context: The Proponent has clarified that there is no infrastructure in place for management of non-contact water from site infrastructure that may contain COPCs, including but not limited to roads, the airstrip, and the campground.</p> <p>Rationale: To understand the potential effects of contaminants from non-contact water on the surrounding environment, site water management planning needs to be updated to include the type of infrastructure and its location for the capture of non-contact water.</p> | Provide a map marking the locations of proposed surface drainage structures for runoff collection including collection ditches, culverts, diversion ditches, perimeter berms, collection ponds and other similar structures. | | Accepted |

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| IR-13 | - | ECCC CNSC | Fish and fish habitat | Section 2.2.4, Waste Management Section 2.2.7.7, Borrow Area Section 2.3.1.3 Site Preparation and Earthworks | <p>Context: The Proponent indicates that a borrow area is planned for an area northeast of the processing plant. The borrow material or overburden will be used during construction for roads, airstrip, pads, and in the batch plant for concrete production needs, during Operation for ongoing maintenance of various Project components and during decommissioning for fill and cover material. Suitable construction fill material will be sourced from the proposed borrow area and any suitable clean sandstone generated during freeze wall and well drilling (Section 2.2.7.7).</p> <p>It was also noted in Sections 2.2.1.3 and 2.2.14 that the freeze wall will be established by drilling over 300 vertical holes from surface to the basement rock. The freeze holes will extend 30 m into the basement rock and will produce waste rock from basement rock (Figure 2.2-6). However, there is no information whether the waste rock from basement rock would potentially be acid generating and/or metal leaching. This means that all the extra 30 m of basement rock should also be characterized for potential ARD/ML to determine use or appropriate disposal.</p> <p>Rationale: ECCC notes that the Proponent did not indicate whether the borrow material and the drill out part of the sandstone layers and basement rock will be tested for Acid rock drainage/metal leaching (ARD/ML) potential before they will be used during construction, operation and decommissioning. ARD/ML is an environmental hazard that will have an adverse effect on waterbodies frequented by fish.</p> <p>Potential acid generating and metal leaching waste rock could pose negative impacts on the environment if they are not managed adequately.</p> | <p>Please provide:</p> <ol style="list-style-type: none">1. Information on whether the waste rock from the basement rock is potentially acid generating and metal leaching;<ol style="list-style-type: none">a. Confirm that any borrow material to be used for construction will be characterized for potential ARD/ML.b. Confirm that the part of waste rock recovered from the basement rock, will also be tested for potential ARD/ML.2. Criteria for segregating the potential acid generating and metal leaching waste rock, if it exists, from clean waste rock; and,3. A plan to manage the potential acid generating and metal leaching waste rock, if it exists. | <p><u>Note to Denison:</u> This IR is conditionally accepted. This commitment should be captured in the Commitments Register.</p> <p>Once Denison has added a commitment to develop the waste rock segregation criteria and to develop a lined storage pad for potentially acid generation (PAG) material in the Commitments Register, this can be accepted.</p> <p><i><u>Proposed rationale text for posting:</u> Denison has captured their commitment to develop the waste rock segregation criteria and to develop a lined storage pad for potentially acid generation (PAG) material in the Commitments Register, so this IR has been accepted.</i></p> | Accepted |
| IR-14 | - | CNSC | Wastes and Decommissioning | Section 2.3.3.1.3 Decontamination, Demolition, and Disposal (p. 2-82) Table 4.3-2: Key Issues and Concerns from English River First Nation (p. 4-33) | <p>Context: The EIS states “Concrete foundations will be left in place. Any portions of concrete foundations remaining above grade will be levelled and rebar will be cut-off at grade. Large slabs will be perforated on a 2-m grid to permit drainage. Concrete slabs will be covered with 0.5 m of development rock or locally stockpiled till.” (p. 2-82)</p> <p>Further, Denison notes that “Concern about responsible authority for restoring the environment, including contaminants when mining concludes. How long will it take to have the environment fully restored and, if Denison is no longer the operator, how will this be completed?” (p. 4-33). This comment status is noted as <i>Complete</i>.</p> <p>Rationale: Permanent structures will remain following decommissioning, according to the excerpt above. It’s unclear how</p> | <p>How has the proposal to leave these foundations in place been received by the Indigenous Nations and communities during engagement sessions? Have engagement activities influenced Denison’s planned decommissioning approach? Describe in additional detail how the comment from p. 4-33 has been addressed and how this has been received by those who expressed this concern?</p> | <p><u>Note to Denison:</u> This IR is conditionally accepted. This commitment should be captured in the Commitments Register.</p> <p>Once Denison has added a commitment to address concerns from Indigenous Nations and communities in the Preliminary Decommissioning Plans as they are developed, in the Commitments Register, this can be accepted.</p> <p><i><u>Proposed rationale text for posting:</u> Denison has captured their commitment related to addressing concerns from Indigenous Nations and communities on their decommissioning approach within the Preliminary Decommissioning Plans in the Commitments Register, so this IR has been accepted.</i></p> | Accepted |

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| | | | | | engagement activities influenced Denison’s planned decommissioning approach, or how the comment above has been addressed or received. | | | |
| IR-15 | - | ECCC | Fish and fish habitat | Section 2.2.3.4 Project Description Section 8.1.3.4.2, Aquatic Environment | Context: In Section 2.2.3.4 it is stated that the estimated PMP event for Project infrastructure planning is 483.3mm. In Section 8.1.3.4.2 it is stated that the PMP is 489.3 mm. Rationale: It is unclear which value is the correct PMP value and if Project infrastructure has been planned correctly. | Provide the correct PMP value and verify that Project infrastructure has been designed utilizing the correct value. | | Accepted |
| IR-16 | - | CNSC | Human health with respect to hazardous contaminants | Section 2.2.3.8 | Context: The EIS and technical supporting documents do not provide sufficient justification for the selection of the proposed wastewater treatment systems for the industrial wastewater treatment plant or the domestic wastewater treatment plant. In addition, it is not clear how the upper bound of the industrial wastewater treatment plant effluent quality was obtained. Rationale: Draft REGDOC-2.9.2 formally documents the CNSC’s expectations to licensees for controlling releases to the environment. For proposed new facilities, these expectations include conducting a best available technology and techniques, economically achievable (BATEA) Assessment, and determining key parameters necessary to support the EIS. These include identifying: <ul style="list-style-type: none">environmental release targets to inform the design of wastewater treatment systems to constrain the quantity and concentration of contaminants and physical stressors released into the environment,the best available technology and techniques through an options analysis; andthe anticipated influent characteristics, overall treatment efficiencies, and maximum predicted design release as the output of the assessment. Consideration of the principle of pollution prevention and BATEA is also a requirement of REGDOC-2.9.1. CNSC staff have met with Denison to discuss the expectations in draft REGDOC-2.9.2. | Please provide a summary of the BATEA assessment to justify the selection of the wastewater treatment plant system. As part of the summary, please identify the anticipated environmental release targets used to inform the design, as well as the maximum predicted design release concentrations and loadings to the receiving environment. The maximum predicted design releases should be used in the ERA to demonstrate protection of people and the environment. | | Accepted |
| IR-17 | - | CNSC | Human health with respect to hazardous contaminants | Section 2.2.3.8 | Context: It is also acknowledged that Denison stated in meetings with CNSC staff that Denison intends to propose final release targets to the CNSC as part of the licence application submission. Rationale: It is not clear in the submission whether Denison has considered whether any applicable technology-based performance | Denison should harmonize their proposed Effluent Release Targets with the technology-based performance standards that exist in the Metal and Diamond Mining Effluent Regulations where applicable, or other suitable international regulations. | | Accepted |

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| | | | | | <p>standards exist in Canada or internationally, and would be relevant as effluent discharge targets, in order to ensure principles of pollution prevention are applied. Consideration of this would help ensure that the proposed effluent discharge targets harmonize with existing federal, provincial/territorial, and/or municipal requirements. For example, there are release limits for radium-226, TSS, and pH outlined in the federal Metal and Diamond Mining Effluent Regulations, which have been demonstrated to be achievable in the uranium mine and mill industry.</p> <p>In addition, countries like the United States, where in-situ recovery has been conducted in the past, have specific technology-based limits. These are known as New Source Performance Standards and are identified in US Code of Federal Regulations (US CFR) 40, Chapter 1, Subchapter N, Part 440 – Ore Mining and Dressing Point Source Category. It is not clear whether these have been considered in Denison’s assessment. These should be considered when identifying suitable achievable technologies.</p> | | | |
| IR-18 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 2.2.3.9, Project Description Appendix 8-E | <p>Context: In Table 2.2-1 the upper bound Industrial Wastewater Treatment Plant (IWWTP) effluent quality final discharge targets for Constituents of Potential Concern (COPCs) are provided. General parameters (e.g., temperature, pH, etc.), and several Schedule 4 Substances with maximum authorized concentrations (lead, nickel, suspended solids, and un-ionized ammonia) under the Metal and Diamond Mining Effluent Regulations (MDMER) have not been provided in this table. There are several COPCs (aluminum, mercury, iron, nitrate, thallium, phosphorus and manganese) for effluent characterization under Schedule 5 Section 4 of the MDMER that have not been provided in this table. Additionally, no information on water quality guidelines has been provided in this table.</p> <p>Furthermore, it is stated that the final effluent quality discharge target for uranium is 0.057 mg/L. However, the Canadian Council of Ministers of the Environment (CCME) water short term (acute) water quality guidelines for the protection of aquatic life is 0.033 mg/L. The proposed effluent discharge target for uranium exceeds the acute water quality guidelines, indicating effluent may pose the risk of being acutely lethal to aquatic biota at end-of-pipe.</p> <p>Rationale: ECCC requests the Proponent include the general water quality parameters that influence water quality thresholds, parameters in Schedule 4 and Schedule 5 Section 4 of the MDMER, and their respective water quality guidelines for consideration and transparency.</p> <p>Discharges from the proposed Project will alter water quality in the</p> | <p>1. Update Table 2.2-1 and Appendix 8-E to include all general parameters required for environmental effects monitoring: pH, temperature, hardness, alkalinity, and conductivity.</p> <p>2. Update Table 2.2-1 and Appendix 8-E to include missing Schedule 4 Substances under the MDMER with maximum authorized concentrations: lead, nickel, suspended solids, and un-ionized ammonia.</p> <p>3. Update Table 2.2-1 and Appendix 8-E to include missing Schedule 5 Section 4 parameters required for effluent characterization under the MDMER: aluminum, mercury, iron, nitrate, thallium, phosphorus and manganese.</p> <p>4. Include all acute and chronic water quality thresholds for each parameter in Table 2.2-1 and Appendix 8-E.</p> <p>5. Describe additional mitigation measures that can be considered to minimize impacts to aquatic biota from uranium concentrations in effluent.</p> | <p>Item 3 remains outstanding and is an issue that also needs to be addressed in IR-108, 114 and 115.</p> <p>With regards to items one and four, these have been accepted for the purposes of the current EA process and will be further assessed as part of licensing technical reviews, prior to the granting of a license.</p> <p>Denison will be expected to address the following:</p> <ul style="list-style-type: none">For item 1, the requested parameters (pH, temperature, hardness, alkalinity and conductivity) were added to Table 2.2-1 in the revised draft EIS and the tables in Appendix 8-E. However, the predicted conductivity presented would not be possible given the TDS reported in Table 2.2-1, and this inconsistency has been found throughout Section 8 and its appendices. Conductivity in µS/cm is typically 1.25-2 times TDS in mg/L, whereas the value in the table is 0.0034 times the TDS concentration. This item is not resolved, but can be carried over to licensing, The Proponent will be expected to correct the proposed effluent conductivity added to Table 2.2-1 and in Appendix 8-E.For item 4, the proponent will have to follow the guidance and requirements in REGDOC-2.9.2 to develop effluent discharge targets. The CNSC will engage with ECCC during this process as necessary. | Not Accepted |

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| | | | | | immediate receiving area, and this may include some sublethal effects on aquatic biota, which must be minimized. It remains the Proponent’s responsibility to adhere to the MDMER to ensure that effluent at the end-of-pipe from all final discharge points be non-acutely lethal and meet requirements for prescribed deleterious substances under Schedule 4 of the regulations. | | | |
| IR-19 | - | ECCC | Change to an environmental component due to radiological contaminants | Section 2.2.4 Project Description | <p>Context: In this section, it is proposed that the IWWTP precipitate pond will have a single geosynthetic composite liner system, which is used for ponds/pads that only store non-radioactive materials.</p> <p>However, from Section 2.2.3.9 on industrial wastewater treatment, it is unclear if the precipitates from the stage three neutralization process that are pumped to the IWWTP precipitates pond will have any residual radioactivity.</p> <p>Rationale: For the protection of the surrounding environment, it is important that any ponds/pads that are expected to store radiological contaminants be designed to have proper controls (i.e., liners with monitoring systems) in place.</p> | <p>1. Confirm the characterization of the precipitates that are to be stored in the IWWTP precipitate pond.</p> <p>2. If radiological constituents are expected within those precipitates, update the draft EIS to ensure the proposed geosynthetic liner system for the IWWTP precipitate pond will be adequate to ensure the protection of the surrounding environment.</p> | | Accepted |
| IR-20 | - | NRCan | Fish and fish habitat | Section 2.3.3.1.1 Appendix 7-C | <p>Context: The Proponent's objective for mining area remediation is to restore the groundwater within the confines of the freeze wall to an acceptable remediation target (EIS, sec. 2.3.3.1.1). The Proponent's acceptable decommissioning objectives for groundwater quality are provided in EIS Table 2.3-3 and in Table 3-5 of Appendix 7-C. These objectives were based on laboratory core flood tests performed by flushing samples of ore with groundwater and groundwater amended with sodium hydroxide or sodium bicarbonate. The composition of the remediated groundwater observed in the core flood tests serves as the source term for the post-decommissioning reactive transport modeling presented in section 4 of Appendix 7-C.</p> <p>Rationale: In NRCan's opinion, it is important for reviewers to be able to assess the level of remediation achieved in order to reach the Proponent's decommissioning groundwater quality objectives. Therefore, the Proponent should provide complete water quality data for the pregnant lixiviant that remains in the ore zone after the end of mining and prior to any remediation.</p> | NRCan requests that the Proponent revise Table 3-5 of Appendix 7-C to show the water quality in lixiviant remaining in the ore zone at the end of mining, prior to remediation activities. | | Accepted |
| IR-21 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 2.3.3.1.3, Project Description | <p>Context: The decommissioning process for the wellfield and associated infrastructure is discussed, however there is no information provided on the potential risk for subsidence of the ground above the depleted uranium deposit. After the uranium has been dissolved and pumped to the surface, a cavity will be formed in the area where the uranium used to exist. This could destabilize</p> | Provide further information on the potential risks from subsidence including the probability of occurrence, how it may affect surface water features, and if there exists any risk to the planned decommissioning of waste management infrastructure. | | Accepted |

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| | | | | | <p>the overlying substrates, causing the ground at the surface to sink in the future. There is currently no information regarding this risk, and how it may alter the overlying environment, surface water features, runoff, or existing nearby waterbodies.</p> <p>Rationale: From a surface water and sediment quality perspective, it is important to understand how potential subsidence in the future post-decommissioning may affect the existing environment. It is currently unclear if there is any risk to the aquatic environment if subsidence were to occur and alter existing waterbodies, create new surface water features, or if there will be any risk to the decommissioned onsite industrial landfill and industrial wastewater treatment plant precipitate pond.</p> | | | |
| IR-22 | - | NRCan | Fish and fish habitat | Section 2.10 Appendix 2-C, section 1.1.1.4 | <p>Context: With respect to the choice of In-Situ Recovery (ISR) mining solution, two alternatives were assessed: alkaline and acidic lixivants (Appendix 2-C, sec. 1.1.1.4). In the consideration of technical and economic feasibility of the alternatives (Table 2, Appendix 2-C), the Proponent concludes that: Option 1 (alkaline) is not technically feasible based on the uranium deposit geochemistry. Option 2 (acidic) is technically and economically feasible based on the uranium deposit geochemistry and ability to dissolve uranium. Accordingly, the alkaline alternative was not carried forward into the Environmental Assessment (EIS, Table 2.10-1; Appendix 2-C, Table 3).</p> <p>While acidic ISR solutions are widely used internationally (e.g., Kazakhstan), in the United States, where the environmental regulatory regime is more strict, alkaline solutions have been used exclusively since 1970.</p> <p>Rationale: In NRCan's opinion, the Proponent should provide a more thorough technical justification for adopting an acidic ISR lixiviant.</p> | In the Alternative Means Assessment (Appendix 2-C), NRCan requests that the Proponent provides a more thorough technical justification for selecting an acidic ISR lixiviant rather than a less environmentally problematic alkaline leach used exclusively in the USA. | | Accepted |
| IR-23 | - | CNSC | Alternative Means | Section 2.10.2 Alternative Means Appendix 2-A PD Engagement Tables Appendix 2-C Alternative Means Assessment (p. 3) | <p>Context: There are multiple rows in the Indigenous Tables for Appendix 2-A where comments and concerns raised by Indigenous Nations and communities and other members of the public were taken into consideration in the Alternative Means Assessment. However, it is unclear how these were considered.</p> <p>A few examples:</p> <ul style="list-style-type: none">16-EN-DesNd-101.1: Interested in any future business opportunities that may be available as Denison advances their Wheeler River Project.16-EN-ERFN-100.15: In that territory near the Wheeler River there are a lot of spawning and calving areas for moose, | Please explain how comments and concerns collected during Denison’s engagement sessions were considered or influenced the alternative means assessment. Please include this information in the EIS and/or it’s appendices. | | Accepted |

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| | | | | | <p>caribou; those creeks are for whitefish spawning. There’s lots of heavy muskeg there. A lot of us have been there, and we’d like to know there’ll still be access to the area.</p> <ul style="list-style-type: none">6-EN-ERFN-100.17: Today because of climate change, things are starting to happen that normally didn’t happen. Even the permafrost is now further down. In the Wheeler River area, where there’s some permafrost, have your environment guys seen a change? Will there be a change? These are some of the questions that need to be answered in order to come out with a positive spin. <p>Rationale: Appendix 2-C, Alternative Means assessment, states (p.3): “Engagement with Interested Parties naturally included alternatives means and the engagement input was included in the evaluation of alternative means. Refer to the references list below and <i>Appendix 2-A Engagement Database Summary – Project Description</i> for details of engagement information referenced in this alternative means assessment.”</p> <p>It is unclear in section 2.10.2 of the EIS, Appendix 2-A or Appendix 2C how the comments documented by Denison have been considered or influenced the alternative means assessment.</p> | | | |
| IR-24 | - | CNSC | Alternative Means | Section 2.10.2 Alternative Means | <p>Context: While Appendix 2-C (Alternative Means Assessment) is detailed and includes all aspects of the Alternative means assessment that are required, the summary of the analysis and conclusions in Section 2.10.2 of the EIS lacks the level of detail required to understand the methodology used, and how Denison arrived at these conclusions.</p> <p>Rationale: As noted in the Agency’s Operational Policy Statement on Addressing “Purpose of” and “Alternative Means” under the CEAA 2012: “If a preferred means is selected, the analysis and the rationale for the choice should be explained from the perspective of the Proponent, and be documented in the EIS in sufficient detail to provide context for public and technical comment periods during the project EA, and ultimately to allow the decision maker to understand the choice.”</p> | <p>Please summarize the analysis of the alternative means assessment within the body of the EIS, in sufficient detail that a reader of the EIS has adequate information to understand the methodology used, and how Denison arrived at these conclusions.</p> <p>*Note: In addition to the adding text to summarize, Table 6 in Appendix 2-C could be useful to understanding table 2.10.1 in the EIS.</p> | | Accepted |
| IR-25 | - | CNSC | Current use of lands and resources for traditional purposes | Section 3, Sections 4, Section 5, Section 11 (and all other applicable once Métis Knowledge Use Study is completed) | <p>Context: The EIS states that Denison is currently negotiating an agreement with MN-S and no traditional land use information is included throughout the EIS given no agreement was signed or Traditional land use information was shared at the time the EIS was being drafted.</p> <p>As noted in the EIS Denison has committed that: “As information becomes available from the agreed-upon process between the</p> | <p>Please update the revised Draft EIS to reflect the integration of the Métis Use and Knowledge Study in the Draft EIS where applicable, when this study is completed and provided to Denison.</p> <p>In addition, please include an updated Issues and Concerns table that includes relevant information from the MN-S as a result of</p> | | Accepted |

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| | | | | | <p>Métis Nation – Saskatchewan and Denison, it will be incorporated into the final EIS.” (p. 11-36)</p> <p>Rationale: More information is required to better understand the issues and concerns, valued components, and current use of lands and resources for traditional purposes by MN-S near the Project area.</p> <p>Requirements are detailed in CNSC’s Generic EIS Guidelines, section 8.9: Indigenous land and resource use.</p> | <p>engagement activities and relevant MN-S studies in the next version of the EIS, as appropriate.</p> <p>Should this information not be made available to Denison at the time of revising the draft EIS, the next version of the EIS and the response to this IR should provide a status update on discussions and engagement with MN-S and next steps.</p> | | |
| IR-26 | - | CNSC | Precautionary principle and approach | Section 3.4.8 Lands Taken Up from an Indigenous Perspective (p. 3-14) | <p>Context: Denison states: “Discrepancies among IK and western scientific information provide an opportunity for Denison to take a precautionary approach. Examples of concrete actions to address uncertainty in cases where IK and LK have differing conclusions on predicted Project effects include addressing uncertainty through monitoring and follow-up programs and communicating results of those monitoring and follow-up programs to demonstrate they have been responsive to the IK shared.” (p. 3-14)</p> <p>Rationale: CNSC’s Generic Guidelines for the Preparation of an EIS state: “In documenting the analyses included in the EIS, the Proponent will demonstrate that all aspects of the Project have been examined and planned in a careful and precautionary manner in order to avoid significant adverse environmental effects.</p> <p>A document by Canada’s Privy Council Office, A Framework for the Application of Precaution in Science-based Decision Making About Risk, sets out guiding principles for the application of precaution to science-based decision making.” (Section 2.5)</p> | Please clarify how the precautionary principle, and the Privy Council Office’s, A Framework for the Application of Precaution in Science-based Decision Making About Risk, sets out guiding principles for the application of precaution to science-based decision making has been considered and incorporated into the EA described in the EIS. | | Accepted |
| IR-27 | - | CNSC | Cumulative Effects Analysis | Section 3.4.8 | <p>Context: During an outreach and engagement trip by CNSC in October 2022, an abandoned exploration camp adjacent to the proposed Wheeler River site was observed. This site has not been identified within the EIS as part of the cumulative effects assessment. As noted in section 3.4.8, KML has also raised concerns with Denison related to abandoned camps and industrial waste left with no programs for clean-up.</p> <p>Rationale: Section 9.4.3 of CNSC’s Generic Guidelines for the Preparation of an EIS states that “The applicant shall assess any residual adverse environmental effects of the Project in combination with other past, present or reasonably foreseeable projects and/or activities within the study area.”</p> | Please specify why abandoned exploration camps and industrial waste aren’t taken into consideration when completing cumulative effects assessment. | | Accepted |

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| IR-28 | - | CNSC | Current use of lands and resources for traditional purposes | Section 4, IER and engagement appendices, including: Appendix 2-A Appendix 6-B Appendix 7-B Appendix 8-A Appendix 9-A Appendix 10-B Appendix 11-A Appendix 12-A Appendix 13-A Appendix 14-B | <p>Context: The summary of issues tables do not appear to include all of the key issues identified by the Indigenous Nations and communities.</p> <p>For example, some Indigenous Nations and communities have shared concerns with respect to accident prevention and overall safety on the Key Lake road (Highway 914) due to increased traffic, impacts on treaty rights and section 35 rights due to cumulative impacts, and decommissioning, that were not captured in the issues and concerns and summary tables in Section 4.3.2 and in the IER.</p> <p>The tables in the engagement appendices include a column titled “Response (From Denison)”. The “Response” column does not include responses, but instead points the reader to where this comment or concern was considered. When navigating to the sections referenced, it is often unclear how this information was considered or influenced the assessment.</p> <p>Rationale: Additional detail is required in order to ensure the key issues are all identified and to understand the status of validation for each issue raised and the response provided.</p> | <p>1. Update the summary of issues and concerns tables to include all relevant issues and concerns raised by each of the Indigenous Nations and communities to date, including concerns raised in the Indigenous Knowledge studies provided, additional engagement, and Draft EIS comments.</p> <p>2. Please include a column in the issues and concerns tables to clearly articulate the specific mitigation/monitoring measures that Denison have committed to, or any other measures, in order to address the concerns raised by each Indigenous Nation and community during the engagement process to date.</p> <p>3. Denison must demonstrate that each Indigenous Nation and community has validated that the summary of issues and concerns table reflects their understanding or agreement, and/or a path forward to complete the validation throughout the EIS and the updated IER.</p> <p>Validation must be complete by the time the technical review is complete, prior to submission of a final EIS. Should Denison not be able to fully address issues, concerns or feedback raised by any Indigenous Nation or community, through mitigation and monitoring measures, this should be documented, and a rationale provided.</p> <p>4. Update the response column of the Engagement tables to describe how these were considered in the sections referenced. Consider renaming this column to reflect the nature of the content (i.e., how the information was considered).</p> | <p><u>Note to Denison:</u> This text is still in draft, but will likely have some minor revisions.</p> <p>This response has been accepted. Denison has provided fully updated information as of January 2024.</p> <p>It will be expected that a fully updated IER and issues and concerns tables for each Nation as per the original IR, be provided in future submissions, for CNSC staff awareness of progress on this work. This includes updates on the validation from all Nations and communities, or updated paths forward to validation, if applicable.</p> | Accepted |
| IR-29 | - | CNSC | Current use of lands and resources for traditional purposes | Section 4.3.2 and IER | <p>Context: In this section, Denison includes the engagement with BNDN and includes a summary of issues and concerns table for the Nation. Within the history of interactions (Section 4.3.3.2.1).</p> <p>Rationale: Denison states that they have been providing information on the Project to BNDN in 2019, 2021 and again in 2022 and that Denison and BNDN have not responded to date in order to advance further engagement and dialogue.</p> | Please ensure updated information of any additional engagement activities that Denison has completed with BNDN related to understanding their current and traditional land use and potential interests near the proposed project is provided. | | Accepted |
| IR-30 | - | CNSC | Indigenous physical and cultural heritage | Section 4.3.2.1.3, Table 4.3.2 | <p>Context: Concerns were raised during engagement sessions that “Elders are not being consulted as most of the engagement has been through online means and without a translator”.</p> <p>Rationale: There’s no indication that a translator has been employed to engage with Elders since 2021 in the engagement Table 4.3.2.</p> | How has Denison adapted engagement with Elders from the ERFN since receiving this comment on March 31, 2021? | | Accepted |

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| IR-31 | - | CNSC | Indigenous Engagement | Section 4.4.2.1.3, Key Engagement Activities (p. 4-88) | Context and Rationale: Regarding the following: “An open house for the general public was planned to be hosted in 2022 on preliminary effects and mitigation, but due to concerns identified by MN-S about hosting a public open house in a community with a significant Métis population, this meeting was postponed by Denison. Denison looks forward to rescheduling the meeting in collaboration with the MN-S.” (p. 4-88) | Please provide an update on the evolution or progress of this engagement with local communities, following collaboration with MN-S (or otherwise). | | Accepted |
| IR-32 | - | CNSC | Current use of lands and resources for traditional purposes | Section 5.3 Section 9.0 Terrestrial Environment | Context: Some sections of the EIS (such as Fish and Fish Habitat, Indigenous Lands and resource use) indicate that Indigenous and/or local knowledge was considered when defining the spatial boundaries. However, this is not included in other sections, such as Terrestrial Environment. Rationale: Section 5.2.2 of CNSC’s Generic EIS Guidelines require that spatial boundaries be defined by considering, but not limited to, the following criteria: Community and Indigenous traditional knowledge, ecological and technical considerations. | Please provide any additional details about how any comments or concerns raised were considered in defining the spatial boundaries with Indigenous Nations and communities with respect to spatial boundaries, for the Terrestrial Section and which specific Indigenous Nations and communities were engaged on these topics and how their input and knowledge was incorporated into the EIS. If already presented in the EIS text body, please indicate where this information can be found or link to Section 4 of the EIS or in the IER. | | Accepted |
| IR-33 | - | CNSC | Residual Effect Characterization | Section 5.8.1, Definitions for Residual Effects Characterization and Significance Section 5.8.1.1, Residual Effects Characteristics Section 8, Table 8.3-9: Fish and Fish Habitat - Surface Water Quality | Context: Denison uses specific criteria (Residual Effect Characteristics: Direction, magnitude, geographic extent, duration, frequency, reversibility, context and likelihood) and associated ratings (e.g., adverse/positive, low/moderate/high) for the predicted effects assessment. However, it is unclear whether an aggregation method was used in order to determine whether impacts will be significant or not significant, depending on the combination of rating categories (i.e., weightings that were calculated, use of decision rules). For example, medium term and long term are both used to represent the same time category: “Effects are expected to last between 3 to 38 years (i.e., effects expected during Construction through to the end of post-Decommissioning).” (See table 8.4-13 on p. 8-200 compared to table 8.4-12 on p. 8-199 and table 8.5-9 on p. 8-246). Rationale: The Generic Guidelines state: “The method used to describe the level of the adverse effect should be transparent and reproducible.” In Table 8.3-11, duration was moderate, but again uses same rationale. There is no 'moderate' in Table 8.3-8, and by the same rationale, this should be medium-term to be consistent with definitions provided and summary Table 8.3-12. It was noted that all three tables should be deemed medium-term | If an aggregation method was used and ratings (e.g., High, medium, low) were weighted, what weightings were used, how were these calculated? Please also describe any decision rules that informed the determination of significance. If no aggregation was used, how did Denison ensure that results were consistent, given the varying rankings for each of the key criteria, and varying combination? Regarding inconsistencies in ratings, please use consistent terminology for same rating. | | Accepted |

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| | | | | | based on definitions of ratings outlined in Table 8.3-8. Frequency was also showing up as "continuous" and "continuously" in these tables. | | | |
| IR-34 | - | CNSC | Cumulative Effects Analysis | Section 5.9.2.2 (p. 5-41) | <p>Context: Denison identifies the Gryphon deposit as a project that is not reasonably foreseeable. The direct quote from the EIS indicates that the “Development of the Gryphon deposit as an underground mine was evaluated at the prefeasibility level in 2018 but has not advanced to feasibility study or EA. Denison has not announced an intent to proceed with the development of the Gryphon deposit.” (p. 5-41)</p> <p>Rationale: The guidance Assessing Cumulative Environmental Effects under the CEAA, 2012 defines <i>Reasonably Foreseeable</i> as a “physical activity [that] is expected to proceed, e.g. the Proponent has publicly disclosed its intention to seek the necessary EA or other authorizations to proceed.”</p> <p>In a press release by Denison Mines (2018: Denison announces decision to advance Wheeler River Project following positive PFS results), Denison publicly disclosed intention to seek the necessary EA for Gryphon to proceed: “After careful consideration of the risks and opportunities associated with permitting and concurrent advancement of project engineering activities, the Company has decided to submit a PD and initiate the EA process in early 2019 for the Phoenix ISR operation, and to bring the Gryphon operation forward, at a later date, as required to achieve the PFS plan of Gryphon first production by 2030.”</p> <p>Further, Denison’s Wheeler River Webpage references a “start of pre-production activities for the Gryphon operation in 2026”</p> | Please update the cumulative effects assessment in the EIS to include the Gryphon deposit as a Present or Reasonably Foreseeable Project. | | Accepted |
| IR-35 | - | CNSC | Change to an environmental component due to hazardous contaminants | Section 6, Chemicals of Potential Concern | <p>Context: The use of petroleum products (e.g., propane, gasoline, and diesel) at the Denison Mines Wheeler River site is associated with vehicles and periodic operational testing of emergency generators as well as stationary pumps for emergency power or fire water systems. Thus, the air emissions will contain acrolein.</p> <p>Rationale: This chemical of potential concern (COPC) poses potential risks to human health via inhalation, but acrolein appears to have been missed or deemed insignificant. However, its consideration in the assessment will provide information on the significance of the associated risk.</p> | Please consider acrolein in the assessment or provide a rationale for its exclusion. | | Accepted |
| IR-35 | IR-35-R1 | Health Canada (HC) | Change to an environmental component due | Section 6, Chemicals of Potential Concern | <p>Context: Potential health risks from long-term exposure to acrolein were not considered in the Proponent’s response to IR-35.</p> | Use predicted annual concentrations and available chronic reference concentrations to account for potential health risks | Note to Denison: This IR is conditionally accepted. Once Denison has made the requested edits from HC, this IR can be accepted. | Accepted |

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| | | | to hazardous contaminants IR-35 Response from Denison | | Rationale: No annual predicted concentrations for acrolein were provided in the draft EIS or in the response to IR-35. Concentrations were modelled for short-term exposure (1h and 24h) only in the draft EIS and compared to the 1-hour and 24-hour Ontario Ambient Air Quality Criteria for acrolein. It is Health Canada (HC) guidance to assess both potential short and long-term health effects. The predicted annual concentrations for acrolein should be compared against chronic reference concentrations (e.g., the USEPA Reference Concentration (RfC) ¹ (0.02 µg/m³) and the Tolerable Concentration (TC) from Environment and Climate Change Canada and Health Canada’s Priority Substances List Assessment Report ² (0.4 µg/m³)). | from long-term exposure to acrolein to support the decision to screen out acrolein as a COPC from further assessment. | Please update Table 3-10 in the Revised DRAFT EIS (January 2024; Appendix 10-A - Environmental Risk Assessment) to include the predicted maximum annual concentration for acrolein at the fence line, as noted in Denison’s Response to IR-35. | |
| IR-36 | - | CNSC | Other | Section 6, Table 6.1-11 Baseline External Gamma Monitoring | Context: For one of the exposures in the summary table for baseline external gamma monitoring (Table 6.1-11), the cell states "Destroyed in Field". Rationale: No rationale or indication as to why or how it was destroyed is provided. | Please provide any additional info available as to how equipment was destroyed. | | Accepted |
| IR-37 | - | CNSC | Air Quality | Section 6.1.1.1, CALPUFF model | Context: "The Saskatchewan Ministry of Environment (SK MOE) has developed the Saskatchewan Air Quality Modelling Guideline (SK MOE 2012a) to assist Proponents in conducting air dispersion modelling assessments in a consistent manner. The guideline defines the recommended approach for dispersion modelling assessments in Saskatchewan, including model selection, emission source characterization, and the determination of compliance criteria to apply." Rationale: Saskatchewan air quality guideline requires consultation on use of CALPUFF model, where it states" The ministry acknowledges that there will be situations where specialized air dispersion models such as CALPUFF, CALQ3HCR and others may be applicable. The use of specialized models requires consultation with the ministry” OR “Pre-consultation with the ministry must be undertaken prior to the facility conducting specialized modelling (p. 3)." It is not clear if Denison Mines consulted with Saskatchewan MOE on use of CALPUFF model. Noted that Section 6.1.4.2 is again referring to Saskatchewan MOE guidance for justification, but no indication that they consulted with them (a requirement). | Please confirm and provide a summary of the consultation with the Saskatchewan MOE on the use of CALPUFF model for the Wheeler River EIS as per provincial air quality guidelines. | | Accepted |

¹ https://iris.epa.gov/static/pdfs/0364_summary.pdf

² https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/hecs-sesc/pdf/pubs/contaminants/psl2-lsp2/acrolein/acrolein-eng.pdf

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| IR-38 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 6.1.4.1, Potential Interactions Between the Project and Valued Component / Key Indicators | <p>Context: In this section, the Proponent identifies primary interactions between Project activities and air quality valued components and their associated key indicators. These primary interactions may result in an adverse effect on the valued component. Among the primary interactions are the use of emergency generators in a backup role should there be an interruption of the provincial electrical grid. However, it is not evident what is the anticipated frequency and duration of interruption to grid power.</p> <p>Rationale: The Proponent states in the conservative operation scenario that while the site will be powered from the provincial grid at the operations stage, the back-up power generators were assumed to be operating under emergency conditions as a worst-case scenario. ECCC acknowledges the positive impact of extending the electrical grid to the Project site with resultant reduction in generator emissions. The impact of an interruption in grid power would be greatest during the winter months when energy use would be greatest and surface-based temperature inversions, which vertically trap emissions, would be strongest.</p> | Provide an evaluation of a worst-case scenario of grid power interruptions (i.e., average aggregate length of power outages) during the winter months for this section of the electrical power grid. | | Accepted |
| IR-39 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 6.1.4.2, Potential Project-Related Effects | <p>Context: In this section, the Proponent discusses the approach taken for air dispersion numerical modelling. Using their CALMET data set, the Proponent's CALPUFF model runs indicated exceedances for 24- hour total suspended particulates, 24-hour particulate matter (PM10), 1-hour nitrogen dioxide, and 24-hour uranium concentrations. However, there is no mention of possible diurnal and seasonal occurrences of the exceedances.</p> <p>Rationale: Adequate assessment of the modelling results requires knowledge of the temporal characteristics for the exceedances. For example, wintertime exceedances may be due to strong temperature inversions, especially during the overnight to morning hours. These strong inversions are challenging for numerical models to capture. Exceedances during warmer months may be due to specific wind directions, which transport emissions directly to downwind receptors.</p> | Provide additional information on any diurnal and seasonal influences of the modelled exceedances. | | Accepted |
| IR-40 | - | CNSC | Air Quality | Section 6.1.6.2.1, Air quality significance determination | <p>Context: Significance determination was not conducted for air quality due to interconnectedness with other assessment endpoints.</p> <p>Rationale: It is not clear where and how these air quality assessment endpoints were factored into the assessment.</p> | Please provide additional information to demonstrate where and how these air quality assessment endpoints were factored in. | | Accepted |

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| IR-41 | - | CNSC | Air Quality | Section 6.1.6.2.2, Background concentrations | <p>Context: The EIS states that "Conservative regional background concentrations from the Saskatchewan Air Quality Modelling Guideline (SK MOE 2012a) and based on the La Loche monitoring station were used for particulate matter, NO2, SO2, and CO. The La Loche monitoring station is located near anthropogenic sources, while the Project is in a remote area removed from anthropogenic sources."</p> <p>Rationale: If La Loche monitoring station is located near anthropogenic sources and the Project is not, use of this data is not a conservative or realistic representation of background.</p> <p>For a realistic approach, background data considered should be upper 95th percentile (or max if n<10) from an area representative of project location</p> <p>For a conservative approach, background data from an area located even further from anthropogenic sources (if this exists) should be used, or an upper limit of background less than upper 95th should be applied as the background.</p> <p>Upper limit of background is used to screen out COPCs or often subtracted from total to ascertain relative contribution / impact from source, so using a higher upper limit may result in COPCs screening out or appear to have a lower relative contribution. If background was added to source, then approach used would be conservative. If this is the case, confirmation and reference to where this is discussed in methodology should be provided.</p> | Please provide additional rationale to justify the appropriateness of La Loche monitoring station concentrations as background for project location. | | Accepted |
| IR-42 | - | HC | Physical stressors (noise and vibration) | Section 6.2.4.2.2, (p. 6-66) Section 6, Section 6.2.9, (p. 6-72) | <p>Nighttime noise impacts are not adequately considered for human receptors.</p> <p>Context: The EIS states in Section 6.2.9 that, "While the predicted sound levels were less than the guideline values, the increase from baseline was predicted to be noticeable" (p. 6-72). No information is provided on individual noise events occurring during the nighttime period.</p> <p>Rationale: While the increase from baseline is predicted to be noticeable, it is important to also consider that changes to the characteristics of the sound from baseline (e.g., a change in frequency, changes in sound modulation, increased impulsiveness or tonality, or a shift in noise from the daytime to being more at night) may cause noise to be even more noticeable. Consult ANSI S12.9-2005/Part 4, clause A.1.3 for further information.</p> <p>In particular, consideration should be given to potential impacts on sleep, where adverse impacts are reported to begin when sound</p> | <p>1. Provide a description of the project- related nighttime noise sources that may impact human receptors as well as a qualitative discussion of the resulting potential impacts on perception considering not only changes in sound levels but also sound characteristics (e.g., tonality, impulsivity).</p> <p>2. Confirm whether individual nighttime noise events exceeding 45 dBA LAMax outdoors (or 30 dBA indoors) are expected to occur more than 15 times over the nighttime period at any nearby potentially noise-sensitive human receptor location(s). This may be of particular concern if some construction and/or operations activities occur during sleeping hours.</p> | | Accepted |

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| | | | | | levels inside bedrooms exceed 30 dBA for continuous noise sources and 45 dBA LAmix for discrete noise events (WHO, 1999). | | | |
| IR-43 | - | HC | Physical stressors (noise and vibration) | Section 6.2.5, (p. 6-66) Section 6.2.5, (p. 6-71) | <p>Mitigation measures for project-related noise were not identified for the Construction phase.</p> <p>Context: The mitigation measures provided in Section 6.2.5, including a complaint management system is also to be implemented as part of the EMS, are only proposed for the operations phase.</p> <p>However, construction activities are predicted to last more than one year. Construction noise will involve the use of equipment operating at the site, construction of surface facilities, drilling, and partial operation of the freeze plant. It will also include regular truck trips and air traffic for personnel changes.</p> <p>Rationale: It is unclear if listed mitigation measures also apply to the construction phase (or only to the operations phase).</p> | <p>1. Clarify whether mitigation measures and the proposed EMS apply to the Construction phase. If not, identify mitigation measures for noise impacts related to Construction phase activities, and consider applying the EMS to the Construction phase and implementing the community complaints and response procedure from the beginning of construction activities.</p> <p>2. Health Canada suggests that construction noise lasting longer than 1 year be assessed as operational noise, and that noise mitigation measures be applied also to the construction phase. Special consideration should be given to mitigation measures for construction noise that occurs at night, in order to minimize impacts on sleep (i.e., avoiding tonal or impulsive noise sources at night).</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends use of Appendix H of Health Canada (2017), which identifies additional construction noise mitigation measures that could also be considered to reduce project-related noise.</p> | | Accepted |
| IR-44 | - | HC | Physical stressors (noise and vibration) | Section 6.2.8, (p. 6-71) | <p>The noise complaints resolution and response procedure is not sufficiently described in the EIS.</p> <p>Context: Section 6.2.8 discusses Monitoring and Follow-up. The Proponent indicates: “The EMS will also include a community complaints and response procedure” (p. 6-71).</p> <p>Rationale: Details have not been provided regarding how the complaints would be received, addressed or what the timelines will be for providing a response or resolution. It is important to provide information to potentially affected communities in advance of particularly noisy activities. Community consultation and advanced notification of noisy activities has been shown to reduce complaints (see Health Canada, 2017).</p> | <p>1. Provide the details of the noise complaints resolution and response procedure as per Health Canada (2017).</p> <p>2. Consider conducting community consultations and/or implementing an advanced community notification system to pro-actively reduce the probability noise-related impacts and complaints.</p> | | Accepted |
| IR-45 | - | HC | Change to an environmental component due to hazardous contaminants | Section 6 Air Quality Technical Supporting Document Section 6.3.1 | <p>The carcinogenic risks of diesel exhaust from the Project should be assessed.</p> <p>Context: Section 6.3.1 discusses modelled predictions of exceedances for Particulate Matter (PM). TSD p. 22 states: “concentrations of 24-hour PM2.5 are also elevated around the standby generators at the freeze plant, which emit fine particulate matter from combustion of diesel fuel”. However, diesel particulate</p> | <p>1. Evaluate the carcinogenic risk of all potential diesel exhaust from the Project based on the approach proposed by Health Canada (2022). Additional guidance (Additional Lung Cancer Mortality from PM2.5: Recommended Approach and Sample Calculation”) is provided as an appendix to this comment table.¹</p> | | Accepted |

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| | | | | | <p>matter is not evaluated for the whole project in the air quality model or the air quality assessment.</p> <p>Rationale: Health Canada has determined that diesel exhaust is carcinogenic in humans which is consistent with the conclusion of the International Agency for Research on Cancer (IARC), and that diesel exhaust is associated with significant population health impacts in Canada.</p> <p>To characterize the carcinogenic risk of diesel exhaust from a project, HC has published a report (2022)¹ which provides a quantitative assessment of the relationship between ambient PM2.5 exposure and lung cancer risk. Specifically, this report quantifies the increase in risk of lung cancer mortality (over the baseline rate in the Canadian population) due to PM2.5 exposure.</p> <p>This quantitative assessment is considered appropriate to characterize risks from diesel PM given the contribution of diesel exhaust to ambient PM2.5 in Canada, and that the carcinogenicity of diesel exhaust has generally been evaluated based on the respirable PM fraction^{1,2,3}.</p> <p>References: [1] HC. 2022. Lung Cancer and Ambient PM2.5 in Canada: A Systematic Review and Meta-analysis. Available at: https://publications.gc.ca/site/eng/9.907038/publication.html [2] HC. 2016. Human Health Risk Assessment for Diesel Exhaust. Available at: http://publications.gc.ca/collections/collection_2016/sc-hc/H129-60-2016-eng.pdf [3] IARC. 2013. IARC monographs on the evaluation of carcinogenic risks to humans. Volume 109. Outdoor air pollution. https://publications.iarc.fr/Book-And-Report-Series/Iarc-Monographs-On-The-IdentificationOf-Carcinogenic-Hazards-To-Humans/Outdoor-Air-Pollution-2015</p> | | | |
| IR-46 | - | HC | Physical stressors (noise and vibration) | Appendix 6-A Table A-1 | <p>Low-frequency noise and associated potential human health effects were not assessed.</p> <p>Context: Some equipment that may emit low-frequency noise (LFN) have been listed in Table A-1: Assessment Scenarios and Sound Level Data (Section 6 Appendix A); however, no information describing potential impacts of this type of sound on nearby human receptors are presented.</p> <p>Rationale: Low frequency noise can be associated with the</p> | <p>1. Clarify whether any project-related activities (construction, operation and/or decommissioning) may produce LFN that could impact off-site human receptors. Evaluate LFN in the noise assessment, if and where applicable. See Appendix C of Health Canada (2017) for a discussion of LFN.</p> | | Accepted |

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| | | | | | introduction of noticeable vibrations and rattles in nearby structures. Research indicates that annoyance related to noise is greater when low-frequency noise is present (ISO 1996-1:2003). As sound environments are usually characterized using A-weighted decibel levels (dBA) that reflect the frequencies most audible to the human ear, the impacts of low- frequency noise may need to be assessed separately. | | | |
| IR-47 | - | ECCC | Air Quality | Appendix 6-A, A.1 | <p>Context and Rationale: Verification of the following calculation is required for assessing predicted emissions of dust from general construction. It appears the result of 0.70 ton/acre/month is incorrect and should instead be 0.314 ton/acre/month.</p> <p>Appendix 6-A, Appendix A, A.1 (p. A4) TSP Emission Factor for General Construction:</p> $EF(TSP) = 0.11 \frac{\text{ton}}{\text{acre}} \frac{1}{\text{month}} \times 1.2 \frac{\text{ton}}{\text{acre}} \frac{1}{\text{month}} + 0.42 \frac{\text{ton}}{\text{acre}} \frac{1}{\text{month}}$ $= 0.70 \frac{\text{ton}}{\text{acre}} \frac{1}{\text{month}}$ | Explain how the emission factor total suspended particulates (EF (TSP)) result was obtained or rectify if it is incorrect and update the draft EIS to reflect the correction. | | Accepted |
| IR-48 | - | HC | Physical stressors (noise and vibration) | Appendix 6-E, Figure 6.2.3, p. 6-57 | <p>Noise-sensitive receptors are not included on noise contour maps.</p> <p>Context: Noise-sensitive receptors are identified in the acoustic model report in Section 6 Appendix 6-E but not presented on any maps in the atmospheric and acoustic sections of the main report (Figure 6.2-3).</p> <p>Rationale: The noise assessment typically includes a map illustrating modelled noise levels from the Project at receptor locations in the study area.</p> <p>Certainty regarding the presence of human receptors in the regional study area is also recommended in order to assess cumulative impacts.</p> | 1. For more clarity, identify noise-sensitive receptors on Figure 6.2-3: Noise Assessment Study Area as well as on contour maps showing the baseline and predicted noise levels. | | Accepted |
| IR-49 | - | HC | Physical stressors (noise and vibration) | Appendix 6-E, 4.0 Table A.1 | <p>The Noise Source Characterization is incomplete.</p> <p>Context: Section 3.0 of the Draft EIS Section 6 Appendix 6- E discusses Source Characterization. There is no detail regarding potential tonal or impulsive noise sources in Section 3.0.</p> <p>Rationale: The draft EIS should include a description of sound source characteristics (e.g., tonal, impulsive, highly impulsive) in order to properly inform the quantitative noise assessment and</p> | 1. Identify any tonal, regularly impulsive, highly impulsive, or high-energy impulsive noises likely to be produced during project activities that could be audible at noise sensitive receptors. Furthermore, describe the timing (e.g., hours of night-time activities), frequency and duration of noise events, and their sound characteristics, including frequency spectrum. See Health Canada (2017) for details. | | Accepted |

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| | | | | | which assumptions/adjustments need to be applied and to properly evaluate impacts of project noise on health of affected receptors. | | | |
| IR-50 | - | HC | Physical stressors (noise and vibration) | Appendix 6-E, 4.0 Table A.1 | <p>The description of noise modelling does not document or justify the use of sound level adjustments.</p> <p>Context: ISO Standard 9613-2 has been used for the sound level modelling; however, it is unclear if all applicable adjustments have been considered as per ISO 1996-1:2016 (Table A.1).</p> <p>Rationale: When modelling techniques are used to estimate present (baseline) or future (construction and operational) sound levels, these techniques and any accompanying assumptions, including the use of sound level adjustments, it is important to provide appropriate documentation and justification.</p> <p>Note that in situations where more than one source characteristic adjustment is applicable (e.g., impulsive or tonal), only the higher of the adjustments is used. However, all time-of-day adjustments and the quiet rural area adjustment are to be added to the highest of the applicable source adjustments.</p> | 1. Clarify whether ISO-1996-1:2016 has been considered in the modelling to account for any applicable sound level adjustments. Adjustments should be considered when calculating Ln (night-time sound level) and Ldn (day-night sound level). In addition, if applicable, adjustments can be applied depending on the noise characteristic (impulsive, highly impulsive, etc.), and because the Project location is considered to be in a quiet rural area. See: ISO 1996-1:2016 and Health Canada (2017) for details. | | Accepted |
| IR-51 | - | CNSC | Geology and Groundwater | Section 7, Figure 7.8-1 Appendix 7-C | <p>Context: Figure 7.8-1 (p. 7-107, main EIS report) shows monitoring well cluster outside of the freeze wall.</p> <p>Rationale: It is not clear what the targeted hydro-stratigraphic units of each monitoring well cluster are. In addition, it is not clear how the establishment of the freeze wall and any leakage from the brine solution will be monitored. If there is any “window” within the freeze wall (i.e., the freeze wall is not continuous), is there any way to identify that?</p> | <p>Please clarify the targeted hydro-stratigraphic units of each monitoring well cluster in Figure 7.8-1 (p. 7-107, main EIS report).</p> <p>Please clarify how the establishment of a continuous freeze wall will be monitored.</p> | | Accepted |
| IR-52 | - | ECCC | Fish and fish habitat | Section 7, Geology and Groundwater Appendix 7 | <p>Context: According to the Proponent, “an acidic or low pH mining solution will be used to leach uranium ores from the ground. Mining solution may be a mixture of sulphuric acid, hydrogen peroxide, ferric sulphate, and freshwater (from shallow groundwater well or surface waterbody) or recycled water.</p> <p>Wellfield will consist of a combination of injection and recovery wells, in the general the arrangement of one recovery well in the center surrounded by four injection wells (5-spot pattern) with about 5 to 10 m between wells. The final wellfield is expected to include approximately 300 wells over an area measuring 90 m wide x 750 m long”.</p> <p>As the components/contaminants mentioned in the description of the hydrogeologic contaminant transport processes above may be transported to Whitesfish Lake through groundwater, the injection</p> | <p>1. Explain why 3D hydrogeology and contaminant transport numerical modelling of the injection and extraction wells was not presented.</p> <p>2. Alternatively, provide simulation results and a sensitivity analysis for the injection and extraction of the acidic solution in the mining area.</p> | | Accepted |

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| | | | | | and recovery wells should be included in the model. Rationale: The hydrogeologic contaminant transport processes described above are an important part of the proposed Project and it is not clear why numerical modelling results and a sensitivity analysis for the above processes was not presented. | | | |
| IR-53 | - | CNSC | Geology and Groundwater | Section 7.3, Table 7.3.-2 Appendix 7-C | <p>Context: The field-based hydraulic conductivity values (referred to as K values hereafter) in Table 7.3-2 (p. 7-32, main EIS report) indicate that the K value ranges of upper and lower sandstone aquifers have a significant overlap with those of the intermediate sandstone aquitard.</p> <p>However, the calibrated K value in Table 2-2 (p. 2.7, Appendix 7-C)) for the intermediate sandstone aquitard is close to the lower end of the field-based K value range, while the calibrated K values for the upper and lower sandstone aquifers are close to the upper end of the field-based K value range.</p> <p>Rationale: It is not clear how representative the calibrated K values are of the field-based K values for each hydro-stratigraphic unit, and if the significant difference between the K values for the upper and lower sandstone aquifers and those for the intermediate sandstone aquitard is supported by the geological properties of the corresponding stratigraphy units.</p> <p>It is stated in the report (p. 7-36, main EIS report) that “Vertical fracture or fault zones that hydraulically connect the Local (upper) and Semi-Regional (lower) groundwater flow regimes are present throughout the Athabasca Basin”. But fractures and fault zones are not explicitly considered in the model. There is possibility that these features could increase the hydraulic connection between the upper and lower sandstone aquifer.</p> | Please provide additional information to support the representativeness of the calibrated K values (for example, use graph to present the measured K values and the calibrated K values). | <p><i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> <p>Please include figure(s) (y axis representing depth below ground, x axis representing K, different length of vertical line segment representing different packer testing intervals, etc.) showing the field measured K values, as well as the calibrated K value for the upper sandstone aquifer, intermediate aquitard, and lower sandstone aquifer. This would help demonstrate the distribution of field measured K values and representativeness of calibrated K values.</p> | Accepted |
| IR-54 | - | CNSC | Geology and Groundwater | Section 7.3.1 | <p>Context: EIS states: “The most important associated topographic features in the region are the northwest to southeast trending drumlins and eskers....” This is not the trend shown on the provided maps, nor described elsewhere in the report, e.g., Section 7.3.2.1</p> <p>Rationale: Inaccurate information in the EIS</p> | Please update the EIS where required to accurately describe the topographical features. | | Accepted |
| IR-55 | - | NRCan | Fish and fish habitat | Section 7.3.3.1; Appendix 7-A, sections 3.4, 3.5, 3.8, 4.2; | <p>Context: According to the Proponent's conceptual hydrogeological model (EIS, sec 7.3.3, Figure 7.3-7, Table 7.3-2; Appendix 7-A, sec. 3.4, Table 3-4), the horizontal hydraulic conductivity of the Intermediate Sandstone (Iss) aquitard is 8.4 E-09 m/s based on field measurements. The Proponent further assumes a 10:1 anisotropy ratio for the unit (Appendix 7-A, sec. 3.5.1) such that its estimated vertical conductivity is 8.4 E- 10 m/s. Based on this information,</p> | In the "Parameter Uncertainty Assessment" for the numerical groundwater flow model (Appendix 7-C, sec. 2.8), NRCan requests that the Proponent develop a calibrated numerical model with an alternate conceptualization of the Intermediate sandstone as a "leaky" aquitard with a horizontal hydraulic conductivity on the order of 1 E-07 m/s and a much lower anisotropy ratio. This should involve modifying the model lateral | | Accepted |

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| | | | | Appendix 7-C, section 2.8 | <p>structural geology and groundwater quality data, the Proponent concludes that the connectivity between the Upper sandstone aquifer and the Intermediate Sandstone aquifer (sic) is limited (EIS sec. 7.3.3.3; Appendix 7-A, sec. 4.4). While acknowledging the paucity of conductivity data and the Proponent's attempt to mitigate this by leveraging collateral information on fracture frequency and clay content (Appendix 7-A, sec. 3.3.1), NRCan considers that the hydraulic conductivity assigned to the Iss aquitard is unrealistically low and inconsistent with the following lines of evidence: a) The conductivity value for the Iss is based on the geometric mean of 18 field measurements, 12 of which are from the same borehole (WR-695) located in the Gryphon zone, beyond the domain of the numerical model (Appendix 7-A, Appendix C, Table C-1). If the conductivity data were weighted equally, with one value per borehole, the geometric mean would be approximately 1.5 E-07 m/s, or two orders of magnitude higher; b) The Proponent notes that vertical fracture or fault zones that hydraulically connect Upper and Lower aquifer systems are present throughout the Athabasca Basin including in the Phoenix area (EIS, sec. 7.3.3.2.2; Appendix 7-A, sec.3.8.1); c) The Proponent notes that groundwater chemistry data (major ions) corroborate the presence of structurally controlled vertical hydraulic connections between the Upper and Lower aquifer systems (EIS, sec. 7.3.3.2.2, sec. 7.3.3.3; Appendix 7-A, 4.3.3); d) Groundwater chemistry data (Appendix 7-A, sec. 4.2, Table 4-1) also indicate the presence of detectable levels of "bomb" tritium (indicating recharge waters < 50 years old) in the Lower Sandstone Aquifer (GWR-025, GWR-008, GWR-033) and in the Iss (GWR-009, GWR-034), outside the area of U mineralization. This is also evidence of vertical hydraulic connection through the Iss. In summary, whereas the Proponent conceptualizes the Iss as a very low-permeability unit with localized vertical hydraulic connection (WS Shear), NRCan interprets the Iss as a "leaky" aquitard with pervasive fracture-controlled and much higher vertical hydraulic conductivity.</p> <p>Rationale: The significance of NRCan's alternative interpretation of the Iss hydrostratigraphic unit is that deep groundwaters, including mining-impacted waters, may represent a greater proportion of baseflow discharge to Whitefish Lake than the 1% currently estimated in the Proponent's groundwater flow model (EIS, sec. 7.4.2.1, p.7-51; Appendix 7-C, sec. 2.6.3).</p> | boundary conditions to allow for groundwater inflow/outflow across the entire thickness of the Athabasca Sandstone Group rather than just the Lower Sandstone aquifer. | | |
| IR-56 | - | CNSC | Geology and Groundwater | Section 7.3.3.2 | <p>Context: It is stated in Section 7.3.3.2 (p. 7-37, main EIS report) that “Exploration boreholes drilled in the Phoenix area, where left unplugged, have the potential to provide preferential flow paths between the Overburden and Upper and Lower Sandstone Aquifers. Exploration holes were reportedly grouted approximately 10 to 20</p> | Please clarify why the exploration boreholes have not been decommissioned and the timeline to decommission the boreholes according to appropriate guidelines/procedures. If it is not decommissioned before the ISR operation, what is the | | Accepted |

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| | | | | | <p>m above and below the ore zone, resulting in open holes remaining throughout the overlying materials. These portions of the open holes may act as open conduits for groundwater flow through the 400 m of Athabasca Group Sandstone.”</p> <p>Rationale: It is not clear why the exploration boreholes have not been decommissioned.</p> | <p>potential impact of the unplugged boreholes on the mining solution migration?</p> | | |
| IR-57 | - | NRCan | Fish and fish habitat | <p>Section 7.3.3.2</p> <p>Appendix 7-A, sections 3.1.2 and 3.7</p> <p>Appendix 7-C, section 2.5.2</p> | <p>Context: The Proponent's conceptual model of groundwater flow in the Local Study Area (EIS, sec 7.3.3, Figure 7.3-7) involves an unconfined Upper system hosted by overburden and the Upper sandstone aquifer, and a Lower confined system hosted by the Lower Sandstone Aquifer. The Intermediate Sandstone aquitard acts as a confining unit. Vertical heads gradients are directed downwards west of the Phoenix deposit and upwards beneath surface water receptors including Whitefish Lake (EIS, sec. 7.3.3.2).</p> <p>Using head data from nested monitoring wells (Appendix 7-A, sec. 3.1.2, Table 3-1) the Proponent calculates upward gradients in cluster WR-607, between the Lower Sandstone aquifer and the Upper Sandstone aquifer. In cluster LA-5, an upward gradient is calculated between the Upper Sandstone and the overburden unit (Appendix 7-A, Table 3-5). In areas west and south-west of the Phoenix deposit, groundwater is estimated to flow downward under a vertical gradient of approximately 0.015 m/m (Appendix 7-A, p.3-15).</p> <p>Rationale: In NRCan's opinion, the Proponent's interpretation of vertical head gradients in the LSA is not fully accurate. For the "Up-Gradient" monitoring well cluster, the tabulated head data (Appendix 7-A, Table 3-1) and data logger hydrographs (Appendix 7-A, Appendix B) indicate a downward gradient (0.014 m/m) from the overburden unit to the Intermediate Sandstone and an upward gradient (0.056 m/m) from the Lower Sandstone to the Intermediate Sandstone. Head data from the "NW" monitoring well cluster indicate a similar pattern of downward (0.016 m/m) and upward (0.014 m/m) gradients converging in the Intermediate Sandstone. In the "Downgradient" and "SE" monitoring well clusters, head observations and data logger hydrographs indicate downward gradients from the shallow aquifer system but essentially equal heads in the Intermediate and Lower Sandstones. This more complex picture of groundwater flow systems in the LSA does not appear to have been captured in the Proponent's conceptual model. Given the importance of the baseline hydrogeological regime for predicting the transport and fate of COPCs in the post-decommissioning period, the Proponent needs to</p> | <p>In section 2.5.2 of Appendix 7-C (Calibration Results), the Proponent should demonstrate that the numerical groundwater flow model reproduces quantitatively or at least qualitatively the vertical head gradients calculated from observations in the nested monitoring well clusters (Appendix 7-A, Table 3-1).</p> | | Accepted |

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| | | | | | demonstrate that the numerical groundwater flow model accounts for observed vertical head gradients. | | | |
| IR-58 | - | ECCC | Fish and fish habitat | Section 7.3.2.4, Ore Deposit | <p>Context: The Proponent states that the Phoenix ore bodies are long and narrow (approximately 25 to 50 m wide) and are located within or near a graphitic pelite unit. Hydrothermal alteration associated with the ore zone is a discontinuous envelope of clay alteration and a sulphide-cemented rock zone that extends into the overlying sandstone and the underlying basement (Figure 7.3-3). This black, clay-rich zone is approximately 3 m thick on average and locally hydraulically isolates the ore zone from the overlying sandstones and underlying weathered basement rock.</p> <p>Rationale: As indicated by the Proponent, a 3 m black clay rich zone isolates the ore zone from the overlying sandstones and underlying weathered basement rock. It is, however, unclear whether this discontinuous clay layer will prevent downward migration of uranium-bearing solution into the Paleo-weathered basement rock or horizontal flow along the unconformity surface to escape into the environment. Escape of uranium-bearing solution into the environment will have a negative effect on the receiving environment.</p> | <p>1. Verify that there will be no downward migration of mining solution into the paleo- weathered basement rock or that there is no flow along the unconformity surface.</p> <p>2. If downward migration of the mining solution occurs, explain how it will be mitigated.</p> | | Accepted |
| IR-59 | - | CNSC | Fish and fish habitat | Section 7.4 Assessment of Project-related Effects, Figure 7.4-2 (p. 7-56) | <p>Context: Figure 7.4-2: Simulated Change in Groundwater Discharge and Flow through Whitefish Lake Over the Life of the Project appears to be missing information.</p> <p>Rationale: Legend is included below the image, but the Legend box is blank. The green dotted line is not represented by anything in the legend.</p> | Please update this Figure to ensure it is complete, and that features are properly indicated in the legend. | | Accepted |
| IR-60 | - | NRCan | Fish and fish habitat | Section 7.4.2.1 Appendix 7-C, section 5.2.1, Appendix B | <p>Context: In the discussion of the limitations of the numerical groundwater flow model (Appendix 7-C, sec. 5.2.1), the Proponent invokes the well known modeling principles of "Occam's razor" and "Parsimony" which guided the parametrization of hydraulic conductivity in model layers. The Proponent states that hydrogeologic property values were applied uniformly for, among other units, the Lower Sandstone aquifer beyond the immediate area of desilicified materials. However, in the layer parametrization for the Lower Sandstone aquifer (Appendix 7-C, Appendix B, Figure B-5), NRCan notes a large zone of enhanced conductivity (1 E-05 m/s) extending south from Kratchkowsky Lake, which contrasts with the value (2 E-07 m/s) assigned elsewhere outside the desilicified zone. NRCan also notes the extremely detailed parametrization of hydraulic conductivity in the clay cap overlying the ore zone where borehole control is dense (Appendix 7-C, Appendix B, Figure B-6).</p> | NRCan requests that the Proponent provide justification based on field evidence for the multiple hydraulic conductivity zones assigned to the Lower Sandstone aquifer and the clay cap above the ore zone. | | Accepted |

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| | | | | | Rationale: In NRCan's opinion, these model features appear to violate the principle of "Parsimony" and require greater justification supported by field observations. | | | |
| IR-61 | - | CNSC | Geology and Groundwater | Section 7.4.2 | Context: There is no discussion of potential induced seismicity from mining processes. Rationale: Induced seismicity may lead to a loss of process as identified for natural seismicity. | Please provide information on the potential mining-induced seismicity. | This IR is accepted. However, it is requested that Denison review the draft EIS for inaccuracy of scientific terms which cast doubt on the credibility of the EIS, such as the use of the term “inducted seismic” instead of “induced seismicity” in section 7.4.2.4. CNSC staff suggests that Denison review the entire draft EIS once again to address similar inaccuracies. See AD-72 in the Advice to Proponent table [reference to come] . | Accepted |
| IR-62 | - | ECCC | Fish and fish habitat | Section 7.4.2, Potential Project-related Effects | Context: The Proponent indicates that the mining area includes: <ul style="list-style-type: none">the ‘active mining area’, which is the target ore zone;a zone extending between 11 and 13 m above the active mining area that represents the maximum vertical height over which the injected mining fluids will migrate upwards from the ore zone during active mining; anda zone extending 50 m vertically upwards from the active mining area (that incorporates the active mining area and the 11 to 13 m zone defined in the previous bullet) that was selected to account for potential upset conditions. Rationale: It is not clear to ECCC how the Proponent would be able to limit the mining solution migration within 11 & 13 m above active mining as the maximum vertical height over which the injected mining fluid will migrate. As the mining fluid will be injected under pressure into zones with possible presence of fractures, the pressure may also cause additional fractures and given that the solution is warm/hot will possibly dissolve the other cementing material in the sandstone above, making it difficult to accurately predict where the solution will migrate to. | 1. Explain plans to limit the upward migration of mining solution into the overlying layer to 11 and 13m above the ore zone. 2. Explain what impacts will occur if the mining solution migrates beyond the predicted height. | | Accepted |
| IR-63 | - | CNSC | Geology and groundwater | Section 7.4.2.1, Potential Effect #1: Groundwater Quantity – Construction to Decommissioning Appendix 7-C, Section 2.7, Groundwater Conditions During Mine Operations | Context: The numerical groundwater model described was calibrated to observed water level and stream baseflow data. Table 7.4-3 in the EIS indicates that Denison recognizes the potential for freeze wall operation to impact groundwater quantity. To simulate this impact, the model was adapted to reduce recharge (to 50%) within the freeze wall area, reduce hydraulic conductivity associated with the vertical freeze walls, and simulate pumping within the freeze wall area. Recovery from pumping and effects on discharge to groundwater discharge to Whitefish Lake are discussed in the potential effects section. Rationale: Although this assessment considered drawdown of the water table and discharge to Whitefish Lake, the discussion did not | Please provide a more fulsome discussion on the impact of freeze wall operations on local and semi-regional groundwater regimes and potential receptors. Please provide the rationale for assumptions made for key model parameters (e.g., selection of 50% recharge, hydraulic conductivity value used to represent freeze wall). In addition, please discuss the potential pathways for groundwater flow around the freeze wall, complete with figures demonstrating these pathways. | | Accepted |

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| | | | | | address the potential effects of operating the freeze wall on the local and semi-regional groundwater regimes. What would the pathway be for groundwater to pass around the freeze wall? What is the basis for the parameters selected, e.g., 50% recharge and lower hydraulic conductivity for freeze well? These factors need to be considered when evaluating the potential impacts of freeze well operations on groundwater flow conditions and corresponding receptors. | | | |
| IR-64 | - | ECCC CNSC | Fish and fish habitat | Section: 7.4.2.2, Potential Effect #2: Terrain Morphology and Stability – Operation Appendix 7-A, Appendix K (p. 12) | <p>Context: The Proponent stated that the geological assessment predicted maximum vertical displacement in altered sandstone immediately above the mining area (17.5 cm). A very minor change in elevation at ground surface (of less than 7.5 cm) was predicted within a discrete and localized area overlying the ore body. The modelling work is considered to provide a worst-case bounding scenario. If subsidence were to occur over the lifetime of the Project, or in the years following mining, the extent of vertical displacement is not expected to exceed that predicted in the modelling, which is based on an assumed volume extraction.</p> <p>Rationale: ECCC notes that the thickness of the ore zone has an average thickness of 5 m with a range of 2 to 17 m, and is 25-50 m wide and that the overburden rock above the ore zone measures about 400 m. Therefore, it is not clear how the Proponent determined that the surface expression of a subsidence on the surface if it occurs will be limited to 7.5 cm and localized. A subsidence greater than 7.5 cm, implies that the void in the ore zone will be narrower, and will affect the amount of water migrating through the zone.</p> <p>It was the recommendation of the consultant who conducted the work in Appendix K that more accurate material properties should be used for future modelling.</p> | <p>Explain:</p> <ul style="list-style-type: none">Will this be revisited with updated data based on extraction feasibility results?How will the surface expression of a subsidence will be limited to 7.5 cm and localized? <p>Suggestions for mitigation and follow-up measures: ECCC recommends that the Proponent consider implementing remediation measures immediately after mining to prevent subsidence from occurring in the first place.</p> | | Accepted |
| IR-65 | - | CNSC | Geology and Groundwater | Section 7.4.2.2 | <p>Context: It is stated the maximum subsidence is 7.5cm based on modeling with an assumed volume extraction. Has subsidence from dewatering/pumping and from lack of inflow of groundwater due to freeze wall been considered?</p> <p>Rationale: Surface facilities and wells may be impacted if there is unaccounted for subsidence.</p> | Please provide additional details for any dewatering/pumping induced subsidence. | | Accepted |
| IR-66 | - | CNSC | Geology and Groundwater | Section 7, Table 7.5-1, Row 1, Column 6 | <p>Context: Column 6 in Table 7.5-1 indicates the mitigation measures for a valued component. For Row 1, Geology, there is no description of mitigation measures but only that contingency plans will be developed if based on monitoring.</p> | Please provide additional details on monitoring and contingency plans related to the geological environment (e.g., subsidence), including triggers for implementing such plans. | | Accepted |

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| | | | | | Rationale: Subsidence may impact wells and surface infrastructure. | | | |
| IR-67 | - | CNSC | Geology and groundwater | Section 7.6.2.1 (Remediation Objectives) | <p>Context: Metallurgical testing, including batch reaction, coreflood testing and column tests are mentioned frequently throughout Sections 2 and 7 of the EIS. Outside of the composition of restored solutions from coreflood tests #2B and 3C, results from these various tests are not reported in the EIS or any associated Appendices.</p> <p>Rationale: The results from metallurgical testing are important to a number of items discussed in the EIS, including (but not limited to): evolution of hydrochemistry during remediation, source of salts in Lower Sandstone Aquifer porewaters, process plans, industrial wastewater treatment, estimating composition and volume of process precipitates, and composition of mining fluids and leachate. In particular, the EIS posits that mining area decommissioning objectives are achievable based on metallurgical testing and provides these objectives in Table 2.3-3. CNSC staff need to understand the specifics of this metallurgical testing, given its importance for the development and justification for mining and remediation activities. Denison must also provide information demonstrating that the proposed restoration actions and remediation targets are As Low As Reasonably Achievable (ALARA).</p> | <p>1. Please provide a summary of the results and the analysis of results of the metallurgical tests within the EIS, or provide the technical supporting document with this information, and ensure the documentation is appropriately referenced in the EIS. This should include sample information for cores (e.g., mineralogy, location, U content, depth), test conditions (e.g., duration, # of iterations, column length, flow rate, temperature, pressure, sample frequency, influent/effluent composition), as well as results and how they are pertinent to the development of ISR activities.</p> <p>2. Please provide further clarification/justification on how results from two singular coreflood tests (i.e., Coreflood #2B and Coreflood #3C) can justify large-scale remediation activities and targets following solution mining.</p> <p>3. Please provide material demonstrating that the proposed restoration actions and remediation targets are ALARA.</p> | | Accepted |
| IR-68 | - | NRCan | Fish and fish habitat | Section 7.6.2.2.3 Appendix 7-C, sections 3.3, 4.1, 4.4.4 and 4.7 | <p>Context: Sources terms for the COPCs considered in 3D reactive transport modeling are given by the composition of "Restoration Solution #1", which the Proponent believes is representative of groundwater quality in the ore zone after remediation at decommissioning (Appendix 7-C, sec. 3.3, Table 3-5; sec 4.0). The Proponent considers COPC source terms as "initial conditions" for groundwater quality in the ore zone at the start of the model simulation period. During the simulation, no additional mass of COPCs is transferred to groundwater in the ore zone.</p> <p>Rationale: In NRCan's opinion, this representation of COPC sources is not conservative as it fails to account for various long-term slow mass release processes. These processes could include redissolution of secondary phases formed during ISR mining (e.g., radium-bearing gypsum or barite, jarosite, alunite) and migration of unrecovered lixiviant or restored solution from low-permeability regions or stagnant zones that were not fully swept during mining or remediation. NRCan notes that scenario #2 in the Proponent's transport prediction uncertainty analysis (Appendix 7-C, sec. 4.7) does consider an extended source release period for protons (desorption from chlorite). However, in NRCan's opinion, additional</p> | NRCan requests that the Proponent's reactive transport prediction uncertainty analysis (Appendix 7-C, sec. 4.7) consider extended source release periods for additional COPCs. | | Accepted |

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| | | | | | modeling scenarios should consider extended-release periods for other COPCs as well. | | | |
| IR-69 | - | NRCan | Fish and fish habitat | Section 7.6.2.2.3 Appendix 7-C, sections 3.1 and 3.2 | <p>Context: For hydrogeological and geochemical assessments in support of ISR projects, the Proponent identifies two aspects of primary importance (Appendix 7-C, sec. 3.1). These are a) groundwater remediation (Appendix 7-C, sec. 3.1.1); and b) the assimilative capacity of host rocks downgradient from the ore zone (Appendix 7-C, sec. 3.1.2). According to the Proponent, the objective of groundwater remediation at decommissioning is to achieve water quality in the mined zone that does not pose a risk to receptors at the point of exposure. Assimilative capacity refers to the ability of groundwater-rock reactions to naturally sequester or attenuate COPCs migrating from the ore zone during the post-decommissioning period.</p> <p>Rationale: However, in NRCan's opinion, the Proponent has neglected to mention the most fundamental aspect for hydrogeological and geochemical assessments in support of ISR projects. That aspect is the choice of ISR lixiviant and its effects on the mineralogy and hydrogeochemistry of the ore zone during mining operations. The Proponent provides information on the pre-mining mineralogy (Appendix 7-C, sec. 3.2.1) and hydrogeochemistry (Appendix 7-C, sec. 3.2.2) but no information on their expected changes as a result of ISR mining. This Information is important when considering source terms in reactive transport modeling.</p> | NRCan requests that the Proponent provide a detailed description of the expected mineralogical and hydrogeochemical changes occurring within the ore and barrier zones as a result of the injection of acidic lixiviant. | | Accepted |
| IR-70 | - | CNSC ECCC | Fish and fish habitat Geology and groundwater | Section 7.6.2.2.3, Evaluation of Geochemical Reactive Transport Appendix 7-C, Section 4.4.2, Sub-Domain Model Hydrogeologic Parameters | <p>Context: The EIS indicates that “changes to hydrogeological conditions within the mining area were considered during development of the 3D sub-domain model. Dissolution of ore within the active mining area is expected to enhance ... hydraulic conductivity”.</p> <p>In Section 4.7 (Prediction Uncertainty Analysis), predictive uncertainty scenarios are provided. For scenario 7, the hydraulic conductivity (K) of the ore zone was increased even further than initial model assumptions. The value used is not indicated in the text.</p> <p>Rationale: A hydraulic conductivity (K) value of 5x10-6 m/s, which is a factor of five (5) greater than the value assumed for the ore zone, was applied in the base case numerical model to account for this impact. It is unclear from the information provided in Section 7 of the EIS or associated Appendices what the basis of this five-fold increase in K value for the ore zone, and how this was judged to be conservative, or to adequately represent anticipated conditions.</p> | Please provide a more fulsome discussion on the anticipated impacts of mining on permeability of the ore zone due to mining activities in the EIS or in an Appendix. The value used for scenario 7 of the prediction uncertainty analysis should be provided. The scientific rationale for the use of a K value only a factor of five greater than the value assumed for the ore zone in the 3D regional model should be provided, alternatively, provide simulation results for a more conservative scenario. Specifically, this discussion should address the potential effects of mechanical permeability enhancement with tools, dissolution of ore, gas plugging, chemical plugging, plugging due to ion exchange, and mechanical plugging. | | Accepted |

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| | | | | | This parameter is important as it impacts the rate at which contaminants flow from the ore zone following mining activities. Due to of the dissolution of uranium, larger voids will likely be created, and the hydraulic conductivity may increase by more than a factor of 5 compared to pre-project material. Therefore, a variation of at least one or two orders of magnitude for hydraulic conductivity should be used in the sensitivity analysis. Having a representative, conservative value for hydraulic conductivity is essential for understanding groundwater as a pathway of contaminant transport to Whitefish Lake and potential impacts to aquatic life. The K value used in the predictive uncertainty analysis should be reported. | | | |
| IR-71 | - | CNSC | Geology and groundwater | Section 7.7.1, Climate Change Considerations | <p>Context: The report states that in a scenario of increased precipitation and decreased/constant evaporation, climate change may result in greater flows in the Wheeler River drainage system and increased recharge to groundwater, which would correspond to increased groundwater discharge to Whitefish Lake. Additionally, it is also stated that climate change was evaluated qualitatively.</p> <p>Rationale: It is not clear why the impacts of increased evapotranspiration associated with higher average temperatures were not considered, even though these are likely outcomes of temperature increases due to climate change in areas such as the Prairies (Climate trends and projections - Canada.ca). It is also not clear why climate change considerations were not assessed quantitatively.</p> | Please provide a discussion on potential effects of increased evapotranspiration, as well as decreased groundwater recharge for the study area. Provide justification for performing qualitative assessment of impacts of climate change rather than a quantitative one. | <p><i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> <p>The effect of climate change on groundwater recharge in Prairies or Canada is generally uncertain due to the large degree of uncertainty in the modelling of future recharge although future changes in temperature and precipitation are expected to alter groundwater recharge (through changes to runoff, evapotranspiration, and snow accumulation). While CNSC staff accepts the response on potential effects of increased evapotranspiration, as well as decreased groundwater recharge for the study area, no justification has been provided on why quantitative analysis was not completed to address the effect of climate change on groundwater recharge.</p> | Accepted |
| IR-72 | - | CNSC | Geology and groundwater | Section 7.8.2, Groundwater Monitoring | <p>Context: Monitoring seems to consider COPCs from surface facilities, and excursion of pumped mine fluid in the Lower Sandstone Aquifer. There does not appear any discussion on how the proposed monitoring program considers potential excursions of brine from freeze wells.</p> <p>Rationale: It is unclear how potential excursions of brine from freeze wells will be monitored. Would this be through the fiber optic cables installed within the freeze well network? Or would it be achieved in the monitoring well clusters? If this is the case, how would an excursion of brine from a freeze well be differentiated from an excursion of mining solution?</p> | Please provide further information regarding how potential excursions of brine from freeze wells will be monitored as part of the proposed groundwater monitoring program. | | Accepted |
| IR-73 | - | CNSC | Geology and groundwater | Section 7.8.2.2, In Situ Recovery Mining Area Appendix 7-A, Appendix C | <p>Context: The EIS recommends that a follow-up study be carried out to supplement available data on hydraulic conductivity in the Desilicified Zone (DSZ).</p> <p>Rationale: Appendix C (Summary of Hydraulic Testing Data and Conductivity Values) of Appendix 7A indicates that only n = 6</p> | As per the EIS recommendations, please provide additional information to supplement available data on hydraulic conductivity in the DSZ. Please provide the following information as part of the follow-up study: | | Accepted |

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| | | | | | hydraulic conductivity values are available for the DSZ, one of which appears unreliable due to a problem with packer sealing. This is relatively few values compared to the Intermediate and Lower Sandstones. Additionally, limited hydraulic head data from boreholes screened in the DSZ is available (GWR-037, GWR-012 and GWR-014; See Figures 16/17 in Appendix 7-A) – most information appears to originate from open core holes. The information presented in its current form is insufficient considering the importance of this zone as a preferential pathway for contaminants following remediation activities, and the heterogeneity of the unit due to intense hydrothermal alteration and fracturing. Further information regarding hydrogeological properties and groundwater flow would aid greatly in validating and refining the numerical groundwater model. | <ol style="list-style-type: none">1. identification of the vertical conductivity (KV) as there is an upward flow component (isotropy was assumed in DSZ for numerical model, this assumption must be verified)2. quantification of the horizontal and vertical flow gradients in the DSZ; and3. identification and mapping of any structures with the potential to influence groundwater flow in the DSZ, such as fracture/fault zones. | | |
| IR-74 | - | CNSC | Geology and Groundwater | Section 7.8.2.3 | <p>Context: It is stated in Section 7.8.2.3 (p. 7-113, main EIS report) that, at the Post-Decommissioning Stage, “Excursion are signaled by a change in water quality that is outside of that bounded by modelling predictions”, and “The model predictions spatiotemporally bound COPC concentrations in the subsurface that do not pose a risk to the receiving environment. Water quality that is outside of this bounding is defined as representing a material increase over a meaningful period compared to the predicted values either in rate of change or magnitude of change of COPC concentrations.”</p> <p>Rationale: It is not clear in which locations (e.g., is it in the mining area, or downstream of the mining area, or anywhere else?) the water quality is used to compare with the model predictions to determine if excursion occurs.</p> | Please clarify in which locations the water quality data is used to compare with the model predictions to determine if excursion occurs. | | Accepted |
| IR-75 | - | CNSC | Geology and Groundwater | Appendix 7-A, Appendix K | <p>Context: The geomechanical study showed that the stability of the remnant ore zone and surrounding rock mass is highly sensitive to the magnitude of the material properties. To quantify this risk, the Proponent conducted a sensitivity analysis to assess the influence that material properties have on the stability of key stratigraphic layers. The results of the sensitivity analyses suggest that small variations in the cohesion magnitude and angle of internal friction may significantly influence the stability of the altered sandstone, ore zone, and upper and lower clays.</p> <p>Rationale: By considering the potential uncertainties and risks in association with the geomechanical study and the empirically derived rock mass strength parameters and the non-site specific physical parameters of different rock formations used for the modeling, the Proponent’s consultant suggests to define a laboratory testing program to address data gaps in the current</p> | Please provide a plan to implement recommendations for further detailed geomechanical studies to reduce the uncertainties and risks in association with the stability and deformation analyses of ore zone rock matrix and its overlying rock mass formations and assess their impacts on the mine operation. | | Accepted |

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| | | | | | geotechnical data and increase confidence in the material properties, and use more accurate material properties to model the phased extraction of uranium-enriched rock and assess the associated risks for cavity collapse and failure in the steel casing. CNSC staff concurs with these suggestions. | | | |
| IR-76 | - | CNSC | Geology and Groundwater | Appendix 7-A, Appendix K (p. 12) | Context: Based on the consultant’s report, the modeled vertical strain is approaching or exceeding the tensile and compressive yield limits for steel casing. Rationale: Failure of steel casing may result in process loss or alter groundwater flow and quality. | Please provide additional details on how casing integrity will be monitored and potential effects mitigated. | | Accepted |
| IR-77 | - | CNSC | Geology and Groundwater | Appendix 7-A, Appendix K Results of a Geomechanical Study Investigating the Influence of Uranium Extraction on Mining-Cavity Stability for the Wheeler River Uranium Project (Revision 1) | Context: It is reported in the appendix K report, within Appendix 7-A, that both phase I scoping analysis and phase II detailed strip model were investigated by numerical modelling. The analysis discussed influence on host rock stability as a result of incremental increase in volumetric extraction and graded conservative treatment of material properties. Rationale: As critical components of a numerical geomechanical simulation, initial and boundary conditions are crucially important to the confidence and reliability of the modelling results. However, this information is absent from the current report. In-situ principal stresses largely affects the stability of the excavated host rock, and the vertical strain and surface subsidence. This information is also absent in current form. | Please provide details on the boundary and initial conditions applied on stress loading and strain for the numerical analysis. In particular, the in-situ principal stresses, which are critical to correct understanding of the excavation disturbance to the host rock, should be provided and justified as appropriate. | | Accepted |
| IR-78 | - | CNSC ECCC | Fish and fish habitat Geology and groundwater | Appendix 7-A, Section 3.5.2, Porosity Appendix 7-C, Section 2.3.2.1, Porosity Values | Context: This section of the report outlines the estimated/assumed effective porosity values. The only reference provided is for permeameter testing on rock core samples (Scibek, 2019). Additionally, the report states that “As tracer test results to estimate effective porosity were unavailable at the time of modelling, effective porosity values for the sandstone bedrock and basement units were sourced from literature values”, where literature values are effective porosities from the Cigar Lake study (AECL, 1994), situated approximately 40 km NE of Wheeler River. No on-site Wheeler River field data was used to justify this value. Additionally,, in the Cigar Lake study, the authors reported that, because results from tracer tests and pumping tests were unavailable, “a practical approach was adopted, i.e., to use the porosity values obtained from laboratory measurements made on core samples, and to assume that those numbers were close to the average field kinematic (effective) porosity values”. Rationale: The source of reported effective porosity values is | 1. Please provide the reference for the data substantiating the assumed effective porosity values reported in Appendix 7-A and used in the numerical model in Appendix 7-C. 2. Please provide information on how the site-specific effective porosity values from tracer tests or pumping tests, were considered in the numerical models. Section 2.2.1.4 of the EIS asserts that tracer tests were carried out in 2021 – this information should thus be available for improving/updating models. Alternatively, provide a sensitivity analysis for the effective porosity in the Desilicified Zone, or contaminant transport simulation results with more conservative effective porosity values. | <i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i> Effective porosity is an important parameter to understanding groundwater flow and contaminant transport. The Proponent states that “As tracer test results to estimate effective porosity were unavailable at the time of modelling, effective porosity values for the sandstone bedrock and basement units were sourced from literature values”, including porosities from the Cigar Lake study (AECL, 1994), situated approximately 40 km NE of Wheeler River. No on-site Wheeler River field data was used to explain this value. Additionally, in the Cigar Lake study, the authors reported that, because results from tracer tests and pumping tests were unavailable, “a practical approach was adopted, i.e., to use the porosity values obtained from laboratory measurements made on core samples, and to assume that those numbers were close to the average field kinematic (effective) porosity values”. In response to the IR, the Proponent explained and supported their methodology for selecting a value for effective porosity. This method included consideration of literature values and a regional analogue at Cigar Lake. ECCC notes that a tracer test was conducted, the results of which were not considered in the selection of the effective porosity parameter. | Accepted |

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| | | | | | <p>unclear from Section 3.5.2 in Appendix A (e.g. literature review, field work, laboratory work).</p> <p>In Section 2.3.2.1 of Appendix 7-C, there is a lack of clarity regarding the effective porosity data used in the numerical model. It appears that no site-specific data derived from tracer tests or pumping tests is used in the numerical model. Given that effective porosity directly correlates to seepage velocity and by extension transport time and distribution of COPCs in groundwater, it is an important parameter. Given its relative importance for contaminant fate and transport, effective porosity should be based on field measurements, or at the very least accounted for in the sensitivity analysis.</p> | | <p>If field test data is available that is potentially relevant to determining effective porosity, it should be included in the EIS when discussing effective porosity. The field test data should also be made available for ECCC to review, to confirm the conclusions reached by the Proponent. ECCC acknowledges that other sources of information can be useful when explaining the most appropriate value for effective porosity such as literature values and regional analogues, as per the Proponent’s IR response. However, field test results should be presented in the EIS and considered as a part of such an explanation. If the Proponent feels that not utilizing field test data is the most accurate approach when selecting an effective porosity value, then this conclusion should be reached with consideration of the field test data as a part of the evaluation.</p> <p>Provide a discussion of how the effective porosity values are selected, including a discussion of how field test results were considered. This information is necessary to confirm that the selected effective porosity values are valid. This also relates to IR-52.</p> | |
| IR-79 | - | CNSC | Geology and groundwater | Appendix 7-A, Section 4, Groundwater Chemistry | <p>Context: Table 4-1 in Section 4 of Appendix 7-A provides groundwater monitoring results from sampling activities carried out at 26 monitoring wells in 2019, 2020, and 2021. The majority of these wells were only sampled once (n = 8) or twice (n = 17). In some cases (Lower Sandstone Aquifer/Intermediate Sandstone Aquitard), the variability of results between sampling events is quite high. Data for the Paleoweathered Zone is sparse.</p> <p>Rationale: Insufficient information is presented in the EIS and associated Appendices to concretely define baseline groundwater chemistry for the different hydrostratigraphic units. As defined in the CNSC’s Generic Guidelines for the Preparation of an EIS: “Based on the scope of the project, the EIS will present sufficiently detailed baseline information to determine the effects the project could have on the VCs and analyze those effects”. This is particularly important given certain features of the study area (i.e., presence of zones of thermal alteration/desilicification, as well as hydraulically active fractures/faults), and the need to adequately characterize baseline conditions in the Desilicified Zone downgradient from the proposed mining area. As an example, the US Nuclear Regulatory Commission (NRC) typically requires a minimum of four (4) quarterly samples from (i) surficial aquifers, (ii) production aquifers, (iii) overlying aquifers, and (iv) underlying aquifers to characterize preoperational groundwater quality (E. Striz, pers. comm.).</p> | Please provide the statistical basis (number of samples and variability) by which “baseline” is defined and the justification that the current information is sufficient to adequately characterize groundwater quality. In order to ensure sufficient baseline information is collected, further iterations of sample collection for groundwater monitoring wells in all defined hydrostratigraphic units may be required. In addition, groundwater quality downgradient from the proposed mining area should be further characterized to assess spatial influence of alteration and hydraulically active features, | | Accepted |
| IR-80 | - | CNSC | Geology and groundwater | Appendix 7-A, Section 4.3.3, Hydrochemistry by Hydrostratigraphic Unit | <p>Context: This section provides data for groundwater samples collected during the Cigar Lake analogue study and Millennium Project for further regional context. The previous studies are heavily referenced to support interpretations made for the conceptual site model.</p> | Please provide additional clarity to and interpretation of Figure 26 in Appendix 7-A, including a revision to the Figure to allow for easier interpretation. This could include clear identification of end members, as well as arrows indicating proposed evolution of groundwater chemistry. Further discussion should be provided | | Accepted |

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| | | | | | Rationale: The Piper Plots in Figure 26 are difficult to interpret (many overlapping circles with variegated colors), and Cigar Lake samples plot predominantly as Na/K-Cl/SO4 groundwater facies. Conversely, samples collected as part of the Phoenix Project (current), plot either as Ca-HCO3 or Ca-SO4/Cl groundwater facies. No explanation is provided for the observed hydrogeochemical differences between groundwater from the Phoenix project and the Cigar Lake analogue study/Millenium Project. | describing observed differences between groundwater chemistry at the Phoenix project compared to Millenium/Cigar Lake. | | |
| IR-81 | - | CNSC | Geology and groundwater | Appendix 7-A, Section 4.3.3, Hydrochemistry by Hydrostratigraphic Unit | <p>Context: The report states in the description of hydrochemistry of the Lower Sandstone Aquifer that, “On the basis of groundwater chemistry and tritium values in that groundwater, the authors (of the Cigar Lake analogue study in 1994) concluded that the groundwater reflected a younger water component that had penetrated to depth along hydraulically active fractures/faults. The same conclusion is made here (in the Wheeler River EIS) for the Phoenix study area – meaning that fracture/fault conditions are such that some areas of the MFa are characterized by younger/recharge groundwaters”.</p> <p>Rationale: Tritium results for most wells in the Lower Sandstone Aquifer (MFa) reported in Table 4-1 of Appendix 7-A exhibit tritium concentrations <15 Bq/L for the 2020 sample, and 0.1 or <0.1 Bq/L for the 2021 sample. Tritium in modern precipitation typically varies from 1 – 3 Bq/L. Conclusions made in the text are not supported by data, especially given that tritium values are not reported in the EIS for local precipitation or surface water. This is important in reinforcing the assumption from the conceptual model that modern meteoric water circulates at depth in the Lower Sandstone Aquifer.</p> | Provide a further discussion on the interpretation of tritium in groundwater, rather than echoing conclusions from the Cigar Lake analogue study. Consideration should be given to the assertion that modern meteoric water circulates at depth in the Lower Sandstone Aquifer. Collection and analysis of stable isotope (e.g., δ2H, δ18O) samples is a cost-effective solution which would greatly improve understanding of groundwater hydrology and support the development of a conceptual model. | | Accepted |
| IR-82 | - | CNSC | Geology and groundwater | Appendix 7-A, Section 4.3.3, Hydrochemistry by Hydrostratigraphic Unit Appendix 7-C, Section 3.5 | <p>Context: A. In-field measurements of Oxidation-Reduction Potential (ORP) for three (3) out of twenty-six (26) groundwater samples are presented in Table 4-1 of Appendix 7-A. Although sparse, these values are also used to characterize redox conditions for representative groundwaters in Table 3-5 of Appendix 7-C.</p> <p>B. In Section 3.5.5 of Appendix 7-C it is stated that groundwaters in the PHREEQC model were allowed to equilibrate with atmospheric concentrations of oxygen, resulting in oxidizing subsurface conditions. In Section 3.7 of Appendix 7-C it states that input files for 3D reactive transport were generated based on outcomes for PHREEQC modelling. However, in reading Section 4 of Appendix 7-C, it is unclear whether this assumption (equilibration with atmospheric oxygen) was carried forward for the 3D model.</p> <p>C. As per p. 3.49 of Appendix 7-C, “A small amount of reactive pyrite was assumed for the first 500 m of transport away from the ore</p> | <p>1. Provide further discussions and information (i.e., ORP measurements or analytical data for redox couples) on redox conditions at the Phoenix site. Particular focus should be given to the spatial heterogeneity of redox processes. Tools such as the reference provided [2] below provide an example of simplified framework for characterizing redox conditions in aquifers.</p> <p>2. Clarify assumptions regarding initial redox conditions for the 3D solute transport model.</p> <p>3. Provide the % reactive pyrite by weight assumed for models in the text. Justification for proportions used, such as analytical data, should also be provided.</p> <p>Reference:</p> | Please see AD-65 in the Advice to Proponent table. | Accepted |

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| | | | | | <p>zone in the model, primarily in the desilicified sediments of the Lower Sandstone Aquifer, and deeper portion of the Intermediate Sandstone Aquitard”.</p> <p>Rationale: A. Given the importance of redox conditions for U mobilization and precipitation/dissolution of minerals (e.g., pyrite/metal oxyhydroxides) and the corresponding influence on contaminant transport from both a modelling and monitoring perspective, these should be further characterized. It should also be noted that the measurement of Oxidative-Reductive Potential (ORP) in natural waters can be complex and difficult due to the variability and disequilibrium of natural systems and issues inherent to electrode calibration (e.g., Schuring et al., 2000). Measurements of redox couples (e.g., As(III)/As(V); Fe(II)/Fe(III); S(-II)/S(VI)) are typically recommended to accurately characterize redox conditions in natural waters (Schuring et al., 2000).</p> <p>B. The assumptions regarding redox conditions for the 3D solute transport model should be clarified.</p> <p>C. The amount of pyrite (e.g., % by weight) assumed for the purposes of modelling should be clarified, given the potential role of pyrite as a reducing agent in limiting the transport of COPCs.</p> <p>Reference: [1] Schuring J.; Schulz, H. D.; Fischer, W.R.; Bottcher, J.; and Duijnsveld, M.H.W. 2000. Redox: Fundamentals, Processes and Applications. Springer: Berlin.</p> | <p>[2] Jurgens, B.C., McMahon, P.B., Chapelle, F.H., and Eberts, S.M., 2009, An Excel workbook for identifying redox processes in ground water: U.S. Geological Survey Open-File Report 2009–1004 8 p.</p> | | |
| IR-83 | - | CNSC | Geology and Groundwater | Appendix 7-A, Section 7.4.2.2 and Appendix K | <p>Context: Leaching of uranium from the ore zone will generate voids within the ore zone, which could fail and collapse. Failure of the voids would cause displacement in overlying rocks, which will lead to the eventual ground subsidence. Based on the developed geological model, a geomechanical study was conducted to assess potential maximum vertical displacement in the overlying rock formations and predict the ground subsidence. While a layer of altered sandstone is modeled above the ore zone, the desilicified zone, a zone that is comprised of completely to partially unconsolidated sands and has very low rock quality, high fracture intensity, and high friability, and low strength in the area overlying and east of the Phoenix deposit, appears not to have been included in the model for geomechanical modeling. The evaluated displacement/deformation in the overlying rock formation and the resulted ground subsidence would not be conservative without including the desilicified zone.</p> <p>Rationale: Stability of the ore zone rock matrix and the potential</p> | <p>Please provide details whether and how the desilicified zone is considered in the geomechanical modeling of the detailed strip model. Such details should include figures and the linkage between the geomechanical model including the determination of strength parameters of the desilicified zone and the geological model including information on the core delineation of the desilicified zone.</p> | | Accepted |

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| | | | | | displacement/deformation in the overlying rock formations when voids in the extracted ore zone collapse are critical for protecting the overlying aquifers, preventing substantial ground subsidence, safeguarding casing integrity, and mitigating plug-off of the remaining ore as well as efficiently mining extraction. The deformed zone in the overlying rock formations will change in hydraulic conductivity that will impact on the assessment of potential effects on groundwater flow and contaminant transport in the zone. Therefore, the rock mass behavior including and above the ore zone should be adequately understood and the potential displacement/deformation should be assessed and quantified with adequately defined geological model. | | | |
| IR-84 | - | CNSC | Geology and Groundwater | Appendix 7-C | <p>Context: It is stated in Section 2.5.2.4 (p. 2.35, Appendix 7-C) that “In addition to calibrating to water level elevations targets, the model was calibrated to estimates of groundwater discharge to Whitefish Lake. A match between simulated and observed flows helps to support that groundwater recharge rates are reasonable, and to provide validation for water budget assessments. Baseflow calibration targets were developed using point streamflow measurements collected upstream and downstream of Whitefish Lake. Figure 2-10 (p. 2.26, Appendix 7-C) shows the locations of the baseflow calibration targets, and Table 2-7 (p. 2.35, Appendix 7-C) illustrates the model-simulated groundwater discharge rates in relation to the estimated range of baseflow from stream measurements. The simulated baseflow to Whitefish Lake is in good agreement with the estimated representative baseflow”.</p> <p>Rationale: It is not clear in Figure 2-10 (p. 2.26, Appendix 7-C) where the point streamflow measurements were conducted upstream and downstream of Whitefish Lake. Additionally, it is not clear how the groundwater discharge to Whitefish Lake is simulated, since the model domain does not cover the whole Whitefish Lake.</p> | <p>1. Please clarify in Figure 2-10 where the point streamflow measurements were conducted upstream and downstream of Whitefish Lake.</p> <p>2. Please clarify how the groundwater discharge to Whitefish Lake is simulated considering that the model domain does not cover the whole Whitefish Lake.</p> | | Accepted |
| IR-85 | - | CNSC | Geology and Groundwater | Appendix 7-C | <p>Context: Section 2.7.3 (Appendix 7-C) mentions Wells A, B and C, and Figure 2-17 (p. 2.43, Appendix 7-C) illustrates the predicted drawdown ranges at Well B and Well C.</p> <p>Rationale: It is not clear where Well A, Well B and Well C are located.</p> | Please provide the locations of Well A, Well B and Well C illustrated in a Figure. | | Accepted |
| IR-86 | - | CNSC | Geology and Groundwater | Appendix 7-C | <p>Context: It is stated in Section 2.7.3 (p. 2.41, Appendix 7-C) that “Both the pumping demand and the recharge changes were incorporated into a transient simulation performed using the calibrated groundwater flow model. The model simulation was started at the beginning of mine construction, with initial conditions</p> | Please clarify the parameters, boundary conditions and any other aspects as used in the transient model that are different from the calibrated model. | | Accepted |

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| | | | | | <p>taken from the calibrated model. The simulation period was extended for 40 years to include the entire period of construction, operation, and decommissioning, and extending through 17 years post decommissioning”.</p> <p>Rationale: It is not clear what is the difference between the calibrated model and transient model in terms of parameters (such as the K values for the mining zone), boundary conditions, etc.</p> | | | |
| IR-87 | - | CNSC | Geology and Groundwater | Appendix 7-C | <p>Context: In Section 2.8 (p. 2.45, Appendix 7-C) Parameter uncertainty assessment, only parameters for certain zones (part of each specific hydro-stratigraphic unit as shown in Figure 2-19, p. 2.46, Appendix 7-C) related to the pathway from the ore zone toward Whitefish Lake were allowed to vary in order to find combinations of parameter values that met statistical calibration criteria. If each hydro-stratigraphic units within the whole model domain were treated as parameter zones that can have varied hydraulic conductivity values, a different combination of parameter values could be obtained that meet statistical calibration criteria too.</p> <p>Rationale: The parameter values for parameter zones between the mining area and Whitefish Lake is important in determining the hydraulic connection between the mining area and Whitefish Lake. Parameter values in other parameter zones could also be important. For example, if the K values for the intermediate sandstone aquitard are significantly larger than in the current calibration results, the interaction between the upper sandstone aquifer and the lower sandstone aquifer could be more active, and the mined-out zone could be more active hydraulically and groundwater in the minded-out zone could have a shorter residence time than in the current calibrated model.</p> <p>Additionally, it is noted that Figure 2.19 (p. 2.46, Appendix 7-C) illustrates the parameter zone for the intermediate sandstone aquitard. However, Figure 2.20 (p. 2.49, Appendix 7-C) did not include the intermediate sandstone aquitard in the results.</p> | <p>It is recommended that the parameter zones in the Parameter uncertainty assessment include hydro-stratigraphic units in the whole model domain to investigate the possible combination of parameter values that could make the groundwater in the mined-out zone more active hydraulically.</p> | | Accepted |

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| IR-88 | - | CNSC | Geology and Groundwater | Appendix 7-C | <p>Context: The conceptual hydrogeological model includes upper sandstone aquifer, intermediate sandstone aquitard, and lower sandstone aquifer. The desilicified zone above the ore zone have enhanced hydraulic conductivity. The boundary condition for the lower sandstone aquifer on the west (upstream) side was assigned to have specified head, which provide source of water for the lower sandstone aquifer.</p> <p>As a result of the conceptual model setup, the upper sandstone aquifer is hydraulically active and the groundwater residence time within the upper sandstone aquifer is relative short. In contrast, the lower sandstone aquifer (and the ore zone) is hydraulically inactive, and the groundwater residence time in the lower sandstone aquifer is relatively long (as shown in the particle tracking results in Figure 7.6-2 (p. 7-71, main EIS report), and the simulated plume for chloride in Figure 7.6-7(p. 7-86, main EIS report)).</p> <p>It is stated in Section 2.6.4 (Appendix 7-C) that “As noted above in section 2.6.3, it is estimated that 99% of the groundwater discharge to Whitefish Lake is derived from groundwater that has only flowed through shallow deposits (i.e., Overburden and Upper Sandstone Aquifers). Contribution of deep groundwater flow through the Desilicified Zone within the Intermediate Sandstone Aquitard is estimated to be < 1% of the groundwater discharging to Whitefish Lake”. This simulation result is reflective of the conceptual model.</p> <p>Section 7.3.3.3 (p. 7-42) states that “The Lower Sandstone Aquifer is characterized spatially by two types of groundwater. The first groundwater type is most like that observed in the Local Flow System. This reflects hydraulically active fractures and fault systems that allow fresh recharge water to penetrate and mix with deeper waters in the aquifer. The second type of groundwater is within the zone of thermal alteration around the ore zone”.</p> <p>The hydraulic connectivity of the ore zone with the upper sandstone aquifer has important implication on the groundwater restoration. The ore zone is not hydraulically active locally because it is enclosed by a clay zone before the mining operation. But if it is located within a hydraulically active area, or on a groundwater flow pathway that is hydraulically active, the mined-out zone (with much larger porosity and hydraulic conductivity) could become active hydraulically after mining operation is finished.</p> <p>Figure 7.6-7 (p. 7-86, main EIS report) shows that the chloride plume is most persistent within the mined-out mining area. This seems to indicate the mined-out zone is hydraulically inactive after the mining operation is finished.</p> | <p>It is recommended to conduct the following work to demonstrate if the mined-out zone is hydraulically active:</p> <ol style="list-style-type: none">1. Determine the groundwater residence time in the lower sandstone aquifer and compare it with the simulated residence time in the numerical model.2. Conduct additional particle tracking to demonstrate where groundwater originating from the mined-out zone flow towards (forward tracking) and where groundwater flowing towards the mined-out zone originates from. This would help determine why groundwater in the mined-out zone is not hydraulically active.3. Conduct sensitivity analysis to investigate the effect of higher K values for the intermediate sandstone aquitard and the K and porosity values of the mined-out zone on the plume migration. | | Accepted |

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| | | | | | <p>It is stated in Section 7.3.3.2 (p. 7-37, main EIS report) that “Exploration boreholes drilled in the Phoenix area, where left unplugged, have the potential to provide preferential flow paths between the Overburden and Upper and Lower Sandstone Aquifers. Exploration holes were reportedly grouted approximately 10 to 20 m above and below the ore zone, resulting in open holes remaining throughout the overlying materials. These portions of the open holes may act as open conduits for groundwater flow through the 400 m of Athabasca Group Sandstone.” So, there is possibility that the unplugged borehole could increase the hydraulic connection between the upper and lower sandstone aquifer.</p> <p>Rationale: It is important to understand if the larger area containing ore zone is hydraulically active. Additional confidence would be gained if there is any other evidence that support that the area containing the ore zone is not hydraulically active, and groundwater residence time in the lower sandstone aquifer surrounding the ore zone is comparable with the simulated results.</p> <p>Table 2-4 (p. 2.16, Appendix 7-C) shows the effective porosity (0.01-0.05) of the ore body. Figure B7 (p. B.8, Appendix 7-C) shows that the calibrated K values for the mined-out zone is 1x10-6 m/s. Section 3.5.2 (p. 3.24, Appendix 7-C) states that “The same average linear velocity was assumed for the mining area (source zone), following from the discussion in Section 4.4.2, where the hydraulic conductivity value in this zone following mining was set to 5x10-6 m/s, and a porosity of 0.2 is assumed for the ore zone (Table 4-2)”. It is not clear what the justification is for the selection of the porosity and K values for the mined-out area, and whether they are conservative. It is also not clear, what the potential impact on the groundwater flow and COPCs transport would be if the mined-out zones collapse.</p> | | | |
| IR-89 | - | ECCC | Fish and fish habitat | Appendix 7-C, Numerical Modelling: Post-Decommissioning | Context: The Proponent states that a hydraulic conductivity value of 5x10-6 m/s was uniformly assigned to the model layers representing the Desilicified Zone. They additionally state that this value is consistent with packer and pumping tests screened in this unit that | 1. Provide an in-depth rationale for choosing a value of 5x10-6 m/s as the base case for the hydraulic conductivity, in both the PH REDox EQUilibrium (PHREEQC) and Finite-Element Ground Water Flow (FEFLOW) models. | Note to Denison: This IR is still under discussion. | |

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| | | | | Evaluation, Section 2.3.1.4, Desilicified Zone | <p>have interpreted hydraulic conductivity values ranging from 1x10-6 to 3x10-5 m/s (Appendix C), with a geomean of 6.0x10-6 m/s.</p> <p>Considering that the Desilicified Zone is of particular interest because it is the main pathway for the COPC to reach Whitefish lake, and that hydraulic conductivities are not entirely understood, ECCC recommends that a larger range of hydraulic conductivities be simulated to understand potential effects on fish and fish habitat.</p> <p>Rationale: The Desilicified Zone is a critical layer in the hydrogeological model as it represents a key potential pathway of contaminants to Whitefish Lake. The base case hydraulic conductivity value (5x10-6 m/s) is even lower than the geometric mean, not to mention the highest value found. When simulating geochemical processes and contaminant transport within this important pathway a more conservative approach should be employed. Modifying this parameter will affect travel times and distribution of COPC in the subsurface.</p> | <p>2. Provide a rationale for keeping the sensitivity analysis within one order of magnitude considering the lack of physical data on the Desilicified Zone. Alternatively, provide contaminant transport simulation results with more conservative hydraulic conductivity (e.g., more than 3x10-5 m/s) values in the Desilicified Zone.</p> <p>See also related: IR-96.</p> | | |
| IR-89 | IR-89-R1 | ECCC | Fish and fish habitat | Appendix 7-C, Numerical Modelling: Post-Decommissioning Evaluation, Section 2.3.1.4, Desilicified Zone IR-89 Response from Denison | <p>Context: The Proponent states that the range of hydraulic conductivities considered in sensitivity analysis was limited to values that fit within a calibration constrained uncertainty analysis of the model.</p> <p>Considering that the Desilicified Zone is of particular interest because it is the main pathway for the COPC to reach Whitefish lake, and that hydraulic conductivities are not entirely understood, ECCC recommends that a larger range of hydraulic conductivities be simulated to understand potential effects on the aquatic environment.</p> <p>The Proponent clarified the details of the calibration-constrained uncertainty analysis that was used for parameter bounding within the model, with hydraulic conductivity sensitivity bounds determined based on model calibration values that were supported by the available physical data.</p> <p>Rationale: ECCC agrees that calibration constrained uncertainty analysis using hydraulic head field data is useful to determine probable upper limits of K values. However, there is always some degree of uncertainty in groundwater data and models. Sources of such uncertainty may include errors, lack of complete and representative field data to determine key parameters, or any number of heterogeneities associated with groundwater systems over large scales. Such uncertainties will always exist and can be accounted for by conducting a sensitivity analysis that accounts for the lack of physical data in the Desilicified Zone by running</p> | Expand the sensitivity analysis of hydraulic conductivity outside of calibration constrained parameters to account for the lack of physical data in the Desilicified Zone. | Note to Denison: This IR is still under discussion. | |

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| | | | | | modelling scenarios using parameters that are outside of the calibration constrained values. | | | |
| IR-90 | - | ECCC | Fish and fish habitat | Appendix 7-C, Section 2.4 and 2.6 | <p>Context: Hydraulic conductivities and hydraulic gradients play an important role in groundwater flow, geochemical modeling, and contaminant transport for the PHREEQC and FEFLOW models. Although there is an important vertical component to the contaminant transport, there is no distinction made between lateral and vertical hydraulic conductivities of hydraulic gradients.</p> <p>Rationale: According to the conceptual model, there is an important vertical aspect to the groundwater flow thus incorporating any vertical hydraulic gradient or hydraulic conductivity information into the calibration would increase confidence in the results.</p> <p>Providing a distinct value for vertical hydraulic conductivity will improve the accuracy of the model in regards to the transport of contaminants to Whitefish Lake through the Desilicified zone, which is important to understand potential impacts to aquatic life.</p> | <p>1. Explain if the vertical and lateral hydraulic gradients and hydraulic conductivities are assumed to be equivalent.</p> <p>2. Provide a rationale for not distinguishing between vertical and lateral hydraulic gradients.</p> <p>3. Alternatively, provide both lateral and vertical hydraulic gradient estimates and the implications on contaminant transport.</p> | | Accepted |
| IR-91 | - | NRCan | Fish and fish habitat | Appendix 7-C, section 2.5.2 | <p>Context: The numerical model calibration quality plot (Appendix 7-C, sec. 2.5.2.1, Figure 2-13) contains a small error. The vertical (simulated heads) and horizontal (observed heads) axes do not have the same scales (499 to 521 masl versus 499 to 522 masl). Therefore, the line of ideal fit is offset.</p> <p>Rationale: As a result, NRCan notes that observed heads in the 510-512 masl range are underpredicted by the model. NRCan also notes that the calibration statistics (Appendix 7-C, sec.2.5.2.3) are highly leveraged by two data points from open boreholes south of Kratchkowsky Lake where simulated values are largely controlled by the nearby constant-head boundary in the Lower Sandstone aquifer (520 masl).</p> | <p>The Proponent should correct the scales on the axes of Figure 2-13 in Appendix 7-C. The Proponent should also comment on the effect on calibration of the clustering of most observation wells in the ore zone.</p> | | Accepted |
| IR-92 | - | CNSC | Geology and groundwater | Appendix 7-C, Section 3.2.1, Mineralogical Composition | <p>Context: Table 3-2 summarizes the clay content of the Athabasca Group sandstones and the Paleoweathered Zone. Although minimum, maximum and median values are provided, the number of samples and variability of the dataset are not. Rationale for incorporating illite into reactive transport modelling and excluding kaolinite/dichlorite is provided in the text.</p> <p>From p. 3.29 in Appendix 7-C: “The illite content was based on the normative clay composition determined from site-specific corehole elemental analysis (median illite by mass is 7.68%; Table 3-2) and using portable infra-red mineral analysis indicating median illite content by mass is 13.1% (data not shown)”</p> | <p>1. Please provide in Table 3- the number of samples and variability of the datasets used to estimate the clay content of hydrostratigraphic units for the model. Include results from infrared mineral analysis in the text if the information is used to support assumptions for modelling.</p> <p>2. Please provide further information/discussion within the EIS relating to the assumptions of clay content in hydrostratigraphic units for modelling. Provide further justification and rationale as to why total clay content in the Athabasca Group sandstones and Desilicified Zone is assumed to be illite, and how this assumption is conservative. This discussion could include a comparison of the properties (cation exchange capacity, surface area) of illite vs.</p> | | Accepted |

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| | | | | | <p>From p. 3.30 in Appendix 7-C: “Using the minor amount of illite compared to the more dominant chlorite is conservative in that not all sorptive capacity of the clays is accounted for in the simulated paleoweathered zone”. This conservative assumption appears contrary to assumptions for the desilicified zone (DSZ) and Athabasca Group sandstones “Illite was used to represent the total clay content, which varies from 1.74% to 5.85% by mass in the hydrostratigraphic units within the Athabasca Group sandstones and Desilicified Zone”.</p> <p>Rationale: Information is missing in the EIS regarding the clay composition of hydrostratigraphic units. Results from infrared mineral analysis are not reported.</p> <p>The assumption for the solute transport model is that all clays in the downgradient DSZ are illite. However, clay content in the Read Formation (Lower Sandstone Aquifer) downgradient of the ore zone is low in illite (0.42%) compared to kaolinite (0.52%) and dichlorite (1.18%). A value of 3.9% illite clay by weight is used for the DSZ, but Table 3-2 indicates median content is 2.42% illite. It is not clear why illite was used to represent total clay content for the DSZ, as opposed to the conservative assumptions used for the Paleoweathered Zone, nor has any basis or justification been given.</p> | kaolinite vs. dichlorite for the anticipated range of subsurface conditions (pH, redox, U concentrations, etc.). | | |
| IR-93 | - | CNSC | Geology and Groundwater | Appendix 7-C, Table 3-10: Properties of Adsorbing Mineral Phases | <p>Context: In Appendix 7-C, section 3.5.6.2.2 Ion Exchange and Surface Complexation, the consideration of ion exchange and surface complexation and the corresponding parameters and chemical reaction are discussed.</p> <p>Rationale: The site density of sorbent Geothite was reported in Table 3-10 to be 1.6E3 mol/kg. Taking into account the specific surface area of 60 m2/g, this equals to 1600/6E4 mol/m2, or 0.0266 mol/m2, 1.6e4 sites/nm2.</p> <p>This value largely overestimates the site density of goethite, which is reported to be in the range of 2~6 sites/nm2. The reference used in the EIS report indicates the similar range of variation for this specific parameter.</p> <p>There are plenty of similar studies on SCM of iron oxides in literature. It is suggested to consult with more than one single study to enhance the reliability of model parameters.</p> <p>The overestimation of sorption site density will directly result in underestimation of the affected COPCs’ concentrations in pore fluid. This will result in underestimation of COPC transport plume in</p> | Please provide additional evidence to justify the model parameter of site density for goethite, applied to the numerical model. If necessary, the reactive transport modelling should be re-run to update the contents presented in the EIS report. | | Accepted |

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| | | | | | the affected underground space, and potentially the dissolved concentrations in the hydrogeological sink. | | | |
| IR-94 | - | CNSC | Geology and Groundwater | Appendix 7-C, Numerical modelling: post-decommissioning evaluation, Section 3.5.5, Subsurface Conditions Incorporated | <p>Context: It is reported in this section the assumed subsurface conditions that were applied in the geochemical site conceptual models. Critical phenomenon of pH tail was mentioned. Inclusion and exclusion of corresponding geochemical reactions were discussed briefly.</p> <p>Rationale: It was reported that the residual reduced minerals of uraninite and pyrite were not included in the modelling of the remediated mining area. The argument was based on consideration of the upstream groundwater, passing through the mined zone, will not be oxidizing and groundwater conditions are expected to be similar to pre-mine conditions. However, this ignores the pH tail effect that releases proton H+ sorbed to solid surface during ISR flooding. By ignoring this process, there is a potential risk of underestimating the source terms for some key COPCs. Exclusion of uraninite and pyrite in remediated mining area modelling is contradictory to pH-tail effect. The justification is not sufficient in the current form.</p> | Please provide additional evidence to justify the approach for excluding uraninite and pyrite from the analysis of remediated mining area. This may require the results from additional modelling. | | Accepted |
| IR-95 | - | CNSC | Geology and Groundwater | Appendix 7-C, Table 3-11 | <p>Context: The Table 3-11 reported the Solid-Phase Concentrations and Partitioning Constants for COPCs. Data were both measured and simulated.</p> <p>Rationale: It is unclear how the partition coefficients of various COPCs upon desilicified and paleoweathered rocks were obtained. It was not reported at what pH were these Kd analyzed. Sorption of chemicals on solid phase is known to be pH dependent. It is unclear whether pH influence was considered in the measurement and analysis of apparent partition coefficients.</p> <p>In addition, uptake of metals on clay is highly nonlinear, and always has a maximum capacity. Even with a very strong affinity towards specific metal ions, the sorption will be saturated at elevated concentrations. Therefore, assuming a linear correlation needs to be cautious of the concentration range of target COPC species, and the applicable sorption capacity of the clay mineral.</p> <p>In the current model, only the linear form of sorption is considered, although with discussion of Kd value selection. Additional rationale is needed to justify if the applied methodology is sufficient for assessment.</p> | Please justify the choice of applying a linear form partition coefficient for the modelling and assessment, and whether it provides a conservative approach to the assessment results. Clarity around the experimental conditions during the measurement of partitioning coefficient of various COPCs on the target rocks may help support this assumption. | | Accepted |

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| IR-96 | - | CNSC | Geology and groundwater | Appendix 7-C, Section 4.4.4, Sub-Domain Model Transport Boundary Conditions | <p>Context: From the text, “Transport parameters were specified for diffusion (1x10-9 m2/s), longitudinal dispersivity (10 m along the plume trajectory), and transverse dispersivity (5 m)”. The source of this information is not provided in Appendix 7-C. It is unclear if the values used are defaults in the modelling software, from literature, from small-scale laboratory tests, or are site-specific values determined through tracer tests.</p> <p>Rationale: The use of a calibrated flow model does not imply that the solute transport model is calibrated. The transport parameters (such as effective porosity, dispersivity and reactive transport parameters) can only be calibrated by matching simulated and observed spatial and/or temporal distributions of a solute. Sensitivity analysis indicates that decreasing longitudinal and transverse dispersivities by a factor of two resulted in exceedances of groundwater criteria for both selenium (Se) and cobalt (Co). Given the clear influence of these values on contaminant transport, it is important that transfer parameter values are justified in the solute transport model. In addition, the influence of large-scale heterogeneity on dispersion and solute transport predictions should be discussed, to identify any uncertainty in the model predictions, and provide confidence that the applied model is adequately representing groundwater flow and solute transport.</p> <p>Further guidance on solute transport modelling can be found in BC MOE (2012) [1].</p> <p>Reference: [1] British Columbia Ministry of the Environment (BC MOE). 2012. Guidelines for Groundwater Modelling to Assess Impacts of Proposed Natural Resource Development Activities. Report no. 194001, 385 p.</p> | <p>1. Please provide the source of the numerical value used for diffusion and longitudinal and transverse dispersivity, and provide justification if default values by the model code were used.</p> <p>2. Please provide a discussion on the influence of large-scale heterogeneity on dispersion and solute transport predictions in the modelling report.</p> <p>See also related: IR-89.</p> | <p><i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> <p>CNSC staff appreciate the comprehensive information provided relating to longitudinal dispersivity and variation based on scale. However, it should be noted that guidance from Gelhar et al. (1992) and the BC MOE (2012) indicate that horizontal transverse dispersivity values should be approximately 1 order of magnitude lower than longitudinal dispersivity values, and vertical transverse dispersivity values should be approximately 2 orders of magnitude lower than longitudinal dispersivity. For the model presented in the EIS, transverse dispersivity is represented by a singular value of 5 meters, with the supporting rationale that the Gelhar et al. (1992) identified 5 meters as a representative value. It is important to note that the Gelhar et al. (1992) paper considered 5 meters to be representative for horizontal transverse dispersivity and identified that vertical transverse dispersivity is smaller than horizontal transverse dispersivity. Additionally, it is important to note that Petrotek (2021) used a transverse dispersivity of 1 m in their numerical models of the ore zone aquifer. CNSC staff thus request that Denison provide further information relating to why horizontal and vertical transverse dispersivity are represented using a singular value, and how this value is considered appropriate to represent both dimensions.</p> <p>Reference: Petrotek 2021. Groundwater Model Report Phase 1, Phoenix Deposit Wheeler River Project. Prepared for Denison Mines. December 2021.</p> | Accepted |
| IR-97 | - | ECCC | Fish and fish habitat | Appendix 7-C, Figures 4-6, 4-7a, 4-7b, 4-8a, 4-8b, 4-9a, 4-9b | <p>Context: Appendix 7, Figures 4-6, 4-7a, 4-7b, 4-8a, 4-8b, 4-9a, 4-9b present contaminant transport simulations of chloride, selenium, cadmium, and uranium. All simulations use initial condition concentrations at t=0 (or end of mining operations. In the 3D FEFLOW contaminant transport model it is not clear why initial condition concentrations were chosen rather than a constant concentration boundary.</p> <p>It is also unclear if mining activities will cause mobilization of the contaminants beyond the end of operations.</p> <p>Rationale: The choice of boundary conditions may impact the predicted transport of contaminants that reach Whitefish Lake through groundwater, which may have impacts to aquatic life.</p> | <p>1. Explain and clarify if mining operations will mobilize contaminants beyond operations?</p> <p>2. Clarify if the source of contamination, (e.g., uranium, selenium) will cease after operations?</p> <p>3. For the 3D model please provide the rationale for using initial concentrations rather than constant concentration boundary conditions for contaminant concentrations.</p> | <p><i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> <p>It should be noted that the fate and transport simulations of the COCs are dependent on groundwater flow. Therefore, the Proponent’s conclusions on the transport of COCs, may need to be revisited depending on how IR-89 is resolved.</p> | Accepted |

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| IR-98 | - | CNSC | Change to an environmental component due to hazardous contaminants | Section 8, Aquatic Environment | <p>Context: It states in EIS in Section 8.3.7.1 (p. 8-151) that "Cameco's Key Lake Operation will overlap spatially and temporally with the Project".</p> <p>Rationale: It is not clear whether there is the possibility that planned Denison discharges would eventually flow into and influence a background reference lake used by Key Lake operation.</p> | Please provide supporting information to demonstrate whether discharges from the proposed operation will not eventually flow into a reference lake used by another existing operation. | | Accepted |
| IR-99 | - | CNSC | Aquatic environment | Section 8, Water Quality, Table 8.2-13 | <p>Context: Table 8.2-13 shows the maximum concentration of hazardous and radiological COPC's in surface water throughout the local study area. However, the concentration for all constituents is stated as mg/L.</p> <p>Rationale: It is unusual for radiological COPC's to be displayed in mg/L, radiological constituents are typically displayed in Bq/L</p> | Please use Bq/L when displaying concentration of radiological COPC's. If this was a typographical error in the table, please indicate as such and revise the table to indicate values are indeed in Bq/L. Please also review other tables displaying concentrations of radiological constituents to ensure this error is not repeated in other tables. | | Accepted |
| IR-100 | - | HC | Indigenous Peoples' health / Socio- economic conditions | Section 8, (p. 8-195) Section 8.5.3, Table 8.5-2, (p. 8-226) | <p>Mercury is excluded as a COPC in the assessment. Inadequate consideration of mercury and methylmercury in fish and other country foods, and use of incorrect Hg-related health guideline values can underestimate the risks to human health among country food consumers.</p> <p>Context: Section 8 states “Mercury has not been identified as a COPC for the Project as it is currently not present in the receiving environment (i.e., background condition) at detectable concentrations and will not be produced as part of the mine process; therefore, it will not be discharged to the aquatic environment.</p> <p>However, it is understood that potential nutrient enrichment-related effects are possible and can be linked to increases in mercury in the environment” (p. 8-195).</p> <p>Table 8.5-2 shows that there is mercury present in the tissues of Northern Pike and White Sucker sampled in the waterbodies within the local study area and in Russell Lake. These fish are regularly consumed by nearby communities according to the ERFN 2017 dietary survey.</p> <p>In Section 8.5.3, fish tissue concentrations are compared to Health Canada's human health risk- based maximum permissible mercury concentration (0.5 µg/g wet weight), which is applicable to most species of commercially sold fish rather than country foods.</p> | <p>1. Include mercury (including methylmercury) as a COPC in the assessment given the baseline presence of mercury in sampled fish, the potential increase of methylmercury in receiving waters due to nutrient enrichment resulting from the Project, the significant fish consumption by the local population and that country foods, particularly fish, are an important source of dietary exposure to mercury.</p> <p>2. Assess health risks from fish consumption by calculating hazard quotients for baseline and predicted methylmercury levels in country foods using Health Canada's pTDI for methylmercury (Health Canada, 2007).</p> <p>3. Clarify whether mercury data represented throughout the EIS represents total mercury, inorganic mercury or methylmercury.</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends including methylmercury in the list of COPCs to be monitored in fish throughout all project phases.</p> <p>See also related Advice to the Proponent: AD-31.</p> | <p>This IR remains not accepted. It is unclear what threshold concentration(s) of mercury in fish would trigger further assessment of potential health risks.</p> <p>The response to IR-100 includes a commitment to monitor mercury concentrations in fish, and to assess potential health risks if concentrations are greater than that used to derive the Government of Saskatchewan (GoS) guidelines for fish consumption (last updated in 2015). However, using this concentration as a threshold would not be protective of human health if the local population consumes greater quantities than the published consumption guideline.</p> <p>Please provide the following information:</p> <ol style="list-style-type: none">Discuss how the fish consumption rates from average and high traditional foods consumer groups (Section 10-A, Table 4-4: Annual Food Intakes for Components of the Human Receptor's Diet) relate to the GoS fish consumption limits for general and sensitive populations.Justify the use of GoS guidelines for fish consumption for mercury monitoring in fish and as a trigger for possible management actions. | Not Accepted |

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| | | | | | <p>Rationale: It is recommended that mercury be listed as a COPC considering it is in fact present in fish tissue under existing conditions, the significant consumption of fish by the local Indigenous communities, and its toxicological significance to human health.</p> <p>Further, the Health Canada provisional tolerable daily intake (pTDI) value of 0.2 µg/kg/bw/day (Health Canada, 2007) is a more appropriate reference level when evaluating consumption of mercury in fish by Indigenous people, as it allows for the consideration of food consumption patterns in the risk assessment that differ from the general population and is protective of the most sensitive sub-group (i.e., developing foetus).</p> <p>It is important to note that methylmercury, rather than inorganic mercury, is generally the predominant mercury species present in fish and is also the most toxicologically significant form. The assumption of 100% of mercury in fish and other country food items being present as methylmercury ensures that the potential health risks are not underestimated. It is unclear, however, if the mercury data presented throughout the EIS represent total mercury, inorganic mercury or methylmercury.</p> | | | |
| IR-101 | - | ECCC CNSC | Fish and fish habitat | Section 8.1.1.3, Section 8.2.1.3 Aquatic Environment | <p>Context: In Section 8.1.1.3 Spatial and Temporal Boundaries the Project Area, Local Study Area (LSA) and Regional Study Area (RSA) are established as they pertain to surface water quantity. The same is done in Section 8.2.1.3 for surface water quality. In Section 8.1.1.3 Figure 8.1-4, the locations of the Project Area, LSA, RSA and surface water features and monitoring stations are provided.</p> <p>However, the locations of wetlands located near the Project area and within the LSA and RSA have not been provided. The location of wetlands within or near the Project footprint, as well as the other wetlands existing within the LSA can be confirmed from Part II_S9 Terrestrial Environment, Section 9.2.3.3 Figure 9.2.-8, including the wetland classifications. There appears to be at least one shallow open water wetland and several bogs located within the Project Area. There is no consideration of wetlands or potential effects to wetland hydrology, surface water or sediment quality throughout the aquatic environment assessments. There is no baseline information regarding wetlands and their status as fish habitat and ecological function, or assessment of potential effects to flow rates, water levels, water quality, sediment quality, or biota.</p> <p>Rationale: There is currently not enough information provided for ECCC to provide advice on the potential risks of the proposed Project to wetland hydrology, surface water and sediment quality</p> | <p>1. Provide baseline information regarding wetland characterization within the Project Area and LSA, including: locations, wetland type, size, water surface elevation, depth, water flow pathways, and the presence of wildlife receptors including presence of fish/fish habitat within the Aquatic Environment section of the draft EIS. If this information is available in annexes or baseline studies, summarize it within the main body of the Aquatic Environment section of the draft EIS with references to respective documents for review.</p> <p>2. Provide baseline information on wetland surface water and sediment quality characterization for wetlands within the Project footprint.</p> <p>3. Provide an assessment of potential effects to wetlands within the LSA and potential effects to ecological receptors during all phases of the proposed Project.</p> <p>4. Provide further information on mitigation measures and monitoring that would be applied for the protection of wetlands.</p> | <p>Responses to items one and four have been accepted, but items two and three require additional information.</p> <p>For item two, the Proponent has not included justification regarding why they have relied on measurements upstream and downstream of the wetlands over direct measurements in the wetland areas within their response. Please provide the missing justification for item two, as well as describe how baseline information will be used to further assess the effectiveness of mitigation measures. Water and sediment quality in wetlands differ than those in stream and lakes systems because of their distinct biota and hydrology. In wetlands, there is a greater cycling of nutrients, more nutrients and metals can be sequestered in sediment, and metal toxicity modifying water quality factors such as pH and dissolved organic carbon are not the same as in streams and lakes. Baseline data on water and sediment quality in wetlands are necessary to evaluate potential effects on fish and fish habitat of proposed discharge to Whitefish Lake upstream of the wetlands. The information would also be used to assess possible effectiveness of proposed mitigation measures.</p> <p>For item three, the Proponent has not provided the predicted sediment quality impacts within item three, which is part of the wetlands assessment that was requested.</p> <p>Please also update Section 8.3 to include additional information on predicted sediment quality impacts to wetlands and to provide an assessment of potential effects to wetlands from sediment quality changes within the LSA.</p> | Not Accepted |

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| | | | | | within the LSA. This pathway of effects is important to assess in terms of potential effects to wetland habitat availability and quality due to changes in flow rates, water levels, water quality, sediment transport, sediment quality and potential effects to terrestrial and aquatic receptors. It is necessary to evaluate if changes in groundwater and surface water runoff flows and routing will affect water levels and habitat availability within wetlands. Potential effects from COPCs and radionuclides to surface water and sediment, or potential effects to ecological receptors within wetlands have not been evaluated. | | This Information is required in order to identify and define potential effect pathways linked to project-related changes to wetland sediment quality and assess effects on wetland functions, fish and fish habitat, and other valued components. Potential effect pathways in wetlands can be different than those in lakes and streams and warrant a separate assessment. | |
| IR-102 | - | ECCC CNSC | Fish and fish habitat | Section 8.1.3.1 Appendix 8-C, including Appendix II, Table 1 (p. 2) | <p>Context: Only one measured-results dataset for baseline stream flow exists that is relevant to the Project data from the Water Survey of Canada (WSC) station for Wheeler River (06DA005), and the Proponent used constructed records. The Proponent states that data from 06DA005 was used to extend local hydrometric station records and calculate baseline water quantity metrics. However, this was done through a complex combination of daily data correlation or monthly unit area runoff relationship, with or without offset, where some stations were based off constructed records instead of the real long-term dataset at 06DA005 (see Section 8.1.3.1 and Appendix II of Appendix 8-C, Table 1, p.2 (PDF p. 569)). Appendix 8-C references previous reports in its own appendices, but no equations are shown and there is no description of the accuracy of the fit, or explanation for not referring back to the one dataset (WSC station). Subsequent statistics calculated from these constructed records (e.g., 7Q10 needed for SK water licenses) would be affected by this uncertainty.</p> <p>Rationale: Fish habitat can be altered by changes to depositional and erosional patterns in streams. Confidence in the Proponent’s estimate of baseline water quantity, and by extension Project effects to fish habitat, cannot be established without a complete description of the method applied, as well as a discussion of its accuracy.</p> | <p>1. Provide more information on the extension of Project hydrometric station data using WSC station 06DA005.</p> <p>2. Discuss the accuracy of any correlations/relationships and justify any deviations from simple unit area runoff relationships in the estimation of baseline water quantity values for the Project hydrometric stations. Constructing records from records that are themselves constructed is not recommended.</p> <p>3. If baseline water quantity metrics need to be revised, discuss (if any) resulting changes to the effects assessment.</p> | | Accepted |
| IR-103 | - | ECCC CNSC | Fish and fish habitat | Section 8.1.3.4 Climate Change Influenced Extreme Events | <p>Context: The Proponent notes that Intensity duration frequency (IDF) curves are used to estimate the size of water management structures around a site and that the IDF curves are often specific to climate monitoring stations.</p> <p>The Proponent used the IDF_CC Tool 5.0 developed by the Institute for Catastrophic Loss Reduction (2021) which generates Intensity Duration Frequency (IDF) curves at ungauged locations in order to estimate future IDF curve values under influences of climate change. This tool generates sub-daily values at ungauged locations by interpolation and distance weighing from gauged locations.</p> | Provide the gauged stations used to generate the sub daily duration values found in Table 8.1-6: Baseline of Intensity Duration Frequency data. | <p>See AD-73 in the Advice to Proponent table [reference to come].</p> <p><u>Note to Denison:</u> This IR is conditionally accepted. Denison’s commitment to providing the requested information related to the IDF (1 in 100 year 24-hour rainfall) and demonstrate climate change resilience of the project (conduct climate risk and resilience assessment) during licensing should be captured in the Commitments Register. Once Denison has added a commitment related to updating the IDF (1 in 100 year 24-hour rainfall) and demonstrate climate change resilience of the project (conduct climate risk and resilience assessment) in the Commitments Register, this can be accepted.</p> <p><u>Proposed rationale text for posting:</u> <i>This IR has been accepted for the purposes of the current</i></p> | Accepted |

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| | | | | | <p>Rationale: IDF trends exhibit random behavior at some locations and correlated behavior at other locations. The choice of gauged locations will infer the statistics for the ungauged locations, including the IDF trends. Without identification of the gauged locations, it is not possible to assess if the modelled data is realistic or not. If the modelled data is not accurate the design of water management structures on the site may not be sufficient resulting in the potential for impacts to the Project from flooding or extreme weather events.</p> | | <p><i>EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> <p>In the Context and Rationale of AD-15 in the Annex 1 – Denison Response, ECCC recommends that the Proponent consult CSA PLUS 4013:19 (2019) <i>Technical guide: Development, interpretation and use of rainfall intensity- duration-frequency (IDF) information: Guideline for Canadian water resources practitioners</i> regarding the consideration of future changes in short-duration precipitation extremes. In IR-103, ECCC indicated that in order to assess the accuracy of the Intensity duration frequency (IDF) curves, ECCC required that the Proponent provide the gauged stations generating the values for the modelled data. The Proponent provided the closest gauged stations, however, the future short duration precipitation values were based on statistical relationships fitted between local scale observed extreme precipitation and modelled simulations extremes.</p> <p>Additionally, REGDOC-2.9.1 (Appendix 1A) stipulates that “<i>The applicant shall also take into account any potential effects of climate change on the project, including an assessment of whether the project might be sensitive to changes in climate conditions during its lifecycle</i>” and Section 5.1.5 of “ECCC’s <i>Strategic Assessment of Climate Change</i>” states “<i>All proponents will be required... to provide information in the Impact Statement on how the project is resilient to and at risk from both the current and future impacts of a changing climate.</i>” CNSC staff review of Section 15.3.2, 15.4.2 and 15.5.3 of the draft EIS show that the vulnerabilities of the project (infrastructures and project activities) and the associated risk (likelihood and consequence) due to potential increase in climate change hazards (in Section 15.3.2 and 15.4.2) due to climate change throughout the life cycle of the project is not presented in detail. It is also not clear from Section 15.4.2 that the mitigation measures in Table 15.4-1 have considered the additional risk due to the impact of climate change. On page 15-19 of the draft EIS states that: “Denison will apply adaptive management that includes monitoring climate factors so that they can proactively mitigate or prevent adverse climate effects on the Project.” Denison did not provide details on how climate factors will be considered within their adaptive management plans.</p> <p>Rationale: Estimates of future short duration precipitation that are based on statistical relationships fitted between local scale observed extreme precipitation and modelled simulations extremes, such as the approach used by the Proponent, are unlikely to provide reliable projections. This is because the amount of information regarding changes in local-scale observed extreme precipitation contained in short records is not sufficient to constrain a regression (model the statistical relationship) between local and larger scale simulations (Li et al., 2019; ECCC 2022). An alternative approach is to base future projections on a comprehensive assessment that integrates climate science understanding and model projections over a large region. The recent Canadian Standards Association (CSA 2019) guidance on IDF for Canadian Water Resources practitioners provides such an assessment. In terms of adaptive management, the Proponent should clearly outline what climate factors will be monitored to mitigate or prevent adverse climate-related effects. This should include information on when and how the climate factors would be monitored and under what circumstances particular adaptive management approaches would be applied. In addition, considering anticipated project life of 37 years, the climate-infrastructure interactions should be assessed to identify climate vulnerabilities of project infrastructures and operations/activities for all phases of the project. This allows climate risk evaluations and</p> | |

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| | | | | | | | <p>propose adaptation measures accordingly. It is difficult to determine how potential changes in future climate will affect project infrastructures and operations/activities and the associated risk (likelihood and consequences) based on the information provided in Section 15.5.3 (p.15-19) of Draft EIS.</p> <p>In order to assess the Proponent’s adaptive management strategies for future extreme precipitation events, ECCC requests that the Proponent consult the CSA (2019) guidance when using future IDF projections in the Project design and provide revised estimates of the potential future changes in short-duration precipitation extremes over the Project’s duration.</p> <p>1. Provide revised estimates of the potential future changes in short-duration precipitation extremes over the Project’s duration as relevant to the Project design.</p> <p>2. Demonstrate how the CSA (2019) guidance will be incorporated in the Project design when developing and considering future IDF projections and estimates of the potential future changes in short-duration precipitation extremes.</p> <p>3. Demonstrate project resilience to climate change (considering all potential climate sensitive natural hazards including hazards in Section 15.3.2 and 15.4.2) by conducting climate change risk and resilience assessment that includes risk treatment/adaptation measures. CNSC staff recommends proponent to utilize “ECCC (2022). <i>Draft technical guide related to the Strategic Assessment of Climate Change: Assessing climate change resilience</i>” as a guide. Other recommended best practice guides include “<i>Infrastructure Canada (2023). Climate Lens General Guidance – Version 2.1. Infrastructure Canada - Investing in Canada Infrastructure Program Climate Lens - General Guidance</i>” and “<i>MAC (2021). Guide on Climate Change Adaption for the Mining Sector. Mining Association of Canada (MAC)</i>”.</p> <p>References CSA Group. (2019). Technical guide: Development, interpretation and use of rainfall intensity-duration-frequency (IDF) information: Guideline for Canadian water resources practitioners. <i>CSA PLUS 4013 :19</i>. https://www.csagroup.org/store/product/2703080/, ECCC (2022). Draft Technical guide related to the Strategic Assessment of Climate Change: Assessing climate change resilience. https://www.strategicasessmentclimatechange.ca/28896/widgets/117114/documents/77106 Li, C., Zwiers, F., Zhang, X., & Li, G. (2019). How much information is required to well constrain local estimates of future precipitation extremes? <i>Earth’s Future</i>, 11-24.</p> | |
| IR-104 | - | ECCC | Fish and fish habitat | <p>Section 8.1.3.4.2 Probable Maximum Precipitation (PMP) Events</p> <p>Appendix 8C</p> | <p>Context and Rationale: The Proponent notes: “The probable maximum precipitation (PMP) event is a design standard value for an extreme rainfall event. The PMP event does not have an estimated return period but is instead based on the theoretical maximum amount of water that a storm could produce based on the maximum persisting dew point.”</p> <p>The Proponent provides a PMP value of 489.3 mm, which is based on data and methodologies available in 1999, taken from the</p> | <p>1. Provide a revised PMP value (using up to date data) or justify the use of a PMP that is based on data and methodologies from 1999 as opposed to a more recent time series analysis.</p> <p>2. Describe the alternative methods for determining PMP values that were considered. Include descriptions of both “statistical” outcomes and “rational” outcomes as applicable.</p> <p>Technical Discussion Required: Yes</p> | <p>Response to IR-104 is accepted by CNSC staff based solely on the Denison’s response (E-DOC#-7220826, p.47/112) that states “<i>Despite Denison’s reiteration that the PMP is adequate for the EA level design basis, Denison is committed to revisiting the estimates per CNSC’s recommendations, as applicable, for the licensing phase of the Project.</i>”</p> <p><i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> | Accepted |

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| | | | | | <p>Atmospheric Environment Branch Report (1999), Report Number AHSD-R99-01. The Proponent references Appendix 8C for details. Appendix 8C contains no supplementary information other than what is already provided in Section 8.1.3.4.2.</p> <p>The assumptions and methodologies presented in the report are the results of time series analyses available in 1999. As time series evolve so do the derived statistics. In order to assess potential flood risks and impacts to the Project from flooding, data that is current and representative of the changing climate is needed. The Proponent should explain why they've used data from 1999 rather than using up to date data, describe what alternative methods for determining PMP they have considered, and describe how they will support their use of 489.3 mm as a PMP, or describe how they will generate a refreshed PMP. The main factor that influences the statistical data output is the length of the time series hence the reason to keep the statistical data. The PMP values can be substantially (>10%) different if two decades of data is used in the statistical analysis.</p> | | <p>There are an additional 24 years of meteorological datasets since the 1999 study thus all historical rainfall extremes including those since 1999 study should be considered to estimate up to date PMP at the Project site The proponent's justification on whether the 1999 or 1994 PMP estimates are current and conservative should be substantiated based on meteorological data analysis. An estimation of updated PMP is achievable by the proponent as meteorological data is freely available and accessible from ECCC and the proponent should provide a revised PMP.</p> <p>The Proponent should also clarify how recent the data used to calculate the PMP or the time series is and explain the use of an older data set that will not produce as accurate of a PMP value as a more recent data set would produce, even when estimates are conservative.</p> <p>Specifically, a. Explain the rationale for the use of the data set which was used to derive the PMP. B. Clarify if the PMP and/or the time series was calculated using more recent data.</p> <p>This will allow for an accurate evaluation of the validity of results derived from the data sets selected by the Proponent.</p> | |
| IR-105 | - | Directorate of Fisheries and Oceans (DFO) | Fish and fish habitat | <p>Section 8.1.4.1, Potential interactions between project and valued component/key indicators Surface Water Quantity</p> <p>Section 8.1.4.2.2, Surface Water Taking</p> <p>8.3.4.1, Potential interactions between project and valued component/key indicators</p> | <p>Context: Table 8.1-8 and Table 8.3-6 in the EIS indicates a potential for freeze wall operation to influence groundwater interactions and surface water quantity and as a result, impact fish and fish habitat. Section 8.1.4.2.2 references Section 7 Geology and Groundwater for details on potential impacts. In addition, IR-63 notes the groundwater model does not describe the pathway in which groundwater would pass around the freeze wall during operation and any resulting potential effects on groundwater discharge to Whitefish Lake.</p> <p>Rationale: As per IR-63, the groundwater model analysis is insufficient to make conclusions on the potential effects of the freeze wall on groundwater discharge into Whitefish Lake. DFO requires this information to fully understand if altered groundwater regimes will result in changes to Whitefish Lake water levels and any potential impacts to fish and fish habitat as a result of changing water levels.</p> | <p>1. Provide a more fulsome analysis of the potential impact of freeze wall operations on local and semi-regional groundwater regimes, and subsequently to fish and fish habitat within Whitefish Lake. The analysis should provide a rationale of how the scope of the groundwater model is relevant to and able to detect changes at the scale of fish and fish habitat.</p> <p>2. If impacts to fish and fish habitat in Whitefish Lake are predicted to occur due to changes in the groundwater regime, describe any mitigation measures that could be used to avoid these impacts.</p> <p>3. If impacts are predicted that cannot be avoided, characterize residual effects on fish and fish habitat.</p> | | Accepted |
| IR-106 | - | CNSC | Change to an environmental component due to hazardous contaminants | Section 8.1.4.2.3, Surface Water Discharge | <p>Context: It is stated in this section under construction that all site contact water will be held in the Clean Waste Rock Pond.</p> <p>Rationale: It is unclear from this section what will happen to the contact water held in the Clean Waste Rock Pond, and whether it will be removed from site or released at a later time. What is the contingency plan if more contact water is produced during construction than the Clean Waste Rock Pond has capacity for.</p> | <p>Please indicate what will happen to the contact water stored in the Clean Waste Rock Pond during construction activities, will it be released after the wastewater treatment plant is installed? Further, please describe the contingency plan if contact water produced exceeds estimates and will exceed the volume of the clean waste rock pond?</p> | | Accepted |

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| IR-107 | - | CNSC ECCC | Aquatic environment | Section 8.2.3.3, Existing Surface Water Quality | <p>Context: Under the methodology and metrics section (8.2.3.1) it is stated baseline water quality was sampled in 2016, 2018, and 2019. Looking at the data in Appendix A of Appendix 8D it seems that some waterbodies have little data available for baseline characterization. For example, Whitefish Lake only has 3 and 5 samples taken between its two sample stations, with sampling frequency seeming intermittent.</p> <p>Rationale: The amount of data available for baseline water quality characterization does not seem sufficient to adequately characterize the baseline and the variation it would experience. An effective baseline characterization is vital to ensure water quality is indeed not being affected by the Project. In addition, it is not clear if data quality objectives were applied to determine baseline information was adequate.</p> <p>To meet CEAA 2012 requirements, and CNSC expectations outlined in REGDOC 2.9.1, Environmental Principles Assessments and Protection Measures, the applicant is required to complete a characterization of the baseline environment.</p> <p>As described in REGDOC 2.9.1 Appendix B.2, Characterization of the Baseline Environment for Environmental Assessment Under CEAA 2012, the “baseline information should be sufficient to support the use of an aquatic dispersion model to conduct the site-specific ERA and to support an assessment of the effects of the environment on the facility or activity”</p> <p>In addition, the “applicant or licensee should include an assessment of any limitations or gaps in the quality and extent of baseline data and methods, as well as the method(s) by which they have been addressed.”</p> | <p>Please clarify which data quality objectives were used for the baseline characterization data. Please provide justification whether the number of datapoints collected with inconsistent frequency in baseline surface water characterization is sufficient to meet data quality objectives and to adequately characterize the baseline, and whether Denison is confident that the data collected is enough for a robust water quality baseline characterization.</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends that additional water samples are collected and analyzed at a consistent frequency to ensure a robust baseline</p> | <p>Before this IR is accepted, the Proponent is requested to provide the statistical correlation analysis to confirm that data is correlated.</p> <p>Additionally, the four expectations set out in the rationale for status have not been adequately responded to. The Proponent should incorporate the following information into the EIS and ERA:</p> <ol style="list-style-type: none">1. Provide raw baseline data (perhaps in an appendix).2. Provide summary statistics for baseline datasets, which at a minimum should include: mean, standard deviation, 95th percentiles, minimum, maximum, and number of samples. Present summary statistics by season (i.e., freshet, summer, fall and under-ice), and include comparisons to relevant water quality guidelines.3. Identify potential gaps in baseline datasets, and indicate how data gaps will be addressed. Describe the planned baseline monitoring to be conducted including, but not limited to, addressing any data gaps.4. Demonstrate that the combined existing baseline data and planned baseline monitoring will yield dataset(s) that provide robust water quality baseline characterization of seasonal conditions (i.e., freshet, summer, fall, under-ice during winter), including a range of flow conditions. <p>The Proponent should also incorporate the additional baseline data collected into the analysis and conclusions of the finalized EIS and ERA.</p> <p>Concerning the other aspects of the IR, these responses are accepted based on Denison’s commitment to conduct periodic sampling prior to construction to strengthen existing environmental data. CNSC staff will review this information to ensure EA predictions remain valid and recommend collecting samples in the fall to spring timeframe, as samples from these seasons is sparse in the current dataset.</p> | Not Accepted |
| IR-108 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.3.3 Aquatic Environment | <p>Context: Tables 8.2-2 and 8.2-3 provide summaries of the baseline surface water quality in the LSA. No justifications for the selection of water quality guidelines have been provided. COPCs that require calculations based on other parameters such as hardness, pH, or temperature to derive guidelines (i.e., ammonia, cobalt, zinc, etc.) should be indicated within the table, with a note specifying the parameter values used in the calculations, so that thresholds may be confirmed. No baseline data for un-ionized ammonia has been provided, which is a Schedule 4 substance requiring monitoring under the MDMER. For cobalt, manganese, and vanadium, Federal Environmental Quality Guidelines (FEQGs) and/or CCME Canadian Water Quality Guidelines (CWQGs) for the Protection of Aquatic Life have not been included. A guideline of 26 mg/L has been provided</p> | <p>1. Update Tables 8.2-2 and 8.2-3 to include all COPCs that require effluent characterization and receiving environment monitoring under the MDMER.</p> <p>2. Update Tables 8.2-2 and 8.2-3 to include missing or corrected water quality guidance thresholds, and information on values used to derive thresholds for COPCs that are dependent on general parameters.</p> | <p>The IR has only been partially resolved. In item one, temperature is still missing from updated tables in attachment IR-108, 8.2-2 and 8.2-3. The Proponent should add this to the tables.</p> <p>In item two, Tables 8.2-2 and 8.2-3 still contain numerous incorrect guidelines. Additionally, the information on values used to derive thresholds for COPCs that are dependent on general parameters contain inconsistencies which should be corrected or explained.</p> <p>The table does not specify if metal concentrations are total or dissolved. The long-term benchmark column includes both guidelines for dissolved metals (e.g. aluminum, manganese) and total metals (e.g. iron, selenium). The table should be updated to clarify if metal concentrations are total or dissolved and include the appropriate benchmarks.</p> | Not Accepted |

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| | | | | | <p>for molybdenum as a Saskatchewan Environmental Quality Guidelines (SEQG), however the actual SEQG is 31 mg/L and the CCME CWQG is 0.073 mg/L.</p> <p>Rationale: In order to assess potential changes to surface water quality from Project related activities, ECCC requires that data on all parameters that require MDMER effluent and receiving environment monitoring be provided for assessment, including accurate water quality guidelines where available.</p> | | <p>For metal parameters, for which guidelines are dependent on environmental modifying parameters, site specific environmental parameters should be used to select the most appropriate guideline. Specific inconsistencies noted are:</p> <ul style="list-style-type: none">Aluminum – guideline may change depending on site specific pH.Ammonia (as N) – should be calculated at site specific pH and water temperature reached during the summer.Ammonia (un-ionized) – The CCME long-term guideline is 0.019 mg/L, so the reference is incorrect.Boron – The CCME has both short- and long-term guidelines for total boron (29 & 1.5 mg/L) which should be included in the tables.Chromium – The type of chromium should be specified. The benchmark specified is the CCME guideline for hexavalent chromium, it is not clear if this was also used for the measured concentrations.Cobalt – The FEQG added as a benchmark includes a specific hardness range and does not apply to the soft waters found on site and should be removed. The guideline is for water with hardness between 52-396 mg/L and table footnote #2 states: <i>“Site-specific hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6).”</i>Copper - the CCME guideline applied for copper is out-dated (1987) and does not reflect the current state of science. The FEQG for copper (2021) reflects the current science utilizing the biotic ligand model and is a more appropriate screening criterion.Dissolved phosphorous & phosphorous – Table footnote #17 states the guidelines for a meso-eutrophic waterbody were used. Use of this guideline should be justified because all sample locations except one had non-detectable phosphorous and dissolved phosphorous concentrations with a detection limit on the upper end of the oligotrophic cutoff, indicating oligotrophic status. Though dissolved phosphorous concentrations were detected at site LB-2, phosphorous concentrations at this site were not detectable, which suggests issues with the measurements. These measurements are therefore not reliable enough to base a trophic status for the region.Manganese – Table footnote #3 states pH of 7.5 and hardness of 15 mg/L were used to calculate the benchmark for dissolved manganese. Justification is required for using a hardness above the site-specific hardness used in footnote #2 (5.26 mg/L) and site-specific pH should be used.Nickel – The long-term benchmark has been changed from the CCME guideline of 0.025 mg/L total nickel to the WHO drinking water guideline of 0.070 mg/L. It is noted that a drinking water quality guideline may not be protective of aquatic life and the more stringent CCME guideline for the protection of aquatic life is the more appropriate benchmark for the receiving environment so the original benchmark should be retained.Strontium – The guideline added for strontium (205 mg/L) is incorrect. The FEQG for dissolved strontium is 2.5 mg/L | |
| IR-108 | IR-108-R1 | ECCC | Change to an environmental component due to | Section 8.2.3.3 Aquatic Environment | Context: Incorrect benchmark environmental quality guidelines and guidelines that cannot be verified remain within the updated Tables 8.2-2 and 8.2-3 provided in the Proponent’s response. The Proponent provided an Aluminum Saskatchewan Environmental Quality Guidelines (SEQG) value of 0.005 mg/L in both tables. This | 1. Update Tables 8.2-2 and 8.2-3 to include footnotes with the concentrations of environmental modifying parameters such as pH, hardness and DOC used to derive guidelines for Aluminum, Cadmium, Copper, Lead, Manganese, Nickel and Zinc. | Item one has been partially addressed, but additional corrections to the footnotes of Tables 8.2-2 and 8.2-3 are needed for copper, manganese, nickel and zinc. Additionally, table footnote #9 does not specify the DOC, pH or hardness values used to calculate the dissolved zinc benchmark. The Proponent should provide the corrections to Tables 8.2-2 and 8.2-3, as well as | Not Accepted |

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| | | | | IR-108 Response from Denison | <p>is incorrect and appears to be the guideline for irrigation, not the guideline for protection of aquatic biota. The Proponent provided a Molybdenum SEQG of 26 mg/L in both tables. This value is incorrect. The correct SEQG for Molybdenum is 31 mg/L and the Canadian Water Quality Guideline (CWQG) is 0.073 mg/L. The Proponent provided a Nitrate SEQG of 13.29 mg/L in both tables. This value is incorrect. The correct SEQG for Nitrate is 3 mg/L and the CWQG is 13 mg/L.</p> <p>Rationale: In order to verify the benchmark environmental quality guidelines that are calculated based on environmental modifying factors such as pH, hardness and dissolved organic carbon (DOC), the specific concentrations of these environmental modifying parameters used in the calculations must be provided. Additionally, incorrect benchmarks for Aluminum, Molybdenum, and Nitrate remain within the updated tables provided by the Proponent. No benchmark was provided for Manganese. It is not clear if Total Chromium or Hexavalent Chromium was measured as the table does not specify, and the benchmark provided was for Hexavalent Chromium. This information is required to understand potential changes to surface water quality from Project related activities and facilitate threshold confirmation. Use of the incorrect threshold could allow for effluent to be discharged at the wrong concentration.</p> | <p>2. Update Tables 8.2-2 and 8.2-3 to include the correct benchmark guideline value for Aluminum, Molybdenum and Nitrate. Include the concentrations of environmental modifying parameters needed for deriving guidelines. If the most stringent guideline value is not selected for use, provide a rationale for use of the chosen guideline.</p> <p>3. Update Tables 8.2-2 and 8.2-3 to include the calculated guideline value for manganese and the environmental modifying parameter concentrations used to calculate the guideline. A benchmark environmental quality guideline has not been provided for Manganese, however a chronic CWQG guideline exists that can be derived based on environmental modifying parameter concentrations.</p> <p>Update Tables 8.2-2 and 8.2-3 to specify if Total Chromium or Hexavalent Chromium was measured.</p> <p>See also related IR-115-R1.</p> | <p>specify the DOC, pH and hardness values used to calculate the dissolved zinc benchmark. Follow up to items two and three can be found under IR-108.</p> | |
| IR-109 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.1.1 Aquatic Environment | <p>Context: In this section it is stated “Treated water from the IWWTP will be pumped to the three Effluent Monitoring and Release Ponds (each 3,300 m3). These ponds will be designed to hold effluent for 72 hours for testing before discharge to the environment” (p. 8-75). It is unclear what procedure will be followed if effluent in monitoring ponds does not meet discharge requirements following testing.</p> <p>Additionally, it is also stated that “Treated water in the Effluent Monitoring and Release Ponds will be monitored prior to release to a surface waterbody or injected into groundwater via deep well injection.” However, the MDMER pursuant to the Fisheries Act requires all mine effluent and seep. From the mine site that contain deleterious substances be discharged through a final discharge point.</p> <p>Rationale: In order to fully understand effluent management, more information is required regarding the procedure for managing effluent in monitoring ponds that does not meet discharge requirements. It is unclear how effluent that does not meet discharge requirements will be managed if it needs re-treatment and re-testing prior to discharge.</p> | Provide further information regarding management of effluent in monitoring ponds that does not meet the requirements for discharge under the MDMER. | | Accepted |

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| | | | | | ECCC reminds the Proponent that Project effluent from all final discharge points must meet federal legislation requirements. | | | |
| IR-110 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.1.1 Aquatic Environment Appendix 8-E, Section 2.1 | <p>Context: It is stated that the diffuser at the final effluent discharge point will be located in approximately 3m of water. However, in Figure 8.2-5 displaying the location of the proposed diffuser and lake bathymetry, the diffuser location seems to be located in 2-2.5m of water. A similar image in Figure 1 Section 2.0 of Appendix 8-E also indicates that the diffuser seems to be located in 2-2.5m of water. Additionally, while thermal effects are unlikely, this cannot be confirmed until a more detailed diffuser design is provided for review.</p> <p>Updated Rationale: The Proponent should confirm the location and depth of the proposed diffuser in order to confirm that modelling predictions for effluent discharged into the receiving environment are accurate.</p> <p>A review of the final discharge design is necessary to confirm the location and depth of the proposed diffuser and modelling predictions for effluent discharged into the receiving environment.</p> | <p>Provide confirmation of the diffuser depth and location.</p> <p>ECCC requests the opportunity to review the finalized diffuser design once it is available.</p> | <p><u>Note to Denison:</u> This IR Is still under discussion, but the expected path forward is conditional acceptance, with a commitment from Denison that it be captured in the Commitments Register that the final diffuser configuration will not change the environmental assessment conclusions of risk to aquatic receptors and that water quality will remain below guidelines.</p> <p>With this commitment, it would be expected that any outstanding issues (ie. if there are deviations from predicted effluent and near-field surface water concentrations of COPCs and risk to aquatic receptors due to the finalized diffuser design) will be further assessed as part of licensing technical reviews, prior to the granting of a license.</p> | Accepted |
| IR-111 | - | CNSC | Fish and fish habitat | Section 8.2.4.2.2, Controlled Discharge | <p>Context: This section of the EIS indicated that the scenario was assessed using a conservative assumption of a continuous freshwater withdrawal rate of 40.5 m3/hr, and a continuous effluent discharge rate of 81.0 m3/hr.</p> <p>Rationale: The withdrawal rate assessed is half of the effluent rate, it is unclear from the text where the other half of the volume of effluent is coming from, if not drawn from the lake.</p> | Please clarify where the other half of the total volume of effluent discharged is from in the water balance between water intake and effluent. | | Accepted |
| IR-112 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.2.2, Aquatic Environment Appendix 8-E, Section 1.2.1 Appendix 10-A (ERA), Section 3.1 | <p>Context: This section of the EIS states that, “for the purpose of assessing the scenario of greatest potential effects, the Project was assessed as having a continuous freshwater withdrawal rate of 40.5 m³/hr and a continuous effluent discharge rate of 81.0 m³/hr.” (p. 8-21)</p> <p>However, several sentences later it is stated that, “The approach to assessing Project-related effects on the Surface Water Quality VC was conservative for the following reasons: The assessment was based on a continuous (year-round) discharge rate at an expected average effluent discharge of 0.0101 m3/s (or 36.5 m3/hr) throughout Construction, Operation, and Decommissioning...”</p> <p>This is a continuous theme throughout Section 8, Aquatic Environment, where the discharge rate for the surface water quality</p> | <p>1. Confirm that the surface water quantity, quality, and aquatic biota risk assessments and modelling, were conducted using the discharge rate for 36.5 m3/hr within the draft EIS.</p> <p>2. Revise any statements or conclusions in the draft EIS to improve clarity about the usage of the maximum upper bound discharge rate of 81 m3/hr. Remove statements regarding use of the discharge rate of 81 m3/hr during modelling and risk assessments to the receiving environment as needed.</p> | | Accepted |

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| | | | | | <p>assessment changes between 36.5 m3/hr and 81.0 m3/hr. However, in Appendix 10-A (ERA) the 36.5 m3/hr discharge rate is the only value used for the near and far-field modelling.</p> <p>It should be made clear in the main body of the draft EIS that the average effluent discharge rate of 36.5 m3/hr has been used as the input for the near- and far-field modelling for effluent, surface water and sediment quality predictions. The maximum upper bound discharge rate is 81 m3/hr; however, modelling for effluent, surface water and sediment quality was not completed for this discharge rate.</p> <p>Rationale: It remains unclear throughout the draft EIS that all predictions of COPC concentrations in effluent, and receiving environment surface water and sediment are based upon the effluent discharge rate of 36.5 m3/hr, and not the maximum upper bound discharge rate of 81 m3/hr. All conclusions about risk to the environment and aquatic and terrestrial biota must make this clear. If the Proponent wishes to make conclusions based on the maximum upper bound discharge rate of 81 m3/hr, modelling needs to be conducted using this rate of discharge.</p> | | | |
| IR-113 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.2.3 and Section 8.4.7.6, Aquatic Environment | <p>Context: No quantitative assessment of climate change has been conducted. Representative concentration pathways (RPC) projections for climate change have not been integrated with near- and far-field modelling to assess impacts to surface water quality or sediment quality in the future.</p> <p>Rationale: Changes in air and water temperatures, precipitation, snow melt, ice formation, etc., due to climate change can all influence COPC concentrations in surface water and sediment. It is not possible to assess the potential impacts from climate change on predicted surface water and sediment COPC concentrations with the current information.</p> | Provide a quantitative analysis of the potential impacts of predicted COPCs from mine effluent to surface water and sediment quality with climate change scenarios for the Project lifespan incorporated into modelling. Include modelling predictions regarding the influence of changes to air and water temperatures, precipitation, snow melt, ice formation, etc., on COPC concentrations in surface water and sediment. | <p>The Proponent has not adequately responded to the IR. The Proponent suggests that the requested quantitative analysis is not necessary and contends that potential climate change effects on water quality should instead be addressed through mitigation measures, monitoring and adaptive management.</p> <p>The Proponent’s approach does not sufficiently characterize the range of potential effluent and water quality predictions. Climate change analysis is lacking, and a sensitivity analysis was not conducted in order to further understand uncertainty and drivers of the model results. Further, some aspects of water quality modeling are not sufficiently conservative, including use of the geometric mean (instead of the 95th percentile) as the baseline concentration for constituents, and pooling data from all lakes, which would mask any differences between the lakes.</p> <p>It is therefore not known whether water quality exceedances may be predicted under climate change scenarios. Without estimating the potential influence of climate change on water quality, it is unclear whether the proposed water quality mitigation measures are adequate.</p> <p>The Proponent should conduct a sensitivity analysis on water quality predictions for low and high precipitation scenarios, including the potential influences of climate change to assist in fulfilling the IR from the previous round.</p> <p>This information is required to assess the potential for significant adverse effects to the environment. If additional baseline information is required, it should be sourced or otherwise collected.</p> | Not Accepted |

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| IR-113 | IR-113-R1 | ECCC | Fish and fish habitat | Section 8.2.4.2.3 and Section 8.4.7.6, Aquatic Environment IR-113 Response from Denison | <p>Context: The Proponent states the following, “The PMP is very conservative (e.g., assumes effectively a full year of precipitation in one event) under both existing and future conditions (climate change)”. This statement suggests that the PMP value utilized considers future climate changes such as possible changes in the frequency or intensity of extreme precipitation events.</p> <p>Rationale: As noted by the Proponent, increases in extreme rainfall are anticipated with a warmer climate. For precipitation extremes across Canada, the relative change in event frequency is expected to be larger for more extreme and rarer events. Given that the extreme precipitation is expected to intensify in the future (Kunkel et al. 2013), the Proponent should consider how these potential changes will influence design values such as PMP.</p> | <p>Clarify if climate change has been considered in the PMP value provided. If it has not been considered, discuss how potential increases in PMP have been and/or need to be considered in the Project design.</p> <p><u>Reference</u> Kunkel, K., Karl, T. R., Easterling, D. R., Redmond, K., Young, J., Yin, X., & Hennon, P. (2020). Probable maximum precipitation and climate change. <i>Geophysical Research Letters</i>, 1402-1408.</p> | <p><i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> <p>The Proponent has not clarified if climate change has been considered in the PMP value provided or discussed how potential increases in PMP have been or need to be considered in the Project design.</p> <p>Thermodynamic effects on atmospheric moisture will lead to intensification of local extreme precipitation in the future. Probable maximum precipitation (PMP) is defined as the greatest accumulation of precipitation for a given duration meteorologically possible for an area (Kunkel et al., 2013). PMP values may increase with climate change.</p> <p>In the response to IR-113 R1, the Proponent states that “the design basis PMP is robust and inclusive of projected total annual precipitation under a high carbon scenario”. It is unclear from this statement how the analysis provided indicates that the PMP is inclusive of climate change.</p> <p>The Proponent should clarify how the analysis that they provided shows that the design PMP considers climate change, and indicate if or how the potential for increased PMP has informed site water management for the mine life and into post-closure and considered in the development of mitigation measures.</p> <p>Reference: Kunkel, K. E., Karl, T. R., Easterling, D. R., et al. 2013. Probable maximum precipitation and climate change. <i>Geophysical Research Letters</i> 40(7), 1402–1408. Available at: 10.1002/grl.50334</p> | Accepted |
| IR-114 | - | ECCC CNSC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.2.3 and Section 8.2.4.2.4 | <p>Context: Tables 8.2-9, 8.2-10 and 8.2-13 demonstrate predicted maximum effluent concentrations of COPCs and maximum predicted receiving environment concentrations in the near- and far-field. General parameters such as temperature, pH, conductivity, etc. that would require Project thresholds and monitoring under the MDMER have not been provided in this table. Lead, nickel, TSS and un-ionized ammonia were not provided, despite all being Schedule 4 substances with maximum monthly concentrations under the MDMER. Aluminum, iron, nitrate, thallium, and manganese have not been provided despite being required parameters under Schedule 5 Section 4 of the MDMER for effluent characterization.</p> <p>For zinc, it is unclear how guidelines have been calculated when CCME thresholds can only be derived with hardness values <250 mg/L. Additionally, water quality thresholds appear to have been calculated using estimated effluent concentrations rather than receiving environment baseline concentrations.</p> | <p>1. Update all tables to include all COPCs with required monitoring under the MDMER including acute and chronic thresholds.</p> <p>2. Ensure all selected water quality thresholds are derived using baseline receiving environment concentrations and use water quality guidelines that are protective of aquatic biota.</p> <p>3. Provide baseline data on the concentrations of methylmercury in surface water, sediment and fish tissues (i.e., large-bodied sports fish and small-bodied forage fish) in the LSA and RSA receiving environment to establish a baseline prior to potential Project impacts.</p> <p>4. Provide an assessment of risk from methylmercury to ecological receptors due to changes in sulphate concentrations in effluent, and potential deposition of mercury from Project related atmospheric emissions in the receiving environment.</p> | <p>The Proponent has responded fully to items two and four of the request. Regarding item one, further corrections to Table 8.2-13 are necessary:</p> <ul style="list-style-type: none">There are several inconsistencies in the footnotes:<ul style="list-style-type: none">numbers 2 & 3 are missing in the footnotes at the bottom;there is no reference to footnote 2 in the table; andThe asterisk “*”, which is sometimes used to qualify the source of screening concentration, is not defined.Screening criteria are missing for aluminum and iron, and should be sourced from CCME or SEQG rather than the MDMER as listed in the table.Uranium-234 and uranium-238 are missing from the table, even though they have been identified as contaminants of potential concern.Proposed screening criteria for cobalt, copper, manganese, nickel, phosphorous and un-ionized ammonia are inadequate, see comment in IR-108 & IR-108-R1.Alkalinity and nitrate have been added to the table as requested, however predicted maximum concentrations are only presented for Whitefish Lake Middle and South. The proponent should describe why there are no estimates for these parameters in other lakes, and how they intend to fill these gaps. | Not Accepted |

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| | | | | | <p>Mercury has been identified as a COPC of interest to Indigenous groups for the proposed Project. Table 8.2-8 indicates that background concentrations of mercury in LA-5 are low, and predicted effluent concentrations are also low. However, no information has been provided on background methylmercury concentrations or expected atmospheric deposition of mercury from Project related emissions. Predicted effluent concentrations of 3915 mg/L of sulphate are quite high, and sulphate is known to increase mercury methylation rates in aquatic environments.</p> <p>Rationale: A review of all modelling results for all COPCs under the MDMER will assist ECCC in understanding the potential risks to the receiving environment. ECCC recommends the use of the most stringent guidelines for the protection of aquatic biota. All water quality thresholds should be derived from receiving environment parameters to determine any baseline receiving environment and effluent COPC exceedances of water quality thresholds.</p> <p>Increased sulphate availability can lead to increased methylation rates of mercury and methylmercury in sediment and surface water. Methylmercury is a toxin that can bioaccumulate within the food chain and present risks to aquatic biota and wildlife consuming aquatic biota. Potential changes to methylmercury concentrations in water quality, sediment and fish tissues should be assessed due to the proposed sulphate loadings in effluent.</p> <p>Additionally, in accordance with the MDMERs, Denison will be required to demonstrate that their effluent quality meets the limits in the MDMER. Denison is expected to provide the predicted effluent quality for lead, nickel, and un-ionized ammonia to demonstrate compliance with the MDMERs.</p> | | <ul style="list-style-type: none">Un-ionized ammonia appears in two separate lines in the table with concentrations differing by 3-4 orders of magnitude and different screening values. A single line entry with accurate values should be retained. The Proponent should provide an explanation for the error in order to give the reviewer confidence that the correct values are retained.The column with screening values does not always use the most conservative value from Table 8.2-8. See comment IR-115 for request to provide justifications. <p>Table 8.2-14 should be updated with corrections to screening criteria necessary for this IR as well as for IR-108 and IR-115. Additional follow up for Table 8.2-10 can be found under IR-108 and IR-108-R1.</p> <p>In the Proponent’s response to item three of the IR, Table 8.2-10 is missing the source for the short-term screening criteria value for arsenic. The Proponent should update Table 8.2-10 to include the source for the short-term screening criteria value for arsenic.</p> | |
| IR-115 | - | ECCC | Fish and fish habitat | <p>Section 8.2.4.2.3 Aquatic Environment</p> <p>Appendix 10-A (ERA), Section 3.1.1.1</p> | <p>Context: Table 8.2-8 demonstrates baseline concentrations of COPCs in LA-5 South Whitefish Lake, their respective water quality guidelines from applicable sources, and proposed Project thresholds. General parameters such as temperature, pH, conductivity, etc. that would require Project thresholds and monitoring under the MDMER have not been provided in this table. Lead, nickel, Total Suspended Solids (TSS) and un-ionized ammonia were not provided, despite all being Schedule 4 substances with maximum monthly concentrations under the MDMER. Aluminum, iron, nitrate, thallium, and manganese have not been provided despite being required parameters under Schedule 5 Section 4 of the MDMER for effluent characterization. Water quality thresholds appear to have been calculated using estimated effluent concentrations rather than receiving environment baseline concentrations. The water quality objective selected for molybdenum is the 31 mg/L SEQG rather than the CCME guideline</p> | <p>1. Update Table 8.2-8 to include all COPCs with required monitoring under the MDMER.</p> <p>2. Ensure all selected water quality thresholds are derived using baseline receiving environment concentrations and are at levels protective of aquatic life.</p> <p>3. Provide additional information to justify the use of the selected water quality guideline for molybdenum.</p> | <p>Please see the response to IR-115-R1 (below).</p> | Not Accepted |

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| | | | | | of 0.073 mg/L. Rationale: ECCC recommends the use of guidelines that will ensure the protection of aquatic biota. All water quality thresholds should be derived from receiving environment parameters to determine any baseline receiving environment and effluent COPC exceedances of water quality thresholds. | | | |
| IR-115 | IR-115-R1 | ECCC | Fish and fish habitat | Section 8.2.4.2.3 Aquatic Environment Appendix 10-A (ERA), Section 3.1.1.1 IR-115 Response from Denison | <p>Context: In the Proponent’s response to item two, it is mentioned that the derived water quality thresholds used in Table 8.2-8 and in the assessment (Section 8.2.4.2.3, Aquatic Environment; Appendix 10-A (ERA), Section 3.1.1.1) are based on hardness concentrations found in effluent. The Proponent mentions that hardness derived from IWWTP discharge will consider IWWTP discharge on the receiving environment and provide “a reasonable estimate of expected hardness in effluent”. However, this does not consider induced hardness (i.e., hardness concentration increases in the receiving environment over the lifecycle of the Project) from effluent contributions as a Project effect; the receiving environment baseline concentrations of hardness have been altered due to inputs from Project effluent. Providing only one estimate of expected effluent hardness in the receiving environment is not an appropriate means of conducting the effects assessment.</p> <p>Additionally, the following COPCs have not been included in the updated table provided in the Proponent’s response: un-ionized ammonia, aluminum, iron, manganese, thallium and total dissolved solids (TDS). It is noted that these COPCs are also subject to monitoring requirements under the <i>Metal and Diamond Mining Effluent Regulations</i> (MDMER).</p> <p>Rationale: Background concentrations of un- ionized ammonia, aluminum, iron, thallium, manganese and TDS are required to determine potential effects to the environment. The Proponent will also require this information to satisfy their obligations under the MDMER.</p> <p>The purpose of the surface water quality assessment is to determine if changes to the receiving environment over the project lifecycle will have significant adverse effects on biota. Changes from baseline in hardness concentrations in the receiving environment due to the deposition of effluent is a Project related effect and therefore providing a single baseline water quality threshold which is applicable only to one set of conditions is not an appropriate method to evaluate impacts across a shifting hardness baseline.</p> | <p>1. Update Table 8.2-8 to include the following COPCs: un-ionized ammonia, aluminum, iron, manganese, thallium and total dissolved solids (TDS).</p> <p>2. Update Table 8.2-8 to include background concentrations of total hardness (in mg/L CaCO3) in the receiving environment.</p> <p>3. Provide rationale that all selected water quality thresholds are derived using baseline receiving environment concentrations and are at levels protective of aquatic life.</p> <p>See also related IR-108-R1</p> | <p>The Proponent has not fully responded to the previous round’s IR. For items one and two, some of the information provided on contaminants of potential concern (COPCs) and the background concentrations of hardness in the receiving environment is not sufficiently conservative. Item three requested rationale that all selected water quality thresholds (i.e., screening criteria) are at levels protective of aquatic life, which was not provided.</p> <p>The updated Table 8.2-8 provides two short-term and two long-term screening criteria for each parameter. The screening criteria reflect calculated screening criteria for both background hardness and project-induced hardness, however, it is unclear which criteria the Proponent intends to apply in their assessment since four separate criteria are provided (see IR-114).</p> <p>The information presented in Table 8.2-8 indicates there are no background water quality exceedances of guidelines. However, it is noted that several screening criteria do not reflect the most conservative guidelines, which is not consistent with the approach described in Appendix 10-A (Environmental Risk Assessment). For some examples, the short-term screening criteria value of 500 mg/L for nitrate is much higher than the BC MOE nitrate guideline of 32.8 mg/L., the long-term criteria for un-ionized ammonia of 6.87 mg/L is much higher than the CCME guideline of 0.019 mg/L and the MDMER limit, and the long-term phosphorus screening criteria represent a trigger range that is two to three trophic levels above background, which is much higher than the CCME guidance framework recommends. The Proponent should review and update Table 8.2-8 to provide conservative screening criteria for all parameters, and include a consideration of the CCME, FEQG, SEQG, and BC MOE when selecting the screening criteria. Screening criteria selection should be informed by the most conservative guidelines. Cases where the Proponent does not propose to apply the most conservative screening criteria should be accompanied with a discussion and rationale for the selection. The Proponent should also specifically state which criteria will be used in screening, how these criteria will be or are applied, how the EA conclusions are informed by the criteria, and whether any EA conclusions are altered by changes to screening criteria.</p> | Not Accepted |

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| | | | | | Water hardness is an environmental modifying factor, various concentrations of hardness influence the toxicity of other COPCs in the aquatic environment. Using water quality thresholds that have been derived from high effluent hardness concentrations will not be protective of aquatic biota, particularly in the early stages of the project lifecycle when receiving environment water quality will be similar to baseline water quality. | | | |
| IR-116 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.2.5, Section 8.4.4.2.5 and Section 8.5.4.2.3 | <p>Context: Tables 8.2-14, 8.4-9 and 8.5-5 demonstrate predicted mass flux (in mg/s) of COPCs in groundwater during the future centuries scenario. The table does not provide any information on actual surface water concentrations of COPCs or accumulation in concentrations over time. It is not possible to determine what the COPC concentrations in surface water and sediment will be during the future centuries scenario with the current information.</p> <p>Additionally, only a subset of parameters have been provided in this table based on parameters that were elevated in effluent after treatment. Groundwater may have a variety of different COPCs with elevated concentrations as it will migrate directly from the ore body area and not receive treatment.</p> <p>Rationale: It is not possible for ECCC to assess the predicted concentrations of COPCs in surface water and sediment, and therefore risk to aquatic biota during the future centuries scenario with the provided information.</p> | <p>1. Provide the predicted water and sediment quality concentrations of COPCs in the receiving environment for the future centuries scenario.</p> <p>2. Include data for a greater suite of COPCs that were assessed as having potential to be at elevated concentrations in groundwater.</p> | | Accepted |
| IR-117 | - | CNSC | Human health with respect to hazardous contaminants | Section 8.2.4, Table 8.2-9 | <p>Context: CNSC staff note that some of the effluent quality predictions in the EIS are quite high for a uranium mine and mill facility compared to the existing facilities.</p> <p>For example, the upper bound effluent quality of molybdenum is 2.5 mg/L. In 2021, the highest monthly mean concentration at the existing uranium mine and mill facilities is 0.213 mg/L.</p> <p>Also, the upper bound effluent quality of copper is 0.022 mg/L. In 2021, the highest monthly mean concentration at the existing uranium mine and mill facilities is 0.002 mg/L.</p> <p>Rationale: Surface water quality models should be based on the anticipated effluent quality. From discussions with Denison, it appears that the effluent quality predictions may change based on the results of more bench scale tests that are still being conducted and continued optimization of the design of the water treatment plant.</p> | <p>Please provide the anticipated effluent quality of the constituents of potential concern during normal operations.</p> <p>Once Denison has refined the effluent quality predictions, Denison is expected to update the inputs into the surface water quality model.</p> | | Accepted |

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| IR-118 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.6.1, Section 8.4.6.1 and Section 8.5.6.1, Aquatic Environment | <p>Context: It is unclear if Tables 8.2-16, 8.4-12, 8.5-7 and 8.5-8 take into consideration potential effects from groundwater seepages of COPCS to surface water and sediment quality in the future centuries scenario. No information regarding the future centuries scenario has been provided in the rationale summary for ratings.</p> <p>Rationale: Groundwater seepage of COPCs may have future impacts to surface water quality, sediment quality and aquatic receptors; however, the extent of residual effects is unclear without further information.</p> | Provide further information regarding how groundwater seep. Of COPCs may have future impacts to surface water quality, sediment quality, and aquatic receptors, and any residual effects that may persist. | | Accepted |
| IR-119 | - | CNSC | Fish and fish habitat | Section 8.3.1.2, Table 8.3-1, Sediment quality | <p>Context: Sediment quality isn't considered a key indicator for fish and fish habitat, but the accumulation of contaminants in sediment porewater without habitat alteration is similar to the key indicator 'change in surface water quality from baseline conditions' that is considered.</p> <p>Rationale: It is not clear whether sediment was just considered for physical disturbance, and why chemical changes are missing from key indicator list for fish and fish habitat.</p> | Please provide the rationale for exclusion of sediment quality from the key indicator list for fish and fish habitat. | | Accepted |
| IR-120 | - | CNSC | Aquatic species | Section 8.3.3 and 8.5, Aquatic Environment | <p>Context: Although downstream impacts are not predicted by Denison it is important from an ecosystem perspective to establish baseline locations to monitor for potential cumulative effects to the aquatic environment due to the Key Lake and Wheeler River Operations to ensure the aquatic environment is being protected from cumulative impacts.</p> <p>Denison should consider adding a far-field exposure location and collecting baseline aquatic ecosystem baseline data in Russell Lake including:</p> <ul style="list-style-type: none">• Water quality/chemistry• Sediment chemistry/quality• Benthic invertebrate chemistry /community• Large-bodied fish tissue/chemistry <p>Rationale: Russell Lake is identified as part of the RSA for the aquatic environment, but it appears that no detailed aquatic baseline data was completed in far-field location in Russell Lake. In addition, several Indigenous Nations and communities and local resource users have indicated that Russell Lake is an important body of water both culturally for traditional use and was once used as commercial fishery.</p> | <p>If Denison has not collected baseline aquatic studies in the far-field downstream receiving environment of Russell Lake, please provide a rationale for why.</p> <p>If a far-field Russell Lake location was sampled as part of baseline data collection, more information about the process and results with regards to sampling at Russell Lake should be included in the EIS. This information would be valuable to help determine potential cumulative effects downstream in the Russell Lake drainage system (due to the Key Lake Operation) which has been identified as a key concern and area of interest by several Indigenous Nations and communities.</p> | Response is accepted, but also see AD-51 in the Advice to Proponent table. | Accepted |
| IR-121 | - | CNSC | Fish and fish habitat | Section 8.3.3.1, Methodology and Metrics | <p>Context: In the description of methodology for fish communities and spawning surveys, there's no mention that could be found for an any evaluation of fish condition, other than sexual condition.</p> | Please provide reference to where fish condition is considered or provide a justification for its exclusion. | Response is accepted, but also see AD-52 in the Advice to Proponent table. | Accepted |

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| | | | | | Rationale: Exposure to other pre-existing stressors could result in abnormal conditions or deformation(s) in existing population, but the extent of existing conditions should be evaluated to ascertain whether the rate is increasing as a result of proposed activities once in operation. | | | |
| IR-122 | - | CNSC | Fish and fish habitat | Section 8.3.8, Monitoring and Follow-up | Context: Section 8.3.8 of the EIS states: “Changes in fish communities/populations will be assessed through comparison of Construction, Operation, and Decommissioning results to pre-development.” Rationale: Tracking changes in fish communities / populations in reference lakes over time should be conducted, as reference lakes can be used to differentiate natural temporal variation with potential project impacts. | Please include reference lakes, and if it is provided, please reference where in the EIS these are discussed. If there are no reference lakes, these should be included in the monitoring program. | Response is accepted, but also see AD-53 in the Advice to Proponent table. | Accepted |
| IR-123 | - | ECCC | Change to an environmental component due to radiological contaminants | Section 8.4.3.2.3, Aquatic Environment Appendix 8-D, Table 3-5 | Context: Table 8.4-3 provides a summary of the baseline concentrations of COPCs in sediments in the LSA. Sediment quality thresholds and justification for the selection of those thresholds have not been provided. Table 3-5 in Appendix 8-D does provide benchmarks but the selection of benchmarks is not discussed, and the most stringent guidelines are not used for some COPCs. Additionally, there is no data provided for sediment concentrations of mercury, which is a COPC that requires surface water quality monitoring and effluent characterization under the MDMER. Rationale: Further information should be provided regarding any exceedances of sediment quality thresholds in baseline concentrations of COPCs, which should be recommended for further assessment of risk due to effluent discharges. | 1. Provide sediment quality thresholds and justification for the selection of those thresholds for comparison against measured baseline COPC concentrations in the LSA. 2. Provide data on baseline concentrations of mercury in sediment. 3. Identify any COPCs with baseline concentrations that exceed sediment quality thresholds in the LSA. | | Accepted |
| IR-124 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.4.4.2.3, Aquatic Environment | Context: Table 8.4-7 provides maximum concentrations of surface water COPCs in sediment. The following COPCs, which are required to evaluate the risk from effluent to sediment quality, were not evaluated: <ol style="list-style-type: none">COPCs that have monitoring requirements in receiving environment surface water and effluent under the MDMER,COPCs that exceed water quality guidelines in effluent, and,COPCs that have baseline concentrations that exceed sediment quality thresholds in the receiving environment. Rationale: Due to the lack of information on COPCs with baseline concentrations that exceed sediment quality guidelines, and COPCs that require monitoring under the MDMER, a determination on risk to sediment quality and aquatic biota cannot be made. | 1. Provide the information on baseline exceedances of COPCs in sediment. 2. Provide an assessment of risk for any COPCs that have baseline exceedances of sediment quality thresholds in the receiving environment. 3. Provide an assessment of risk from any COPCs that require monitoring in the receiving environment and effluent under the MDMER. Please include any COPCs in effluent that will exceed water quality guidelines. | The Proponent has not fully responded to the previous round’s IR. The modeling of surface water and sediment COPC’s described in Appendix 10-A show results for the receiving waterbodies, but it is not clear how the results for the COPC concentrations for water quality and sediment quality calculated for each of the water bodies, shown in Figure 6-1 and 6-2 respectively, are being interpreted. The Proponent has not explained if these modeled values are based on the worst-case scenarios that account for environmental variables such as seasonal changes in hydrology and chemistry or if they have only accounted for changes in operational effluent discharge scenarios to consider the upper bound discharge rates. Additionally, it is unclear whether depositional areas for sediment were identified based on hydrological data. Additional information is also needed regarding baseline exceedances of sediment COPC thresholds and the associated risk assessment of mine operations on the receiving water body. The Proponent should consider maximum COPC scenarios for the receiving water bodies in baseline assessments and the risk assessment, including seasonal variability and sediment | Not Accepted |

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| | | | | | | | <p>depositional areas to determine whether the baseline assessment and risk assessment fully considered the effects of the operations of the proposed mine. The Proponent should provide supplemental information to aid in determining if the environmental model has considered environmental variability such as seasonal changes in water levels, flows and sedimentation. The Proponent should also demonstrate that the model has considered a reasonable expected worst case scenario, such as a 100 year return.</p> <p>This IR is addressing quality of inputs (ex. baseline data, conservatism of scenarios modelled, environmental variability, etc.) in to modelling. This information is required to assess the conservatism of modelling the bounding conditions and potential for significant adverse effects to the environment.</p> | |
| IR-124 | IR-124-R1 | ECCC | Change to an environmental component due to hazardous contaminants | <p>Section 8.4.4.2.3, Aquatic Environment</p> <p>IR-124 Response from Denison</p> | <p>Context: In the Proponent’s response it is stated, “Schedule 5 parameters will be monitored as per the MDMER once under this regulation (i.e., meeting regulated criteria of discharge to the environment [50 m3/day). Please refer to Table 8.2-13 of attachment IR-114. In these cases, COPCs including Schedule 4 parameters were below screening criteria.”</p> <p>If concentrations of Schedule 5 parameters in effluent exceed water quality thresholds, these parameters are necessary for ECCC to examine in the risk assessment to determine the potential for effluent to be acutely lethal and for adverse effects to aquatic biota. These parameters will also be required to be characterized under Section 4, 5 and 7 of the MDMER. As per CSA N288.6-22 Section 7.2.5.2.1, “Screening of environmental concentrations of chemical and radiochemical substances released to the environment should be performed to identify COPCs for further evaluation in the risk assessment. Both measured concentrations and concentrations calculated from release rates may be used in the screening analysis. The screening concentrations should be compared to screening criteria, and chemicals that exceed screening criteria should be identified as COPCs.”</p> <p>As per CSA N288.6-22 Section 7.2.5.4.2, “If COPCs exceed the screening level for one medium, they should be carried forward into the EcoRA for all media that are likely to contribute to exposure. For example, for a given COPC, if a water screening benchmark is exceeded, the same COPC should be carried forward for sediment if its concentration was above the detection limit.”</p> <p>Additionally, updated Table 8.2-13 of attachment IR-114 has been found to be insufficient due to maximum concentrations in surface water for mercury, aluminum, total suspended solids, iron, thallium, manganese, nitrate and phosphorus being absent and the use of incorrect water quality thresholds.</p> | Provide an assessment of risk from any MDMER Schedule 5 parameters that are required to be characterized in effluent and in surface water quality in the receiving environment and that have effluent concentrations that will exceed water quality guidelines derived from environmental baseline conditions. | <p>The Proponent has not fully responded to the previous round’s IR. The modeling of surface water and sediment COPC’s described in Appendix 10-A, Figure 6-1 and 6-2 respectively shows results for the receiving waterbodies. However, it is unclear if these modeled values are based on the worst-case scenarios that account for environmental variables such as seasonal changes in hydrology and chemistry, or if they have only accounted for changes in operational effluent discharge scenarios to consider the upper bound discharge rates. The Proponent’s responses regarding baseline exceedances of COPC thresholds in the receiving waterbodies require additional information regarding environmental variability, including but not limited to seasonal changes in water levels, flows and sedimentation, in order to determine whether the model has considered environmental variability. The Proponent should also demonstrate that the model has fully considered a reasonably expected worst case scenario, such as a 100-year return period for the above variables.</p> <p>The Proponent should include a consideration of the maximum COPC scenario for the receiving water bodies in baseline assessments and the risk assessment, including seasonal variability and sediment depositional areas, to consider the effects of the operations of the proposed mine.</p> <p>This IR is addressing quality of inputs (ex. baseline data, conservatism of scenarios modelled, environmental variability, etc.) in to modelling. This information is required to assess the conservatism of modelling the bounding conditions and potential for significant adverse effects to the environment.</p> | Not Accepted |

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| | | | | | Rationale: Due to the lack of information on COPCs with concentrations that exceed water quality thresholds in effluent, a determination on risk to sediment quality and aquatic biota cannot be made. | | | |
| IR-125 | - | CNSC | Fish and fish habitat | Section 8.5, Aquatic Environment and Fish health | Context: Indigenous Knowledge studies and information collected in relation to the Project clearly identified the importance of water quality and fish health to local Indigenous peoples and is discussed throughout the Draft EIS. For example: <ul style="list-style-type: none">“Russell is one lake where I commercially fish. How will this effluent impact the water quality, fish health? Will I be able to sell fish from here? If there is going to water” pollution, I just want to know” (19-LK-ERFNTrip-134.255) ““How are you going to protect the water quality? We are concerned about mercury in fish, other animals, etc. Is there mercury or arsenic in the uranium solution?” (p. 8-53) Rationale: Several Indigenous Nations and communities and local resources users have indicated Russell Lake is an important body of water both culturally for traditional use and was used as commercial fishery in the past and from an aquatic ecosystem perspective. | One of the many mitigation measures mentioned throughout the aquatic environment section states: “Denison will work with the associated communities to develop and implement the Project-specific monitoring programs and a framework to share the results for the purpose of assessing the performance of the water management system.” (p.10-32) Has Denison considered the collection of additional baseline fish tissue species that are of importance to Indigenous Nations and communities and local cabin owners from Russell Lake? Assuming the species would be walleye (commercially and recreationally) and lake white whitefish that is traditionally an important species consumed. Please provide more information on the engagement to date on the development of the Surface Water Management Program and Monitoring program that Denison is developing and engagement to date with interested Indigenous Nations and communities in the region on fish and fish health. | Response is accepted, but also see AD-51 in the Advice to Proponent table. | Accepted |
| IR-126 | - | ECCC | Aquatic species | Section 8.5.3 Appendix 10-A (ERA), Section 5.3.1.1.8 | Context: The Proponent has used the US Environmental Protection Agency (US EPA) guidelines for the assessment of selenium fish tissue concentrations in Section 8.5.3 of the draft EIS and in the Environmental Risk Assessment (ERA) in Appendix 10-A (ERA) of Section 10. Rationale: ECCC’s Federal Environmental Quality Guidelines of 6.7 ug/g dry weight fish whole body tissue for selenium should be used, as it is more protective than the US EPA guidelines. | Update the selenium fish tissue assessment in the draft EIS and the Wheeler River ERA (Appendix 10-A (ERA) in Section 10) as needed using ECCC’s FEQG. | The Proponent did not compare their predictions for fish tissue selenium to the FEQGs in the ERA as requested. Furthermore, in their response the Proponent does not use available species-specific moisture content and conversion factors available for northern pike and lake whitefish when converting muscle selenium concentrations to whole-body selenium concentrations. This means that the Proponent’s prediction likely underestimates the selenium tissue concentrations in the fish. Consequently, the hazard quotients reported are lower than expected. Additionally, the method used by the Proponent to predict selenium concentrations in northern pike and lake whitefish does not appear to include dietary uptake and bioaccumulation of selenium, only direct contact with pore water and overlying water is considered (Table 5-5 in Appendix 10A; Section 2.2.2 of Appendix A to Appendix 10-A). Selenium uptake through the aquatic food web has been shown to result in bioaccumulation of selenium in aquatic-dependent wildlife and resulting in reproductive impairments and malformations (ECCC 2022). Dietary sources of selenium would typically be expected to be the main contribution to tissue concentrations of selenium compared to selenium uptake from water. In most situations, the conversion of inorganic selenium to organic selenium through uptake from water into periphyton/algae is the rate limiting step of selenium bioaccumulation into higher level organisms including benthic invertebrates and fish. This step is affected by many environmental parameters (e.g. temperature, substrate, lentic/lotic environment). | Not Accepted |

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| | | | | | | | <p>Considering that the effluent discharge contains 42 ug/L selenium, consideration of dietary selenium is warranted.</p> <p>The Proponent should update the final EIS with the following information:</p> <ol style="list-style-type: none">1. Update the ERA with the assessment of selenium concentrations in fish tissue to include a comparison of selenium fish tissue concentrations to ECCC FEQG guidelines for either fish whole body tissue (6.7 ug/g dry weight) or fish egg/ovary tissue (14.7 ug/g dry weight) <u>using</u> species-specific moisture content and muscle : whole body and/or egg-ovary : muscle conversion factors (see Tables B-1b, Table B-3, Table B-4, and Table B-5 in US EPA (2021)).2. Update the ERA for the assessment of selenium concentrations in fish tissue using a method that considers dietary uptake and bioaccumulation in order to determine predicted fish tissue concentrations of selenium in northern pike and lake whitefish. This is recommended to be done over all Project phases for both the Expected Case and sensitivity scenarios. <p>Provide predicted fish tissue selenium concentrations that include the range of variability of data used to develop the tissue selenium predictions. Only one output value without a confidence interval is provided for each location and species (see Table B.5 in Appendix B of Appendix 10-A).</p> | |
| IR-127 | - | CNSC | Aquatic environment | Appendix 8-E, Section 1.2.1, Hydrological Inputs | <p>Context: Within this section it states that the 7Q10 low flow rate used in the mixing assessment “was provided verbally to Ecometrix by NewFields Canada during a project meeting on 26 April 2022”</p> <p>Rationale: The statement that this value was provided verbally is not an infallible method of communicating data, as the value could have been misheard, misremembered, or recorded improperly.</p> | Please verify that the 7Q10 value used in the assessment is the correct value determined by NewFields. | | Accepted |
| IR-128 | - | CNSC | Current use of lands and resources for traditional purposes | Section 9 Various pages in section 11.1, Land and Indigenous Resource Use Section 12 Section 14 | <p>Context: The increased road traffic (14-18 trucks per day during construction/operations) may have indirect impact on ungulates, furbearers and wood land caribou presence/absence for traditional and subsistence hunting have been raised to CNSC staff when meeting with Indigenous Nations and communities and are presented in the EIS.</p> <p>Rationale: The increased traffic and therefore dispersal of game (moose, woodland caribou) due to increased traffic has been raised as a concern with respect to increased mortality on wildlife and decreased ability to practice traditional rights.</p> | <p>How have the potential residual impacts with respect to increased traffic and noise (due to current and future operations) been communicated to Indigenous Nations and communities who use the road #914 for cultural and traditional activities (such as moose harvesting, berry picking and small game and birds)?</p> <p>Please provide any additional information on the engagement that has taken place to date with Indigenous Nations and communities with respect to concerns and potential impacts on current use of lands and resources due to increased road traffic, and any mitigation measures proposed by Indigenous Nations and communities to minimize the potential impacts.</p> | Response is accepted, but also see AD-54 in the Advice to Proponent table. | Accepted |
| IR-129 | - | CNSC | Current use of lands and resources for | Section 9 Section 10 | <p>Context: ERFN indicated they are concerned about declining moose populations from an influx of hunters; more people may be</p> | Please provide additional information on the discussions Denison has had with Indigenous Nations and communities on how to | Response is accepted, but also see AD-62 in the Advice to Proponent table. | Accepted |

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| | | | traditional purposes | Section 11, including Section 11.1.4.3.1 (p. 11-46) Section 12 Section 16 | <p>accessing the area year after year, and worried populations may be affected by the Project (21-EN-ERFN-473.13).</p> <p>Further, the EIS highlights that: “Vehicle collisions are the most likely source of direct mortality for moose. Effective mitigation measures (e.g., breaks in snowbanks; speed limits; and exclusion fencing around contaminated waste pads and ponds) will be implemented to reduce moose mortality.” (p. 11-46)</p> <p>Rationale: The Technical Guidance for Assessing the Current Use of Lands and Resources for Traditional Purposes under CEAA 2012 notes: “The views of affected Aboriginal groups on mitigation be considered and included in the EIS. This could assist in ensuring that the environmental effects on the current use of land and resources for traditional purposes are at an acceptable level for the community.”</p> <p>Sources for indirect moose mortality (e.g., increased hunter access, changes to health due to sensory disturbances, changes to predator-prey dynamics) may result in mortality outside the Wildlife LSA. The residual effect of change in moose mortality is likely to occur. Although mitigation measures are expected to reduce, but not fully eliminate, the residual effect on moose.</p> <p>The potential residual impact on the moose and other large game populations in the broader regional study area may potentially impact Indigenous treaty rights, culture, and community well-being if the harvesting of moose and large game declines due to increased traffic, noise, and vehicle mortality or increased outside hunting pressure.</p> | <p>mitigate any residual project impacts on their traditional harvesting activities of large game such as moose.</p> <p>More information is required to determine if Denison has engaged directly with ERFN/KML and other Indigenous Nations who utilize the area to harvest moose to determine current baseline harvest numbers that provide subsistence, continued cultural identity and community well-being, as well as discussions on how the Project could potentially impact moose populations and the harvesting of moose for traditional practices.</p> | | |
| IR-130 | - | H. Mulye | Physical stressors (noise and vibration) on wildlife | Section 9, Terrestrial Environment | <p>Context: Sensory disturbances such as noise have been identified as stressors for selected wildlife (Ungulates, Furbearers, and Woodland Caribou), birds and amphibians in the Project area. However, there is no consideration of impacts from vibrations on these species. Also, impacts of noise and vibration on reptiles have not been assessed in the Project area.</p> <p>Rationale: While noise has been qualitatively assessed for selected wildlife, birds, and amphibians, there is no consideration of project-related vibrations as a sensory disturbance/physical stressor. Sensitive terrestrial species (specifically, herpetofauna, amphibians, invertebrates, and caribou) can be impacted by vibrations emanating from the operation of heavy machinery, blasting activities, and other anthropogenic activities at the Project site.</p> <p>Also, impacts of physical stressors (noise and vibration) on reptiles</p> | <p>Please provide a discussion of impacts of physical stressors (specifically vibrations) on wildlife, birds, and amphibians in the Project area. Specific mitigation measures and/or monitoring for impacts from project-related vibrations should be considered, as appropriate.</p> <p>Also, include reptiles in the assessment of project-related noise and vibrations as sensory disturbance/physical stressor, or a justification for their exclusion.</p> | | Accepted |

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| | | | | | were not assessed. These species should be included in this assessment due to their sensitivity to noise and vibrations. | | | |
| IR-131 | - | ECCC | Migratory birds, Wildlife and Wildlife Habitat | Section 9, Terrestrial Environment | <p>Context and Rationale: As per the requirement outlined in Section 79 of the Species at Risk Act (SARA): <i>The person must identify the adverse effects of the project on the listed wildlife species and its critical habitat and, if the project is carried out, must ensure that measures are taken to avoid or lessen those effects and to monitor them. The measures must be taken in a way that is consistent with any applicable recovery strategy and action plans. This is accomplished by ensuring that the Proponent has identified, avoided, lessened and will monitor effects to species at risk.</i></p> <p>As per the CNSC’s Generic Guidelines for the Preparation of an EIS pursuant to the Canadian Environmental Assessment Act, 2012: <i>“The EIS will then describe mitigation measures that are specific to each environmental effect identified. Measures will be written as specific commitments that clearly describe how the Proponent intends to implement them and the environmental outcome the mitigation is designed to address. The EIS will describe mitigation measures in relation to species and/or critical habitat listed under the Species at Risk Act (SARA). These mitigation measures will be consistent with any SARA permit, applicable recovery strategy and/or action plan”.</i></p> <p>The draft EIS neither lists the adverse effects to all listed schedule 1 SARA species, nor outlines the measures that will be taken to avoid or lessen these effects. The Proponent references that additional species-specific mitigations will be detailed in environmental management plans but has not provided those plans for review.</p> | Identify all species at risk listed on Schedule 1 of the Species at Risk Act and their critical habitat that are likely to be affected by the Project and describe how they may be adversely affected by the Project. Describe what measures will be taken to avoid or lessen the effects of each Project activity and stage, and how these effects will be monitored to ensure they are avoided or minimized. | | Accepted |
| IR-132 | - | ECCC | Wildlife and Wildlife habitat | Section 9, Terrestrial Environment | <p>Context and Rationale: ECCC has identified that three species at risk arthropods (yellow banded bumble bee, transverse lady beetle, and nine-spotted lady beetle) have ranges overlapping the Project area and these were not mentioned in the draft EIS.</p> | 1. Conduct an effects assessment for arthropod species at risk. 2. Explain what mitigation measures will be used to minimize potential effects. | | Accepted |
| IR-133 | - | ECCC | | Section 9, Terrestrial Environment | <p>Context and Rationale: There is potential for some species at risk (e.g., myotis species, barn or bank swallows, common nighthawk) to be attracted to and use mine infrastructure (buildings, roads etc.) once constructed for nesting, roosting, or foraging.</p> <p>Details on mitigation measures and adaptive management with respect to attraction to Project components should be identified to assess residual and cumulative impacts to species at risk.</p> | For all Project phases, describe the mitigation measures and adaptive management to prevent and minimize effects on species at risk that may utilize mine infrastructure. | | Accepted |

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| IR-134 | - | ECCC | Wildlife and Wildlife habitat | Section 9, Terrestrial Environment | <p>Context and Rationale: The draft EIS states in multiple places that vegetation clearing may occur year-round.</p> <p>In order to correspond with the timing of emergence from hibernation, tree clearing should not be conducted during the bat roosting period. If maternity roost trees are removed after pregnant females have established a roost area, there is a higher likelihood of abortion than there would be otherwise.</p> <p>Species-specific mitigations are required to protect bat SAR.</p> | Provide important roosting dates for bat species at risk in the Project area. | <p>The Proponent provided a complete response regarding the roosting dates for bat species at risk, however follow-up IRs are required.</p> <p>See follow-up IR-134-R1.</p> | Accepted |
| IR-134 | IR-134-R1 | ECCC | Wildlife and Wildlife habitat | Section 9, Terrestrial Environment | <p>Context: The Proponent has committed to conduct pre-construction and pre-clearing surveys for multiple species, however the timing and methods for the surveys were not provided. Knowing the survey methodology for pre-construction and pre-clearing for little brown myotis and northern myotis is important for assessing cumulative impacts, effectiveness of adaptive management strategies as well as determining how bat species were considered in the EIS.</p> <p>Rationale: ECCC can determine whether the methodology the Proponent will use to collect data is appropriate and if the methodology would contribute to a more complete understanding cumulative effects and adaptive management strategies.</p> <p>A clear outline of how timing has been considered and incorporated into the methodologies is required to understand how sensitive periods for bats, such as roosting, have been considered in the EIS. An understanding of the methodologies and how these sensitive periods are being considered is required to evaluate the effectiveness of mitigation strategies and adaptive management strategies which are being developed by the Proponent.</p> | The information provided by the Proponent regarding the roosting dates and potential habitat for bats is complete, however, the information related to the pre-construction and pre-clearing surveys is missing details on important habitat features for bat species at risk. As two Species at Risk Act (SARA) schedule 1 listed bat species, little brown myotis (<i>Myotis lucifugus</i>) and northern myotis (<i>Myotis septentrionalis</i>) have been identified in the Project area, effects need to be identified, avoided, lessened and monitored. | <p>The Proponent indicated that wildlife sweeps would be completed within a period of seven days prior to project activities. Wildlife sweeps will be conducted rather than conducting species-specific surveys focused on species at risk. Sweeps will be based on timing of the Project and related activities focused on identifying features such as hibernacula that may require mitigation.</p> <p>The Proponent also indicated that the methods associated with these sweeps will be tailored to species at risk (including bats) that may potentially be using the habitat.</p> <p>Species specific surveys are required to reliably identify rare species, such as species at risk, which may not be captured by more general wildlife sweeps. It remains unclear how the Proponent will complete wildlife sweeps, identify appropriate mitigation measures and implement those, or how these measures will be assessed for effectiveness. Information is outstanding on how surveys will be tailored to species at risk. ECCC recommends the Proponent to provide information on the methods that will be used for tailored surveys to species at risk, including bats or for the Proponent to provide a discussion on why these methods cannot be developed as part of this review.</p> <p>For further clarity, Denison is expected to describe how the pre-construction and pre-clearing survey methods are targeted/tailored for each SAR, where surveys will be performed to address SAR habitat, and the approximate timing prior to disturbance along with appropriate scientific rationale. At a minimum, one paragraph must be provided for each SAR specifically addressing the items above.</p> <p>Also see: IR-142-159-167-R1</p> | Not Accepted |
| IR-135 | - | ECCC | Migratory birds, Wildlife and Wildlife Habitat | Section 9, Terrestrial Environment | <p>Context and Rationale: The mitigation measures for birds and wildlife presented in the draft EIS are very general. Additional detail is required for a complete assessment of residual and cumulative Project effects to birds and wildlife.</p> <p>The Proponent has committed to providing a number of plans including, a Decommissioning Plan, a Spill Response Plan, a Waste Management Plan, a Surface Water Monitoring Plan, a Remediation and Closure Plan, a Radiation Protection Plan, a Soil and Vegetation Monitoring Plan, a Wildlife Monitoring Plan, and a Woodland</p> | <p>The following information should be included in the various plans and should be provided for review during the environmental assessment:</p> <p>1. For all Project phases, describe the species-specific mitigation measures and responses to prevent and minimize effects on migratory birds or species at risk (SAR) birds and mammals that may utilize mine infrastructure.</p> | | Accepted |

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| | | | | | Caribou Management Plan. In order to assess potential affects to migratory birds and wildlife from Project related activities, ECCC requires details on species-specific mitigation measures, and monitoring plans. | <p>2. Explain how light pollution will be managed and what specific mitigation measures will be used to minimize effects to migratory birds and SAR birds and mammals.</p> <p>3. Provide details on what methods will be used for erosion control and how they will prevent sediment from entering waters frequented by migratory birds or SAR. Explain what actions will be taken if the erosion control measures are not successful.</p> <p>4. Provide details on noise and other sensory disturbance monitoring and mitigations if noise levels surpass thresholds.</p> <p>5. Describe time windows and species- specific mitigations related to maintenance activities such as vegetation management, road or building repair and stream crossing replacements.</p> | | |
| IR-136 | - | CNSC | Soil Salvage Monitoring | Section 9.1.8.2 | <p>Context: The Proponent plans to salvage and stockpile soil and organic matter/peat in order to use it in reclamation activities during decommissioning. Periodic monitoring of the stockpiles is proposed to be conducted to verify that soil and organic matter/peat are delineated, stripped, handled, and stockpiled as recommended, and to evaluate the stability of salvaged soil, e.g., in relation to potential erosion and/or degradation. It is unclear whether monitoring includes soil quality in terms of concentrations of COPCs.</p> <p>Rationale: It is expected that project-related activities (road and airport traffic, drilling) can result in open-source (i.e., fugitive) dust and process-source dust (incl. radionuclides), which can accumulate and result in changes in soil quality of the stockpiled soil and organic matter/peat as described in Sections 9.1.4.2.2 and 9.1.4.2.3).</p> | Please clarify if COPC concentrations monitoring is planned to be performed for stockpiled soil and organic matter/peat. | | Accepted |
| IR-137 | - | ECCC | Migratory birds, Wildlife and Wildlife Habitat, Vegetation and Wetlands | <p>Section 9.2.1.3, Spatial and Temporal Boundaries for Vegetation and Ecosystems, Listed Plant Species and Wetlands</p> <p>Section 9.3.1.3.1, Spatial Boundaries for Ungulates, Furbearers and Woodland Caribou</p> | <p>Context and Rationale: The CNSC’s Generic Guidelines for the Preparation of an EIS Pursuant to the Canadian Environmental Assessment Act, 2012 states that: “The EIS will describe the spatial boundaries, including local and regional study areas, for each VC to be used to assess the potential adverse environmental effects of the Project and provide a rationale for each boundary.</p> <p>Spatial boundaries will be defined taking into account the appropriate scale and spatial extent of potential environmental effects, community knowledge and Indigenous knowledge, current or traditional land and resource use by Indigenous groups, ecological, technical, social and cultural considerations.”</p> | <p>Provide a biologically relevant rationale for the delineated study boundaries (LSA and RSA) for all different valued components. Include the following information:</p> <ul style="list-style-type: none">• Descriptions of how the RSA and LSA boundaries were derived for all VCs. <p>Specific to boreal caribou:</p> <p><u>Project Footprint:</u></p> <ul style="list-style-type: none">• Include a 500-m buffer of area of maximum physical disturbance to represent functional habitat loss for boreal caribou <p><u>LSA:</u></p> | | Accepted |

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| | | | | 9.4.1.3.1, Spatial Boundaries for Raptors, Migratory Breeding Birds, and Bird Species at Risk | <p>The information provided in the EIS does not enable a biologically relevant assessment of the Project’s effects.</p> <p>The Proponent did not provide rationale for the selection of study areas for individual vegetation, wildlife or migratory bird valued components (VC). Different VCs may have different spatial boundaries for the LSA and/or RSA. For wildlife and bird VCs, the LSA is defined as a 1.7-km buffer from the Project area, and the RSA is defined as a 6.6-km buffer around the LSA. There is no information on how the spatial boundaries were derived.</p> <p>Specific to Woodland Caribou, boreal population (hereafter referred to as boreal caribou):</p> <p><u>Project Footprint</u>: In a scientific assessment of critical habitat (Environment Canada, 2011) [1] ECCC demonstrated that the application of a 500-m buffer to mapped anthropogenic features best represents the combined effects of increased predation and avoidance on caribou population trends at the national scale. Adding a 500-m buffer to the Project footprint is required to represent functional habitat loss.</p> <p>The draft EIS does not appear to use a buffer for their Project area. The draft EIS (Section 9.3.1.3.1) states: “Project Area: the area within which the Project and all components/activities are located (i.e., the area of maximum physical disturbance). The Project Area covers 169.6 ha and is not VC-specific, but consistent throughout the EA.” (p. 9-168)</p> <p><u>LSA</u>: The defined LSA for boreal caribou has to consider avoidance of disturbed areas, predator access to undisturbed areas, reduction in connectivity and sensory disturbance. This required information is not detailed in the draft EIS.</p> <p>Adverse effects of Projects including predator and prey access to undisturbed areas, reduction in connectivity, and sensory disturbance to individual boreal caribou can vary and extend several kilometers depending on Project activities and ecological context. At minimum, the LSA should capture the above- mentioned effects. For boreal caribou, the Project footprint should be defined as the immediate area to be cleared, plus a 500-m buffer to represent functional habitat loss. Following this guidance, the LSA should be defined as a buffer of the Project footprint with the 500-m buffer.</p> <p><u>RSA</u>: The Amended Recovery Strategy for Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada states:</p> | <ul style="list-style-type: none">• Include a description of how the LSA takes into account boreal caribou avoidance of disturbed areas, predator access to undisturbed areas, reduction in connectivity and sensory disturbance to individuals. <p><u>RSA</u>:</p> <ul style="list-style-type: none">• Include a description of how the RSA used in the draft EIS is an accurate representation of the SK1 boreal caribou range; or• Re-do the assessment with the RSA at the scale of the range <p>See also related IRs: IR-154 and IR-156.</p> | | |

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| | | | | | <p><i>Mitigation of adverse effects from individual projects/activities will require a coordinated approach and management of cumulative effects within and among ranges. A cumulative effects assessment is essential to position the proposed project/activity in the context of all current and future development activities. The cumulative effects assessment will:</i></p> <ul style="list-style-type: none">• <i>Assess the impact of all disturbances (anthropogenic and natural) at the range-scale;</i>• <i>Monitor habitat conditions, including the amount of current disturbed and undisturbed habitat, and amount of habitat being restored;</i>• <i>Account for planned disturbances; and</i>• <i>Assess the distribution of disturbance in large ranges for risk of range retraction in parts of the range.</i> <p>The proposed Project’s cumulative effects for boreal caribou are possible at the scale of the SK1 boreal caribou range. The RSA used for boreal caribou for this Project is only 40,173.6 ha, compared to the SK1 range, which is 18,034,870 ha. As such, it is too small to capture cumulative effects to this species and does not follow the Scientific Assessment to Support the Identification of Critical Habitat for Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada (Environment Canada, 2011) or the Amended Recovery Strategy for Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada.</p> <p>Reference: [1] Scientific Assessment to Support the Identification of Critical Habitat for Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada (Environment Canada, 2011).</p> | | | |
| IR-138 | - | CNSC | COPC in Lichen | Section 9.2.4.2.2 Appendix 10-A (ERA) | <p>Context: A quantitative assessment using modelling dispersion and uptake of COPCs in the environment was completed for the Project as part of the ERA, to support conclusions drawn in the EIS. In Appendix 10-A (ERA), COPCs in plant tissue was estimated for lichen. Table 5-5 of the ERA (p. 5.24) named “Complete Exposure Pathways for All Selected Ecological Receptors to be Assessed using the IMPACT Model” lists the exposure pathway for lichen as direct contact on soil.</p> <p>Rationale: Airborne COPC can deposition on lichen and subsequently enter the food chain; therefore, the “contact with air” pathway should be considered. In fact, lichen species are frequently used to monitor the deposition and accumulation of airborne contaminants (e.g., dust, metals). It is also noted that based on sampling results of the 2017 baseline studies, lichen frequently contain higher concentrations of COPC than blueberry (compare</p> | <p>Please include the exposure pathway of direct deposition (dry and wet) of airborne contaminants on lichen in the quantitative ERA, or justify why this exposure pathway was not considered.</p> <p>See also related: IR-189.</p> | | Accepted |

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| | | | | | Table 9.2-6 and Table 9.2-7 in the EIS), especially at sampling sites with elevated concentrations (e.g., RSV9 and RSV10). | | | |
| IR-139 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 9.2.5.2.7, Waste and Hazardous Materials Management | <p>Context: In this section, the Proponent outlines various measures to mitigate air emissions, including implementation of the air quality programs within the Environmental Management System, regular maintenance and inspection of equipment, and elimination of unnecessary idling of equipment. However, the intention to use industry-standard emission control systems has not been substantiated.</p> <p>Rationale: For the protection of air quality, it is important to specify the emission standards that equipment will have (e.g., Tier 3 or Tier 4 engines). Vehicles and equipment with Tier 4 engines have much lower emissions of contaminants than those with Tier 3 engines. If non-Tier 4 engines are used, ECCC recommends that best management practices are followed, including proper maintenance of the engine and anti-idling measures.</p> | Confirm if vehicles and equipment will be equipped with Tier 4 engines where feasible. | Response is accepted, but also see AD-55 in the Advice to Proponent table. | Accepted |
| IR-140 | - | CNSC | Change in the Areal Extent of Wetlands | Section 9.2.6.4 | <p>Context: Predicted residual effects on the areal extent of wetlands include the direct effect of loss of wetlands and several indirect effects of alteration of wetlands. As stated in the EIS, wetlands can exhibit low resilience and high susceptibility to disturbance. At the same time, wetlands tend to support a high species diversity, and are considered to have a moderate to high potential to support listed plant species. Lastly, wetlands are rare on the landscape compared to terrestrial ecosites (see Table 9.2-5).</p> <p>Rationale: Several wetland ecosites (BS19/24, BS25, BS27) occur only in small areas (< 30 ha) in the RSA but are predicted to experience disturbance of 6-64%, most notably the ecosite BS19/24 where 0.8 of 1.2 ha are predicted to be disturbed. It is noted that wetlands are scattered throughout the landscape as shown in Figure 9.2-8. More information is requested regarding the ecological impact of this disturbance.</p> | <p>1. Please provide a discussion on the ecological impact of disturbance to rare wetland ecosites.</p> <p>2. Please provide information on whether adequate other habitat is available for species impacted in these disturbed sites in close proximity, taking into account the home ranges of susceptible species.</p> <p>3. Please provide additional information on whether wetland connectivity is maintained through the landscape within the LSA/RSA.</p> <p>See also related: IR-141.</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends that Denison conduct monitoring of species present in wetlands before and after disturbance, with a focus on listed plant species.</p> | | Accepted |
| IR-141 | - | ECCC | Wetlands | Section 9.2.6.4.1 | <p>Context and Rationale: The Proponent states that: “Direct loss of wetlands has been mitigated by reducing the size of the Project Area to the extent practicable during Project design.</p> <p>However, up to 0.5 ha (less than 0.1%) of all wetlands within the Terrestrial RSA are anticipated to be removed from the Project Area during Construction (Table 9.2-16).”</p> <p>Information is not provided on whether wetlands in the terrestrial</p> | <p>1. Provide information that accounts for whether wetlands are considered ecologically, economically and socially important to the region.</p> <p>2. If the above is affirmative provide a wetland compensation plan to offset the loss. Consistent with the Operational Framework For Use of Conservation Allowance [1] a minimum ratio of 2:1 should be the starting point when determining the amount to be offset.</p> | | Accepted |

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| | | | | | RSA are considered ecologically, economically or socially important to the region. Information on the regional importance of the wetlands that will be lost is needed in order to assess effects, including a wetland compensation plan if the wetlands are considered regionally important. | [1] Available at : https://publications.gc.ca/site/eng/9.696852/publication.html See also related: IR-138. | | |
| IR-142 | - | ECCC CNSC | Wildlife and Wildlife habitat | Section 9.3.3.2.1 Scientific Literature Review – Wolverine Section 9.3.5 Mitigation Measures Section 9.3.6 Residual Effects Evaluation | <p>Context: The Proponent did not conduct any field work to identify potential wolverine dens in the Project area and therefore did not present any mitigations for the potential impacts to wolverine dens.</p> <p>In Section 9.3.3.2.1, the Proponent states: “Denning females are sensitive to disturbance during denning season in February to April and may abandon their dens and, in some cases, their litter, which may decrease their reproductive success. “</p> <p>In Section 9.3.6, the Proponent states: “In the Project Area, 145.0 ha or 100% of available wolverine habitat is assumed to be removed and will not be available to wolverine for the duration of the Project (Table 9.3-13). Similarly, 145.0 ha (3.4%) of available wolverine habitat within the Wildlife LSA is anticipated to be removed, all from the Project Area, during site clearing in Construction. In the Terrestrial RSA, up to 0.5% (145.0 ha; from the Project Area) of available wolverine habitat is anticipated to be removed during site clearing in Construction.”</p> <p>The residual effect assessment estimates that 8.2% of available wolverine habitat within the Terrestrial RSA may be altered or lost (Table 9.3-20).</p> <p>Rationale: As Wolverine is a Species at Risk Act Schedule 1 listed species, effects need to be identified, avoided, lessened and monitored. Mitigations, such as setback distances, should be used to protect important habitat features, such as dens.</p> <p>Wolverine occupy large home ranges and, therefore, need vast tracts of undisturbed land to maintain viable populations. The species avoids most human footprint types and linear features.</p> | 1. Please provide additional information on whether the lost and/or altered wolverine habitat overlaps with wolverine home ranges. 2. Describe any important wolverine habitat feature (i.e., dens) that may be lost as a result of the Project. 3. Assess the need for pre- construction/pre-clearing surveys to identify any wolverine denning sites. 4. Please provide additional information on whether the remaining, available, undisturbed wolverine habitat size is suitable to maintain populations. | The information provided by the Proponent is complete, however, a follow up IR regarding survey methods for all pre-construction and pre-clearing surveys is required. See follow-up IR-142-159-167. | Accepted |
| IR-142 IR-159 IR-167 | IR-142-159-167-R1 | ECCC | Wildlife and Wildlife Habitat | Reference to EIS: Section 9.3.3.3, Baseline Studies Section 9.3.5 Mitigation Measures IR 142, 159, and 167 | <p>Context: The Proponent has committed to conduct pre-construction and pre-clearing surveys for multiple species, however the timing and methods for the surveys were not provided.</p> <p>Rationale: Knowing the survey methodology for pre-construction and pre-clearing surveys across multiple species is important because the Proponent is intending to collect data so that ECCC can determine whether the methodology used to collect the data is appropriate and if the methodology would contribute to</p> | Provide survey methodology and timing for all preconstruction and pre-clearing surveys, including avian and species at risk surveys (caribou, wolverine). | The Proponent notes that: <ul style="list-style-type: none">• Site clearing and other works that involve disturbance of vegetation and/or soil will be completed in winter.• Pre-disturbance wildlife sweeps would be conducted by qualified biologists at least seven days prior to any scheduled vegetation/land disturbance.• Mitigation measures to avoid or minimize adverse effects on identified features are not species specific. | Not Accepted |

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| | | | | Responses from Denison | understanding cumulative effects and adaptive management. Understanding how timing has been considered and incorporated into the methodologies is required to understand how sensitive periods, such as nesting, breeding, foraging and migration, have been considered in the EIS. An understanding of the methodologies and how these sensitive periods are being considered is required to evaluate the effectiveness of mitigation strategies and adaptive management being developed by the Proponent for each species mentioned in IR-142, IR-159 and IR-167. | | <ul style="list-style-type: none">The methods associated with these pre-construction and pre-clearing sweeps will be tailored to species at risk that may potentially be using habitats at certain times of the year.Methods will include searching for potential roost trees for bat species, as per protocols included in the Wildlife Habitat Features Field Guide (BC Ministry of Environment and Climate Change Strategy, Ecosystems Branch 2019). If sensitive features are found, then they will be documented, and data collected would inform the development and implementation of appropriate mitigation measures. <p>It is unclear what is meant by “surveys are not species-specific” but sweeps will be “tailored to the species at risk”. It is also unclear how mitigation measures will be developed and implemented in a seven-day period.</p> <p>In order for ECCC and CNSC to provide advice on potential effects to SAR based on the habitat potential mapping, the development of species-specific mitigation measures needs to be produced for review during this assessment process. The Proponent also needs to provide details on follow up and monitoring programs that are in place to confirm that the mitigation measures implemented are effective.</p> <p>In addition, ongoing monitoring is required for SAR. Denison is expected to describe the planned monitoring and follow-up programs for SAR. Denison must justify how the proposed methods are adequate to provide a baseline for each SAR, to verify that mitigation measures are effective, and to allow for statistically robust comparison to assess potential impacts on SAR over the lifecycle of the project.</p> | |
| IR-143 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.3.3, Baseline Studies | <p>Context and Rationale: The baseline caribou data is insufficient to understand potential Project impacts to this species. Presence/absence detection was provided by camera traps, incidental observations, winter track and pellet survey.</p> <p>Additional information and analyses on caribou use of the landscape during all life stages of the Project area is required to assess impacts and to determine significance of impact from the Project to caribou.</p> | <p>Provide details on the baseline caribou data including:</p> <ul style="list-style-type: none">Revision of map 9.3-8 to include all observations, categorized by type, season and year (see also IR-145); andDescription of seasonal use of the LSA, RSA and caribou range.Description of Project areas used by caribou.Description of future studies planned to assess habitat use by caribou. Include specific details on how many additional years of aerial surveys will be completed to assess the caribou baseline conditions. <p>Utilizing additional data noted above and specified in IR-145, explain how caribou use of the area could be affected by the Project throughout all seasons and life stages (e.g., calving, post-calving, rutting, wintering).</p> <p>See also related: IR-152.</p> | | Accepted |
| IR-144 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.3.3, Baseline Studies – map 9.3-8 | <p>Context and Rationale: The mapping of caribou observations during baseline studies provided in Figure 9.3-8, “Caribou Sign Observations in the Wildlife Study Areas,” is insufficient to enable conclusions to be drawn.</p> | <p>Update map 9.3-8 to show all caribou observations during baseline studies, broken down by type of observation (camera, incidental, pellet, track) and season/year when the observation was made.</p> | | Accepted |

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| | | | | | <p>ECCC is not able to review the spatial aspect of caribou observations without a map of all available observations. Additional information is available, as stated in Section 9.3.3.3.3:</p> <p><i>“A total of 200 observations were made between 2017 and 2019 and recorded as either caribou sign (i.e., tracks, pellets, and evidence of feeding activity based on ground feeding craters and arboreal feeding evidence) or photographs (collected through the wildlife camera study) to document caribou presence in the LSA and RSA. Most observations occurred in the Terrestrial RSA, with observations concentrated in the north and southeast portions.</i></p> <p><i>Three observations occurred in the southeast portion of the Wildlife LSA, and no caribou sign was observed in the Project Area. Figure 9.3-8 provides an overview of some caribou sign observed during the baseline studies.”</i></p> | <p>Include additional data from the Province of Saskatchewan (see also IR-145) to help characterize caribou use on a spatial map.</p> | | |
| IR-145 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.3.3, Woodland Caribou | <p>Context and Rationale: The Proponent has not provided sufficient information on how caribou use the landscape, including identification of areas for different life stages of caribou (calving, post-calving, rutting and wintering).</p> <p>The University of Saskatchewan published a report entitled Population and habitat ecology of boreal caribou and their predators in the Saskatchewan Boreal Shield. This report contains information on habitat types that are used during different life stages. Additionally, Appendix H of the Amended Recovery Strategy for the Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada 2020² [1] details habitat characteristics required by boreal caribou to carry out life processes necessary for survival and recovery.</p> <p>The scientific literature review (Section 9.3.3.3.1) on Woodland Caribou states: “While calving areas have not been documented within the SK1 range, it is recognized that caribou may use open fen and treed bog habitat types for calving during the spring/summer period. In Saskatchewan, caribou habitat used during the calving season in the SK2 range demonstrated a strong selection for treed muskegs, but avoidance of jack pine, mixed hardwood stands, and roads (Dyke 2008).”</p> <p>ECCC is not able to verify the Proponent’s effects assessment without sufficient information on important habitat or biophysical attributes for caribou within the study areas.</p> <p>[1] https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/recovery-strategies/woodland-caribou-boreal-2020.html#toc0</p> | <p>1. Provide, based off existing literature or available data and the Amended Recovery Strategy for Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada:</p> <ul style="list-style-type: none">information on known important habitat features or biophysical attributes in Project areas for different caribou life stages (calving, post-calving, rutting, wintering),a map(s) of the type and spatial extent of important caribou habitat features or biophysical attributes of the study areas as defined in Appendix H of the Recovery Strategy,<ul style="list-style-type: none">mapping should be at the RSA/LSA level as well as larger-scale mapping at the scale of the Project footprint. <p>2. Assess the potential direct and indirect effects based on additional information on caribou from bullet A above.</p> <p>See also related IRs: IR-143 and IR-152.</p> <p>Suggestions for mitigation and follow-up measures: ECCC recommends that the Proponent contact the Province of Saskatchewan to enquire about obtaining caribou telemetry data in the Project area. The data can be analyzed to determine important habitat features in the Project area.</p> | | Accepted |

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| IR-143 IR-144 | IR-143- 144-R1 | ECCC | Wildlife and Wildlife Habitat | Section 9.3.3.3, Baseline Studies IR-143 and 144 Responses from Denison | <p>Context: In the IR-143 response, the Proponent states: “As described in the EIS, caribou may use open fen and treed bog habitat types for calving during the spring/summer period. Information from Indigenous Knowledge (IK) was included in the EIS, including potential calving areas in the Terrestrial RSA.” The Proponent provided a revised Map 9.3-8 to display these features.</p> <p>Rationale: While the revised Map 9.3-8 shows seasonal use, it is challenging to see the overlapping spatial and temporal features. The map is not adequate for fully understanding the seasonality of the data. The scale provided does not allow for a proper assessment of seasonal use, including differentiation of habitat use such as calving, movement or wintering habitats.</p> <p>Some habitats, based on use, may be more used for more critical functions than others and this information cannot be adequately assessed based on the information provided.</p> | Provide individual maps by season and survey type or with larger scale insets that show areas with overlapping spatial and temporal features. | | Accepted |
| IR-143 IR-145 | IR-143- 145-R1 | ECCC | Wildlife and Wildlife Habitat | Section 9.3.3.3, Baseline Studies IR-143 and 145 Responses from Denison | <p>Context: Information presented on boreal caribou in the study areas in the Proponent’s response is insufficient to:</p> <ul style="list-style-type: none">• characterize and determine the risk of Project impacts,• and• calculate the appropriate level of offsetting required. <p>Information on important habitat features and how caribou are using the landscape is required to complete an assessment of the Project impacts.</p> <p>Although the Proponent provided a map showing telemetry points (provided by the Province of Saskatchewan), the map lacked sufficient detail to assess habitat use and important biophysical features of the Project area.</p> <p>The IR-145 response states: “Available habitat was determined as the ecosites in which caribou / caribou sign were detected most frequently during the baseline studies, and the EIS used a precautionary approach by assuming caribou use of these areas</p> | <p>1. Provide maps at the Project Development Area (PDA)/Local Study Area (LSA)/Regional Study Area (RSA) scale showing caribou habitat quality.</p> <p>2. Provide maps at the PDA/LSA/RSA scale showing areas with the appropriate biophysical attributes for calving and other life stages, such as important wintering habitats and movement corridors.</p> <p>Indicate the source of telemetry data (i.e., University of Saskatchewan and/or the Province of Saskatchewan).</p> | | Accepted |

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| | | | | | <p>during all seasons and life stages.” As a part of the analysis, calving areas are particularly important to delineate if information is available as a key part of all life stages.</p> <p>In the draft EIS, the habitat types that are considered non-habitat for caribou are open bogs (BS20), leatherleaf shrubby fens (BS22), graminoid fens (BS24), open fens (BS25), rush sandy shorelines (BS26), sedge sandy shorelines (BS27) and waterbodies.</p> <p>Rationale: Woodland caribou are known to use treed bog and open fen (Section 9.3.3.3.1 of the draft EIS), however open fens and bogs are excluded from the identified available Woodland Caribou habitat, based on not detecting presence or not detecting presence as frequently.</p> <p>Mapping of important caribou habitat features is required to assess important potential impacts to caribou. In the absence of telemetry data, mapping of habitat quality, based on a combination of known ecosites and known important biophysical features will provide a reasonable alternative where known important caribou habitat features cannot be mapped.</p> | | | |
| IR-146 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.3.3.1, Woodland Caribou, Scientific Literature Review - Predation | <p>Context and Rationale: The information on impacts of predation and apparent competition for caribou in relation to the proposed Project are insufficient.</p> <p>In the section on caribou predators (9.3.3.3.1), the Proponent provided details on densities of wolves and their overlap with caribou and speaks of apparent competition. The Proponent did not examine other predators, such as black bear.</p> <p>The analysis on impacts of predation and apparent competition is insufficient since known predators have been omitted without explanation from the assessment of effects. ECCC is not able to verify the Proponent’s effects assessment since important species have not been considered in the assessment.</p> | Provide further information and analyses on all potential predators of caribou, including impacts from apparent competition. | | Accepted |
| IR-147 | - | ECCC | SAR – Boreal Caribou | Section 9.3.4.2.1, Alteration and/or Loss of Habitat | <p>Context and Rationale: The process of in-situ recovery mining will likely create changes to the surface topography and potential ground subsidence as well as changes to groundwater elevations. These changes can affect the plant communities and ecosite types.</p> <p>In Section 9.3.4.2.1 the Proponent states that: “Following decommissioning and reclamation, wildlife habitat is expected to recover to baseline conditions.”</p> | <p>1. Provide further rationale and/or analysis regarding the return of wildlife habitat to baseline conditions post- decommissioning. Incorporate other environmental impacts including:</p> <ul style="list-style-type: none">• Ground subsidence and impacts on wildlife habitat• Changes to aquifers and impacts on wildlife habitat <p>2. Describe reclamation activities/measures, including temporal information that will be implemented to help in the recovery to baseline conditions.</p> | | Accepted |

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| | | | | | A more thorough explanation regarding post-decommissioning landscape is required to assess Project impacts. | | | |
| IR-148 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.4.2.1, Alteration and/or Loss of Habitat | <p>Context and Rationale: ECCC analyzes disturbance for caribou at the range level, in this case within the SK1 range. However, the Proponent did not provide an adequate assessment of total disturbance at the range level. The draft EIS (Section 9.3.4.2.1 p. 9-211) reads: “The SK1 Boreal Shield Woodland Caribou Management Unit has relatively low levels of anthropogenic disturbance and was exposed to large fire disturbances in the past 40 years (ECCC 2019). Environment and Climate Change Canada (2019) identified this caribou population as being self-sustaining at a threshold of 40% undisturbed habitat with the total anthropogenic disturbance not exceeding 5% of their habitat. The current anthropogenic disturbance levels (without areas burnt by past forest fires) for the study areas are below this threshold (with the exception of the already disturbed Project Area) and are estimated as: 24.8 ha (14.6%) for the Project Area, 168 ha (3.5%) for the Wildlife LSA, and 599 ha (1.5%) for the Terrestrial RSA.”</p> <p>Analysis of habitat disturbance should be calculated at the range level in order to assess impacts and determine significance.</p> <p>Analysis should be consistent with the methodology described in the document Scientific Assessment to Support the Identification of Critical Habitat for Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada (Environment Canada, 2011) [1].</p> <p>[1]https://publications.gc.ca/site/eng/401605/publication.html, p. 28/41</p> | <p>Provide the following in order to support analysis of habitat disturbance:</p> <ol style="list-style-type: none">1. Calculation of total disturbance including natural and anthropogenic disturbance at the range level.2. Description of effects on existing habitat at the scale of the range (for < 40% undisturbed habitat in the SK1). Include:<ul style="list-style-type: none">• an account (and GIS file if available) of existing habitat affected, using the following formula: (Project footprint + 500m buffer) – overlapping (permanent alteration(s) + 500m buffer)3. A map of the SK1 range showing all disturbed and undisturbed habitat, including predicted disturbance (direct and indirect) resulting from the Project.4. Description of whether the Project is expected to compromise the ability of the range to be restored to the undisturbed habitat threshold, and provide a rationale for the conclusion. <p>See also related: IR-154.</p> | | Accepted |
| IR-149 | - | ECCC CNSC | Wildlife and Wildlife habitat | Section 9.3.5.2, Additional Wildlife-specific Mitigation Measures | <p>Context: The EIS describes that ongoing research is performed to inform the development of a Woodland Caribou Management Plan. This includes studies on the effectiveness of linear disruption features on predator/prey movements, and a field program for long-term reclamation planning. Moreover, it is stated that the Plan will include a detailed assessment of the need for habitat offsets.</p> <p>The draft EIS Section 9.3.5.2 states: “A wildlife monitoring plan and a Woodland Caribou Management Plan will be developed to address wildlife-specific mitigation measures based on proven and accepted mitigation following standard industry guidelines and BMPs. The plans will provide guidance to avoid or minimize potential adverse effects of the Project on wildlife and wildlife habitat, including monitoring and follow-up programs, as appropriate. It will be in place during all phases of the Project and</p> | <p>Provide the Woodland Caribou Management Plan, to demonstrate effective mitigation of potential project effects, along with wildlife-specific mitigation measures for review.</p> <p>The Plan should be informed by and consistent with the Boreal Caribou Recovery Strategy and demonstrate that avoidance and minimization measures will be applied to mitigate for predicted Project effects to boreal caribou and its critical habitat prior to considering offsetting measures. That is, the Plan should follow the mitigation hierarchy and information should be provided as outlined below:</p> <ol style="list-style-type: none">1. AVOID: Describe all measures that will be taken to avoid effects to boreal caribou and avoid the destruction or alteration boreal caribou critical habitat. | <p><u>Note to Denison:</u> The proposed path forward on this IR is to develop a commitment to be added to Denison’s Commitment Register, related to Denison’s offsetting plan meeting the objectives of the province’s Caribou, Boreal recovery strategy. The language around this is still in discussion, and the text in draft.</p> <p>Current Rationale: The IR has not been fully resolved. The Proponent has updated Appendix 9-F to link caribou data, habitat/ecosite data and habitat suitability in its analysis which remain unchanged from conclusions provided in the EIS and has committed to monitoring using remote cameras for presence of caribou within the Project Footprint and within the Terrestrial RSA as part of the Environmental Management System. However, the Caribou Management Framework is still lacking the requested information on the amount of offset required to mitigate effects to caribou. Without the intended outcomes of the offsetting plan, there remains uncertainty regarding whether effects are adequately addressed in a manner that is consistent with the</p> | |

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| | | | | | <p>will be subject to ongoing review and revision as required. If monitoring identifies a need for additional or revised mitigation measures, a process of adaptive management (as described in the plan) will be triggered.”</p> <p>Rationale: The draft EIS does not present sufficient species-specific mitigation measures for boreal caribou. ECCC is not able to assess potential residual impacts to caribou without specific mitigations.</p> <p>Since the Woodland Caribou Management Plan is still under development, it is difficult to judge whether the measures will be adequate to mitigate and/or offset potential project effects on Woodland caribou and its critical habitat.</p> | <ol style="list-style-type: none">2. MINIMIZE: Describe all measures that will be taken to minimize the effects to boreal caribou and minimize the destruction of boreal caribou critical habitat.3. RESTORE ON-SITE: describe the measures that will be taken to restore disturbed areas of the Project, related to construction, operation and maintenance, on boreal caribou critical habitat, remaining after considering the avoidance and minimization measures.4. Characterize the risk of the adverse effects that are likely to result from the Project on boreal caribou and its critical habitat after avoidance minimization, and onsite restoration measures have been considered.5. OFFSET: Describe the measures that will be implemented outside the Designated Project area to mitigate adverse effects, destruction or alteration of boreal caribou critical habitat by the Designated Project during construction and operation.6. Characterize the risk of the adverse effects that are likely to result from the Project on boreal caribou and its critical habitat after avoidance, minimization, onsite restoration, and offset measures have been considered. <p>Describe all relevant uncertainties on the effectiveness of the measures to address adverse effects on boreal caribou and the rationale for the selected measure, in light of the mitigation hierarchy.</p> <p>See also related IRs: IR-157.</p> | <p>species Recovery Strategy. Additionally, the generic mitigation measures have not been updated to include factors, such as sensory disturbances, during important life stages.</p> <p>In order for ECCC and CNSC to provide additional technical advice on potential impacts to caribou, the Proponent would need to provide the previously requested information on the amount of habitat required to mitigate the adverse effects to caribou resulting from the Project and update the mitigation measures to include factors, such as sensory disturbances, during important life stages.</p> | |
| IR-149 | IR-149-R1A | ECCC | Wildlife and Wildlife Habitat | <p>Section 9.3.5.2, Additional Wildlife specific Mitigation Measures</p> <p>Proponent response to IR-149</p> <p>IR-149 Response by Denison</p> | <p>Context: Much of the information presented in the Conceptual Caribou Management Plan is qualitative in nature and does not present specific details regarding a quantitative assessment of impacts following measures to avoid, minimize, and restore on-site and then assess residual effects and determine the offset required to counterbalance the remaining impacts. This is required to understand if offsetting is sufficient to address impacts to caribou. The Proponent also does not provide details on methods that will be used for pre- disturbance wildlife clearance surveys. ECCC is aware that that the Proponent will be participating in restoration trials as part of the ‘Developing Eco-restoration Together’ program.</p> <p>Rationale: ECCC requires the quantitative details on the assessment of impacts to be included within the Conceptual Caribou Management Plan to adequately assess how the Proponent has applied the mitigation hierarchy. Details on the methods that will be used for pre- disturbance wildlife clearance</p> | <ol style="list-style-type: none">1. Provide a quantitative assessment of impacts following measures to avoid, minimize and restore on-site and then assess residual effects and determine the offset required to counterbalance the remaining impacts.2. Provide details on methods to be used for pre- disturbance wildlife clearance surveys.3. Provide details on the Proponent’s role in the Developing Eco-restoration Together program and how that work may be used in offsetting requirements.4. Provide the scope (i.e., quantitative habitat amount) of the Eco-restoration Together program. | <p><u>Note to Denison:</u> With regards to item one of the response, the proposed path forward on this IR is to develop a commitment to be added to Denison’s Commitment Register, related to Denison’s offsetting plan meeting the objectives of the province’s Caribou, Boreal recovery strategy. The language around this is still in discussion, and the text in draft.</p> <p>Item two has not been resolved, but this is also in discussion, given overlap with IR-134.</p> <p>Items three and four have been resolved as the Proponent is no longer using the Eco-Restoration Together Program as part of their offsetting plan. Items one and two remain outstanding.</p> | |

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| | | | | | <p>surveys will also be required to verify that the Proponent has adequately considered how they have avoided, mitigated, or restored impacts to caribou.</p> <p>While ECCC understands that the Proponent will be participating in restoration trials as part of the ‘Developing Eco-restoration Together’ program, however, more clarity on the Proponent’s role in the program and the scope of the program is required. Details such as how the outcomes of these programs will result in mitigation measures and offsetting requirements and additional clarity on the scope of the program should also be provided so that ECCC can understand the objectives and deliverables of the program.</p> | | | |
| IR-149 | IR-149-R1B | ECCC | Wildlife and Wildlife Habitat | <p>Section 9.3.5.2, Additional Wildlife specific Mitigation Measures Proponent response to IR-149</p> <p>IR-149 Response by Denison</p> | <p>Context: Section 4.2.2 of the Conceptual Caribou Mitigation plan states: “locating excessive noise generating activities such as the concrete batching operation as far away from sensitive wildlife locations as possible;”. However, no specific mitigation measures are mentioned for impacts to caribou due to noise generated from the Project air strip.</p> <p>Rationale: Noise from the air traffic using the air strip will also generate excessive noise that can impact caribou. Additional information on the timing and frequency of air traffic, as well as specific mitigations related to impacts from air traffic, including mitigations related to frequency and timing of flights, will be necessary to evaluate impacts to caribou due to air strip noise.</p> | <p>1. Provide additional information on the timing and frequency of air traffic using the Project air strip.</p> <p>2. Provide specific mitigations related to impacts from air traffic, including mitigations related to frequency and timing of flights.</p> | <p>Item two has been accepted as the Proponent has provided potential measures likely to be incorporated into operations of the airstrip, but item one remains outstanding. The information requested was not provided as the Proponent notes it is too early in the planning phase to provide this information. Once flight schedules have been determined, the Proponent should share them for review. If this cannot be provided at this time, the Proponent should provide information on the frequency and approximate timing of flights, as well as any periods of restricted activity planned for mitigation purposes.</p> <p>In addition, Denison is expected to provide details on specific mitigation measures to address sensory impacts to caribou, such as restricted activity periods to accommodate for the caribou calving season, or different flight paths.</p> <p>Please see the related follow up advice for IR-149-R1B in the Advice to the Proponent document.</p> | Not Accepted |
| IR-150 | - | ECCC | Wildlife and Wildlife habitat | <p>Section 9.3.5.2.1, Best Management Practices for working in Boreal Woodland Caribou Range in Saskatchewan</p> | <p>Context and Rationale: In the draft EIS Section 9.3.5.2.1, the Proponent states: “Denison proactively initiated research to provide field-based findings on the effectiveness of linear disruption features on predator/prey movements.”</p> <p>“Results will help the development of proactive and meaningful restoration strategies as an ongoing part of the overall Project (Omnia 2022). Additionally, the 2023 field program will support a program that uses the results from the 2021/2022 Caribou Trail Study in long-term reclamation planning. The program will be led by the University of Saskatchewan and is funded by Denison, an Indigenous-owned environmental company, the Northwest Communities Environmental Services (Métis owned), Mitacs, and the Natural Science and Engineering Research Council of Canada through an alliance grant. The Caribou Trail Study and the reclamation plan will culminate with the development of a Woodland Caribou Management Plan.”</p> <p>ECCC is available to support the Proponent through review of study</p> | <p>Provide the report for 2021/2022 Caribou Trail study for long-term reclamation planning for ECCC review.</p> | | Accepted |

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| | | | | | programs should those programs be made available during the review process. ECCC requests to see the 2021/2022 study to further our review of caribou use in the Project area. | | | |
| IR-151 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.6.4 | Context and Rationale: In the analysis of residual and cumulative effects for woodland caribou, information and analyses on impacts to connectivity and movement across the landscape is lacking. | 1. Using available reports and data, provide an analysis of impacts to landscape connectivity for woodland caribou at the LSA and Range scales. 2. Determine whether the Project is expected to result in a reduction of connectivity within or between the ranges and provide a rationale for the conclusion. Describe how movement corridor(s) may be affected by Project activities and infrastructure. | | Accepted |
| IR-152 | - | CNSC | Woodland Caribou Residual Effects Evaluation | Section 9.3.6.4, Appendix 9-B | Context: Baseline studies for Woodland caribou include: <ul style="list-style-type: none">• Winter Track Count Survey to assess presence, abundance, feeding activity, and ecosite affiliation;• Pellet Group/Browse Availability Survey to detect presence and abundance of caribou, and frequency of occurrence and abundance of lichen;• Covert Camera Survey to determine presence and use of linear features (roads, trails, and hand-cut lines). The Saskatchewan Conservation Strategy for Boreal Woodland caribou [1] states that caribou are very susceptible to predation during the calf-rearing period, and populations are extremely sensitive to even minor changes in mortality rates. Rationale: It is unclear if, or how, any data on seasonal and spatial use of habitat was considered in the residual effect analysis, for example summer/winter home ranges, sensitive life stages including calving (e.g., location of calving sites). It should be noted that the English River First Nation have identified caribou calving areas in the vicinity of the Project footprint. Reference: [1] Saskatchewan Ministry of Environment. 2013. Conservation Strategy For Boreal Woodland Caribou (Rangifer tarandus caribou) in Saskatchewan. Saskatchewan Ministry of Environment. Fish and Wildlife Technical Report 2014. | Please provide a summary of available baseline data on habitat use during all seasons and life stages, in particular sensitive stages such as calving, and how habitat use during all seasons and life stages was considered in the residual effect analysis. See also IR-145 and IR-143. | | Accepted |
| IR-153 | - | CNSC | Woodland Caribou Residual Effects Evaluation | Section 9.3.6.4.1 | Context: According to ECCC (2020), forest fires can directly alter habitat, making it unsuitable for boreal caribou (e.g., through loss of mature conifer stands, loss of lichens and other forage plants, barriers to movement). Boreal caribou generally do not return to | 1.Please provide further information on the suitability of ecosites BS3 and BS7 for Woodland caribou in different life stages. | | Accepted |

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| | | | | | <p>burned areas for several decades until the forest is old enough to support lichens and other food sources, although they may make limited use of burned areas to feed on new growth.</p> <p>The residual effects evaluation of alteration and/or habitat loss lists ecosites BS3 and BS7 (regenerating forest types) as available habitat in Table 9.3-22, which represent 43.5% of the Regional Study Area.</p> <p>Rationale: It is unclear whether the ecosites BS3 and BS7 (regenerating forest types) represent suitable habitat for Woodland caribou year-round. More information is required on the habitat quality (e.g., time since last forest fire) and suitability for different life stages of caribou.</p> <p>For conservatism, it is recommended to perform a second residual effect analysis not including regenerating forest ecosites.</p> | <p>2. Please provide the results of a residual effect analysis not including ecosites BS3 and BS7 for conservatism.</p> <p>3. If 2 leads to habitat fragmentation, consider connectivity of habitat patches in the residual effect analysis.</p> | | |
| IR-154 | - | CNSC | Woodland Caribou Alteration and/or Loss of Habitat | Section 9.3.6.4.1 | <p>Context: Lichen, the primary food source for Woodland caribou (up to 70% of the year-round diet), can be exposed to airborne contaminants and dust deposition at distances of 1–40 km (e.g., increased metal concentrations or dust were detected in lichen at distances of 1–40 km from a mine site [1, 2]).</p> <p>Rationale: Further information is requested on how the potential for contamination of the food source “lichen” is reflected in the applied buffers of direct and indirect disturbance for woodland caribou.</p> <p>References: [1] Watkinson et al. (2021). Effects of dust deposition from diamond mining on subarctic plant communities and barren-ground caribou forage. Journal of Environmental Quality 50(4): 990-1003. Doi: 10.1002/jeq2.20251. [2] Chen et al. (2017). Does dust from arctic mines affect caribou forage? Journal of Environmental Protection 8(3): 258-276. Doi: 10.4236/jep.2017.83020.</p> | <p>1. Please provide additional justification for how the potential for contamination of the food source “lichen” is reflected in the applied buffers for sensory disturbance.</p> <p>See also related IRs: IR-137, IR-148 and IR-156.</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends the following:</p> <ul style="list-style-type: none">• COPC in Lichen monitoring is recommended in transects from the Project site to assess COPC concentrations and confirm whether the chosen buffer is conservative. | | Accepted |
| IR-155 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.6.4.1, Alteration and/or Loss of Habitat | <p>Context and Rationale: In Section 9.3.6.4.1 of the draft EIS, the Proponent presents figure 9.3-14 and table 9.3-22, which “depicts available woodland caribou habitat in the Project study areas” and provide a summary of available Woodland Caribou Habitat in the Project Area, Wildlife Local Study Area, and the Terrestrial Regional Study Area.</p> <p>The Proponent does not provide a biologically relevant explanation on the ecosites that are considered available woodland caribou habitat.</p> | <p>1. Provide a biologically relevant explanation about how available caribou habitat was determined or determine available habitat based on new data from the province of Saskatchewan (See IR-145).</p> <p>2. Consider referencing Appendix H of the Amended Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada 2020 to define important biophysical features.</p> | | Accepted |

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| | | | | | According to the amended recovery strategy for Caribou, all habitat within SK1 range has been designated as critical habitat. To align with best current knowledge and the amended recovery strategy, the map and table should show the biophysical attributes, as outlined in Appendix H of the recovery strategy. | | | |
| IR-156 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.6.4.1 Section 9.3.7.3.1 | <p>Context and Rationale: In Section 9.3.6.4.1 of the draft EIS, the Proponent identified that 142 ha of available caribou habitat within the Project footprint will be directly impacted or lost, while an additional 1,165 ha will be indirectly impacted by Project activities such as sensory disturbance. They assessed the residual and cumulative effect of alteration to habitat for woodland caribou as not significant: “The residual effect of alteration and/or loss of available woodland caribou habitat is not expected to result in a change that will alter caribou habitat integrity to the point where it would not be able to sustain the regional woodland caribou population. Therefore, the effect is assessed as not significant.”</p> <p>Section 9.3.7.3.1 of the draft EIS states: “It is not expected that the cumulative effects of alteration and/or loss of habitat will alter the integrity of woodland caribou habitat within the Terrestrial RSA to the point where it is not sustainable or available to contribute to ecological functions. Therefore, the cumulative effects resulting from the Project’s residual effect interacting with residual effects from other projects and activities is predicted to be not significant.”</p> <p>For the residual effect of alteration and/or loss of available caribou habitat (Section 9.3.6.4.1, Table 9.3-24), the Proponent assessed the magnitude as low, the geographic extent as local, the duration as long-term, the frequency as frequent, the reversibility as fully reversible, the context as high and the likelihood as likely. The rationale provided by the Proponent is insufficient to determine the accuracy of these assessments, given the lack of data and the small size of the assessment area. ECCC does not support the residual effects assessment of low magnitude, given the uncertainties related to seasonal use by caribou in the Project area and the current level of disturbance in the SK1 range.</p> <p>For the cumulative effect of alteration and/or loss of available caribou habitat (Section 9.3.7.3.3 , Table 9.3-30), the Proponent assessed the magnitude as moderate, the geographic extent as beyond the RSA, the duration as long-term, the frequency as frequent, the reversibility as fully reversible, the context as high, the likelihood as likely, the significance as not significant and the level of confidence as moderate. The rationale provided by the Proponent is insufficient to determine the accuracy of these assessments, given</p> | <p>Provide a revised assessment of residual and cumulative effects, taking into consideration that the disturbance within the SK1 range is above the disturbance management threshold required for survival and recovery of the species.</p> <p>See also related IRs: IR-137 and IR-154.</p> | | Accepted |

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| | | | | | <p>the lack to data presented for caribou and the small size of the RSA, compared to the SK1 region. ECCC does not support the conclusion of the cumulative effects assessments or for the level of confidence.</p> <p>The Amended Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada 2020 states that the range is currently at the 60% disturbance management threshold. Therefore, any activity likely to result in the alteration or destruction of critical habitat may impact on the species survival and recovery. In addition, the Proponent’s assessment was based on information that was lacking data on calving, wintering and rutting areas, and connectivity and caribou movements. The absence of considerations of the regional context of disturbance does not provide a conclusion based on best available information.</p> | | | |
| IR-157 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.9 Ungulates, Furbearer and Woodland Caribou Summary | <p>Context and Rationale: The Proponent has committed to developing a Woodland Caribou Management Plan, which will include a “detailed assessment for the need for habitat offsets.” The Woodland Caribou Management Plan will support ECCC’s review of the Proponent’s assessment of residual effects following mitigation and offsetting.</p> <p>This plan should consider ECCC’s Operational Framework for Use of Conservation Allowances (ECCC, 2012). ECCC is available to assist the Proponent in the determination of appropriate offsets that would balance against Project adverse effects after the application of measures to avoid, minimize and restore on-site are adopted.</p> <p>Based on the Amended Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada 2020, anthropogenic impacts to local caribou populations experience a lag effect, which occurs over extended periods. This lag effect needs to be adequately considered when proposing offsets.</p> <p>ECCC is available to assist the Proponent in understanding how critical habitat is described in the Recovery Strategy and the determination of appropriate offsets that would balance against Project effects based on the predicted impacts to caribou habitat.</p> | <p>Provide the Woodland Caribou Management Plan for review. The plan should clearly demonstrate efforts to avoid and minimize any Project effects and restore on-site any disturbed areas prior to the consideration of offsetting. Details on how severity of disturbance and vulnerability of the species were considered should be explained.</p> <p>See also related: IR-149.</p> <p>Suggestions for mitigation and follow-up measures: ECCC notes that the Woodland Caribou Management Plan should clearly explain efforts to address Project effects, including any contribution to cumulative adverse effects, after it has been determined that all options in the previous steps of the mitigation hierarchy (i.e., avoidance, and minimization,) have been fully considered and applied.</p> <p>In the Woodland Caribou Management Plan, provide details on how the factors outlined in the Operational Framework for Use of Conservation Allowances (ECCC, 2012) were considered in determining the offsetting amounts, including the severity of disturbance and vulnerability of the caribou population. Important factors including time lag (the amount of time from restoration work to when the habitat would be considered caribou habitat) would also need to be considered.</p> <p>ECCC typically recommends a minimum offset multiplier of 4:1 (offset outcome: area disturbed). This is a benchmark ratio applied to a project that is in the lower end of the risk spectrum, such as one with a low severity impact adversely affecting a low vulnerability ecological component. In general, the minimum 4:1</p> | <p><u>Note to Denison</u>: The proposed path forward on this IR is to develop a commitment to be added to Denison’s Commitment Register, related to Denison’s offsetting plan meeting the objectives of the province’s Caribou, Boreal recovery strategy. The language around this is still in discussion, and the text in draft.</p> | |

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| | | | | | | multiplier accounts for time-lags to restoration, uncertainty in outcomes, a precautionary approach, and the adverse impact itself in its specific context. Offset multipliers are variable and determined by project-specific circumstances and associated risks and uncertainties. | | |
| IR-158 | - | ECCC | Migratory birds | Section 9.4.1.2, Key Indicators and Measurable Parameters | <p>Context and Rationale: In Section 9.4.1.2 the Proponent outlined key indicators for “Migratory Breeding Birds” which includes Waterbirds and Waterfowl, Upland Game Birds and Migratory Songbirds. These are broad categories, which do not allow for assessment of the variation in habitat requirements or ecology of individual species or guilds.</p> <p>Updated Rationale: The Proponent should identify additional focal species that can serve as indicator species by representing anticipated impacts to a broader guild of species. Indicator species should be demonstrably sensitive to the potential effect of interest, and suitable for inferring effects on other species.</p> <p>Species may be grouped into guilds for assessment based on similarities in ecology or vulnerability to Project effects, such as species at elevated risk of collision with vehicle traffic.</p> <p>By identifying focal species or guilds for each key indicator species within the Migratory Breeding Birds Valued Components (VCs), ECCC would be able to accurately review the Proponent’s assessment of impacts and mitigation measures in order to assess the accuracy of the Proponent’s conclusions and provide expert advice on the mitigation measures.</p> | Identify focal species/guilds for each key indicator species within the Migratory Breeding Birds valued components. Provide an updated analysis of Project effects on migratory birds. | | Accepted |
| IR-159 | - | ECCC | Migratory birds | 9.4.3.2.3 Baseline Studies – Migratory Songbirds Appendix 9-B, Section 2.10.2, Results | <p>Context and Rationale: Information presented in the draft EIS is insufficient to accurately predict Project impacts to breeding birds. The Proponent collected a single year of breeding songbird point counts and aerial waterfowl surveys (including avian species at risk). A single year of surveys in which birds may be unusually scarce or abundant could severely compromise interpretation of post-construction monitoring data.</p> <p>Additionally, data presented in the draft EIS is from 2017 and ECCC advises that more recent data is needed for a comprehensive baseline to verify Project impacts.</p> <p>Data from the Saskatchewan Conservation Data Centre (HABISask), the Saskatchewan Breeding Bird Atlas and the Boreal avian Modelling project contain information on avian densities and avian species at risk that could supplement field data.</p> | Supplement breeding bird point count data and aerial waterfowl data collected during 2017 with additional pre-construction field data or existing post-2017 data/modelling to provide a comprehensive baseline that can be used to verify Project impacts during construction and operational phases. | | Accepted |

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| | | | | | <p>The national standard for major projects recommends a minimum of two years of field surveys to be provided, so that temporal variability can be considered when comparing post-construction against baseline records and other available data.</p> <p>Updated Rationale: ECCC recommends that for major projects, a minimum of two years of field surveys should be provided so that temporal variability can be considered when comparing post-construction against baseline records and other available data. More recent data is needed due to landscape changes that may have occurred since 2017 as well as cumulative effects that have occurred in that time. Additionally, if there was an unusually high population density of birds in 2017 due to extraneous circumstances, Project effects may be attributed to a non-existent decline in the population when the discrepancy can be due to natural variability.</p> <p>A more recent baseline will account for interannual variation and any regional effects and will allow for a more accurate review of mitigation and follow-up measures. Data from the Saskatchewan Conservation Data Centre (HABISask), the Saskatchewan Breeding Bird Atlas and the Boreal Avian Modelling project contain information on avian densities and avian species at risk that could supplement field data.</p> | | | |
| IR-160 | - | ECCC | Migratory birds | Section 9.4.3.2.3 Baseline Studies – Migratory Songbirds | <p>Context and Rationale: ECCC advises that the results of the field studies need to be interpreted/analyzed in the context of the study area. The Proponent presents results on areas with highest richness and diversity but does not make a link to habitat that will be lost or experience indirect effects.</p> <p>Updated Rationale: Results regarding the effects of the Project, including a discussion on habitat types that will be lost or indirectly impacted during the life of the Project, and a discussion on the overall impact on the avian community including results from baseline studies as well as other supplemental information as per IR-159 are required to assess the validity of the Proponent’s conclusions and should be used in effects assessment.</p> | <p>Provide results interpreted in the context of Project direct and indirect effects. Include discussion on the habitat types that will be lost or indirectly impacted during the Project and the overall impact on the avian community, using results from the analysis of baseline studies and other supplemental data (as per IR-159).</p> <p>Discussion should support the conclusions of the effects assessment.</p> <p>See also related IRs: IR-161 and IR-162.</p> | | Accepted |
| IR-161 | - | CNSC | Bird Species at Risk | Section 9.4.3.3 Appendix 10-A (ERA) | <p>Context: For the assessment of effects on Bird Species at Risk (SAR), in the EIS it was decided to use representative species for certain SAR birds:</p> <ul style="list-style-type: none">Olive-sided Flycatcher and Common Nighthawk were selected to represent Barn Swallow.Yellow Rail and Rusty Blackbird were selected as substitutes for Horned Grebe. | <p>1. Please provide additional information to justify the selection of surrogate species for Barn Swallow and Horned Grebe in the EIS. This should include a description of the similarity of SAR and associated surrogate species and any relevant uncertainties.</p> <p>2. Please provide conservative estimates of habitat loss and alteration for the represented and not directly assessed species (Barn Swallow, Horned Grebe).</p> | | Accepted |

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| | | | | | <p>No further rationale is provided to demonstrate that the identified surrogate species are representative of the Barn Swallow and Horned Grebe in the EIS. For example, do they share a common diet?</p> <p>Moreover, in the residual effects assessment, limited discussion is provided on the conservatism of chosen suitable habitat types for both surrogate and represented species, in the calculation of habitat loss and alteration, as well as change in mortality. For example, how does habitat for Common Nighthawk and Barn Swallow overlap (do they use identical habitat types?) and how does this affect the calculation of habitat loss and alteration used to evaluate the magnitude of residual effect?</p> <p>Finally, in the ERA, Lesser Scaup is the surrogate for Horned Grebe. Yellow Rail is also represented by Lesser Scaup but Rusty Blackbird is represented by Olive-sided Flycatcher.</p> <p>Rationale: It is unclear what criteria were applied to select surrogate species for Barn Swallow and Horned Grebe, and how the chosen surrogates relate to Barn Swallow and Horned Grebe in terms of habitat type and range, nesting, and feeding requirements etc.</p> <p>There is also inconsistency with respect to the use of surrogate species for the Horned Grebe between the EIS and ERA supporting document.</p> | <p>3. Please provide clarity as to why different surrogate species are used for Horned Grebe between the EIS and ERA.</p> <p>See also related IRs: IR-160 and IR-162.</p> | | |
| IR-162 | - | ECCC | Migratory birds | Section 9.4.3.3, Bird Species at Risk | <p>Context and Rationale: Not all avian species at risk present in the study area were included as Key Indicators in the avian species at risk (SAR) valued component (VC). Barn swallow and horned grebe were recorded in the study area, but not included as VCs. Additionally, bank swallow may inhabit the Project area. Impacts to Species at Risk Act Schedule 1 listed species need to be identified, avoided, lessened and monitored.</p> <p>In Section 9.4.3.3. the Proponent states: “It is acknowledged that the listed Barn Swallow (<i>Hirundo rustica</i>) and Horned Grebe (<i>Podiceps auratus</i>) could potentially occur in the Terrestrial RSA. Incidental observations occurred during the baseline studies (Appendix 9-B). To focus the effects assessment on a few key species (described in the following) it was decided to use Olive-sided Flycatcher and Common Nighthawk to represent Barn Swallow as well, and to use Yellow Rail and Rusty Blackbird as a substitute for Horned Grebe. Unlike Horned Grebe, Yellow Rail and Rusty Blackbird are also listed provincially.”</p> | <p>1. Explain how nesting habitat requirements of barn swallow is represented by common nighthawk and olive-sided flycatcher as a VC or assess individually each SAR that overlaps with the Project and is likely to be affected.</p> <p>2. Explain how nesting habitat requirements of horned grebe are represented by yellow rail and rusty blackbird as a VC, or assess individually each SAR that overlaps with the Project and is likely to be affected.</p> <p>3. Assess individually each SAR that overlaps with the Project and is likely to be affected.</p> <p>See also related IRs: IR-160 and IR-161.</p> | | Accepted |

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| | | | | | <p>Barn swallow, bank swallow and horned grebe may have different nesting habitat requirements than the representative species discussed in the draft EIS. An explanation of how differing species are representative of one another is required, or if an explanation cannot be provided, the species should be assessed individually.</p> <p>Updated Rationale: The management plans for these three species demonstrate the variability in their habitat selection.</p> <p>The Management Plan for the Yellow Rail (<i>Coturnicops noveboracensis</i>) in Canada (Environment Canada, 2013) states “Yellow Rails inhabit shallow wetlands and other wet areas with grass-like vegetation. They breed in wetlands such as damp hay fields or meadows, floodplains, bogs, upper levels of estuaries, salt marshes (Bookhout 1995, Alvo and Robert 1999, COSEWIC 2009), shallow prairie wetlands, and wet montane meadows (Peabody 1922, Sherrington 1994, Popper and Stern 2000). “</p> <p>The Management Plan for the Rusty blackbird (<i>Euphagus carolinus</i>) in Canada (Environment Canada 2015), states: “Rusty Blackbirds tend to select breeding sites with a combination of freshwater bodies with shallow water and emergent vegetation for foraging that are adjacent to wetlands with conifers or tall shrubs with cover for nesting (Matsuoka et al. 2010a, Matsuoka et al. 2010b, Greenberg et al. 2011).”</p> <p>The Management Plan for the Horned Grebe (<i>Podiceps auritus</i>), Western population, in Canada (ECCC, 2022) states: “The Horned Grebe breeds in small (generally 0.5 to 2 ha, but ranging from 0.24 to 18.2 ha), shallow (at least 20 cm deep, but on average 40 cm), and usually fishless, perennial wetlands, but they can also nest on larger lakes with shallow edges and sufficient emergent vegetation. Breeding sites usually contain at least 40% open water with beds of emergent vegetation, such as sedges (<i>Carex</i> spp.), rushes (<i>Juncus</i> spp.) and cattails (<i>Typha</i> spp.) (Faaborg 1976, Kuczynski et al. 2012, Routhier 2012, Stedman 2018).”</p> <p>Due to differing habitat selection and use, ECCC recommends that each selected VC is given an individual assessment with specific mitigation measures. This will allow for a more accurate review of the chosen mitigation measures.</p> | | | |
| IR-163 | - | ECCC | Migratory birds | Section 9.4.3.3.3, Baseline Studies – Avian species at risk VCs | <p>Context and Rationale: The baseline studies and data analysis for species at risk (SAR) birds is insufficient to accurately predict Project effects.</p> <p>ECCC recommends the use of predictive modeling in relation to</p> | Provide additional information, including mapping/modelling of specific habitat requirements for each avian species at risk or provide a justification of models used in the draft EIS. | | Accepted |

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| | | | | | survey data and habitat attributes to produce distribution and density maps. Sites within the study area that support particularly high densities or diversity of an individual species, based on direct observation and, where appropriate, distribution or occupancy models, would greatly improve confidence in Project impact predictions. Additional information on specific habitat use or models of habitat used by SAR would facilitate a more complete analysis of Project effects. | | | |
| IR-164 | - | ECCC | Migratory birds | Section 9.4.4.2.1, Alteration and/or Loss of Habitat – Migratory Breeding Birds | <p>Context and Rationale: The discussion on impacts to migratory songbirds presented by the Proponent is not sufficient to understand the impacts on various guilds of birds (e.g., aerial insectivores, forest birds, wetland birds, habitat specialists).</p> <p>As per IR-158, focal representative species/guilds should be used as key indicators (KI) in the Migratory Breeding Birds Valued Component. A greater level of detail on Project impacts to migratory songbirds with differing habitat requirements is needed for a fulsome assessment of effects.</p> <p>Updated Rationale: A greater level of detail, including a discussion on impacts to different focal species and/or guilds within the Migratory Breeding Birds Valued Component, is required for a more fulsome assessment of effects and identification of mitigation measures. Additionally, mapping detailing important features or habitat types that will be lost due to the Project for different guilds of migratory birds will be required to assess Project effects. This information will be required in order for the Proponent to apply adaptive management, and for ECCC to review the adequacy of these management plans.</p> | <p>1. Provide further discussion on impacts to different focal species/guilds within the Migratory Breeding Birds Valued Component.</p> <p>2. Provide mapping of important features or habitat types that will be lost due to the Project for different guilds of migratory birds.</p> | | Accepted |
| IR-165 | - | CNSC ECCC | Birds (all species) | Section 9.4.4.2.2 Section 9.4.5.2.4, Avian Deterrence and Prevention of Entrapment Appendix 10-A (ERA) | <p>Context: On p. 9-364 of the EIS, it is stated that exposure to hazardous materials through contact with contaminated waste ponds could affect avian health and contribute to mortality.</p> <p>However, the ERA places the avian receptors only in waterbodies and locations outside of the Project area (see Figure 5-2 in the ERA), i.e., Whitefish Lake, McGowan Lake, the inlet to Russell Lake, and Kratchkowsky Lake.</p> <p>Further, there are insufficient details on the potential effects of the water quality in the water management and treatment facilities on birds, species at risk, and other wildlife, including the risk of bioaccumulation of contaminants. The Proponent should assess potential effects of water quality from these areas using applicable CCME guidelines.</p> | <p>Please perform an ecological risk assessment with avian receptors located at the contaminated waste ponds, including:</p> <p>1. Describe and analyze the possibility of birds, species at risk and other wildlife using the water or waste management facilities and provide an analysis to determine if there is a risk to wildlife that may access these areas.</p> <p>2. Identify the potential toxicity of water management ponds to aquatic migratory birds and species at risk (SAR).</p> <p>3. Describe what measures will be taken if the waters are found to be toxic to migratory birds and SAR.</p> | | Accepted |

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| | | | | | <p>Rationale: It is unclear whether the ecological risk assessment based on the chosen exposure locations is protective and conservative for avian species potentially exposed to contaminated waste ponds on the Project site.</p> <p>While mitigation measures such as physical, visual, and/or auditory deterrents are proposed in Section 9.4.5.2.4, the possibility of avian species coming into contact with waste ponds cannot be excluded based on the available information in the EIS. The possibility of birds, species at risk, and other wildlife accessing the water management and treatment facilities for drinking water or other purposes is not discussed in the draft EIS.</p> | <p>Suggestions for mitigation and follow-up measures: CNSC recommends that Denison ensure adequate mitigation measures are implemented to minimize the potential for avian exposure to pond waters.</p> | | |
| IR-166 | - | ECCC | Migratory birds | Section 9.4.5.2 Additional Avian Species-specific Mitigation Measures | <p>Context and Rationale: Avian species-specific mitigation measures are not presented in the draft EIS. The Proponent has committed to providing a variety of environmental management plans.</p> <p>Section 9.4.5.2 reads: “Additional mitigation measures specific to the Raptors, Migratory Breeding Birds, and Bird Species at Risk VCs, in accordance with the Migratory Birds Convention Act, and tailored to Project features will be incorporated into various Project management and monitoring plans such as the, erosion and sediment controls, soil and vegetation monitoring, wildlife monitoring, the Decommissioning Plan, air quality monitoring, Spill Response Plan, Radiation Protection Plan, surface water and effluent monitoring, and Waste Management Plan.”</p> <p>Migratory birds, the nests of migratory birds and/or their eggs can be inadvertently harmed or disturbed as a result of many activities, including but not limited to clearing trees and other vegetation, draining or flooding land, or using fishing gear; this is known as incidental take. This inadvertent harming, killing, disturbance or destruction of migratory birds, nests and eggs is prohibited under the MBCA. Incidental take, in addition to harming individual birds, nests or eggs, can have long-term consequences for migratory bird populations in Canada, especially through the cumulative effects of many different incidents. For further details, please refer to the Avoiding Harm to Migratory Birds website at: https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds.html</p> <p>In order to assess the effectiveness of species-specific mitigations and need for additional mitigations ECCC requires details on the species-specific mitigation measures proposed, and the monitoring plans.</p> | <p>Provide details on species-specific mitigations for species at risk (SAR) and other avian species that will include:</p> <ul style="list-style-type: none">• details on what activity restrictions will be implemented for migratory birds and SAR and when they will be applied;• details on mitigations used during regular maintenance activities such as vegetation management (e.g., mowing), access road repair (e.g., aggregate stockpiles), and infrastructure repair;• details on methods used to detect species listed on Schedule 1 of the <i>Migratory Birds Convention Act</i> (e.g., Pileated Woodpecker) and mitigations/setback distances and timing to reduce risk to these species. | | Accepted |

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| IR-167 | - | ECCC | Migratory birds | Section 9.4.5.2.1 Work Timing Windows and Habitat Disturbance | <p>Context and Rationale: The Proponent has stated that when it is not practicable to clear outside of the breeding bird window, they will conduct pre-clearing surveys. Section 9.4.5.2.1 states: “Prior to commencing any site clearing (i.e., vegetation clearing and/or soil disturbance) during the nesting season, pre-clearing nest surveys will be conducted at that location within the Project Area.”</p> <p>ECCC does not recommend the use of nest searches or pre-clearing surveys for active bird nests during the breeding season as a mitigation, given the difficulty associated with finding nests reliably and the high likelihood of disturbing nesting birds when searching. Instead, ECCC recommends that clearing and grubbing activities not be conducted during the breeding bird season.</p> <p>The Migratory Birds Regulations 2022 (MBR 2022) brings new scenarios that need to be considered:</p> <ol style="list-style-type: none">Most migratory birds:<ul style="list-style-type: none">Nests are protected only when they are in use or when live eggs or chicks are present.Migratory birds listed in MBR 2022 Schedule 1:<ul style="list-style-type: none">For the 18 species of migratory birds identified on Schedule 1, the MBR 2022 provide year-round nest protection until they can be deemed abandoned.Migratory birds listed under SARA:<ul style="list-style-type: none">For some SARA listed migratory birds, the residence prohibition (s.33) will protect nests that are not active, but are re-used in subsequent years, and the critical habitat prohibition (s.58) will protect nests that are part of the critical habitat identification. Those prohibitions apply everywhere in Canada and at all times of the year. In these cases, a SARA permit will be required. | <p>Provide the following information:</p> <ul style="list-style-type: none">details on how vegetation clearing related to site development will be conducted to minimize risk to migratory birds and species at risk (SAR).the timing window that will be used for vegetation removal to reduce risk to migratory birds and SAR | Response is accepted, but also see AD-57 in the Advice to Proponent table and follow-up IR-142-159-167-R1. | Accepted |
| IR-168 | - | ECCC | Migratory birds | Section 9.4.5.2.4, Avian Deterrence and Prevention of Entrapment | <p>Context and Rationale: The Proponent mentions that avian deterrents will be used on power transmission lines, buildings and other Project infrastructure. However, the Proponent does not mention any deterrents that will be used for deterring birds from the water or waste management facilities.</p> <p>Details on deterrents for all Project components should be identified to assess residual and cumulative impacts to migratory birds.</p> | <p>Provide information on avian deterrents to be used to prevent birds or other wildlife entering water or waste management ponds.</p> <p>2. Explain how proposed timing of use of deterrents will reduce risk of migratory birds making contact with treatment waters outside of the nesting season (i.e., during migration and stop overuse).</p> <p>3. Explain which deterrents will be used, which deterrents were considered, and what alternative, adaptive measures will be considered if deterrents are unsuccessful for any Project components.</p> | | Accepted |

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| IR-169 | - | ECCC | Migratory birds | Section 9.4.6.3, Residual Effects Evaluation for Migratory Birds, Table 9.4-15 and Map 9.4-11 | <p>Context and Rationale: The analysis of available habitat types for migratory songbirds appears incorrect.</p> <p>In their interpreted ecosite mapping, the Proponent identified 25 different ecosite types. In their table 9.4-15 and map 9.4-11, the Proponent only lists 8 ecosite types that are available migratory songbird habitat. Section 9.4.6 Residual Effects Evaluation for Migratory Songbirds reads: “Considering the baseline data (Appendix 9-B), migratory songbird habitat is described in the following text without species-specific differentiation and referred to as available habitat for migratory songbirds. Based on the baseline study results, 66.8%, 52.2%, and 50.7% of the Project Area, Wildlife LSA, and Terrestrial RSA, respectively, are assumed to provide available habitat for migratory songbirds (Table 9.4-15).”</p> <p>All Project areas, except some anthropogenic features and open water, would be considered available habitat for migratory songbirds. Although some ecosite types may have lower density and diversity, it is expected that all ecosites provide migratory songbird habitat.</p> | <p>1. Explain how information in Table 9.4-15 and map 9.4-11 were derived.</p> <p>2. Explain why other habitat types were not considered as available habitat for migratory songbirds.</p> | | Accepted |
| IR-170 | - | ECCC | Migratory birds | Section 9.4.6.4, Residual Effects Evaluation for Bird SAR, Table 9.4-19 | <p>Context and Rationale: The table and map presented by the Proponent do not appear representative of all available habitat for common nighthawk (CONI). Although CONI do preferentially use open areas such as gravel (often an anthropogenic disturbance) and regenerating forest, as identified in the draft EIS, they also use rock outcrops that can be within forested areas. As this area lies within the pre- Cambrian shield, there are likely rock outcrops that are also available habitat.</p> <p>As aerial insectivores, CONI select nesting areas in close proximity to wetlands or lakes where there is abundant forage.</p> <p>Rationale: Habitat requirements and preferences for all species at risk is required for developing effective mitigations and adaptive management.</p> | <p>1. Provide an updated table and map that considers all available habitat for common nighthawk.</p> <p>2. Additionally, as part of environmental management plans the Proponent should include species-specific mitigations that are biologically relevant to all the species at risk for all Project phases and components.</p> | <p>Item one was accepted, but item two remains outstanding. In Section 9.4.5.2.1, the Proponent has not included species specific mitigations for all species at risk, including common nighthawk. The Proponent should include species specific mitigations for all species at risk, including common nighthawk, so that ECCC can provide advice on the extent of Project impacts to these species.</p> <p>Additionally, the Proponent indicates that prior to site clearing during the nesting season (period from March 15 to August 31), pre-clearing nest surveys will be conducted. ECCC does not typically recommend nest surveys as a pre-clearing activity (please refer to the Advice to the Proponent relating to IR-170). In some instances, surveying for breeding activity using non-invasive methods could be required to determine species presence, and for some migratory birds SAR it may be required to survey for nest trees (residences) prior to clearing as these have year-round protection through SARA and a permit may be required.</p> <p>Specifically, it is not adequate to group SAR together (e.g., all birds) due to the unique life history and habitat requirements of each individual SAR. Denison is expected to provide species-specific mitigation measures for each SAR separately.</p> | Not Accepted |
| IR-171 | - | ECCC | Migratory birds | Section 9.4.6.4, Residual Effects Evaluation | <p>Context and Rationale: Section 9.4.6.4 Residual Effects Evaluation for Bird SAR – Common Nighthawk reads: “Progressive reclamation is anticipated to begin during Construction. However, a conservative approach is used, with Common Nighthawk (CONI) habitat in the Project Area considered to be unavailable for the duration of the Project, only becoming available as habitat following Post-</p> | <p>Develop mitigation plans appropriate for avoiding collisions of common nighthawks with vehicles, when and where nighthawks are observed foraging near or roosting on gravel roads. Demonstrate how the planned mitigation activities will result in reduced residual effects from this pathway.</p> | | Accepted |

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| | | | | | Decommissioning (i.e., during the regeneration of vegetation following Decommissioning).” CONI may nest on the roadsides of access roads within the Project area. As such, the Project area should still be considered available habitat for the duration of the Project and appropriate mitigations and adaptive management should be discussed for this species. | | | |
| IR-172 | - | CNSC | Birds (all species) | Section 9.4.6.4.2 | Context: Populations of listed species may be less resilient to changes in mortality. CSA N288.6:22 Clause 7.2.4.3 states that effects on a few individuals of endangered, threatened, or vulnerable species would not be acceptable. The residual effects assessment for “Change in Mortality” for bird species at risk states that Project mitigation measures identified in Section 9.4.5 are expected to limit interactions between bird species at risk and potential sources of direct and indirect mortality. However, the mitigation measures are not discussed with respect to their effectiveness to limit interactions, specifically for bird species at risk. Rationale: It is unclear if the proposed mitigation measures are effective in preventing mortality in bird species at risk for which even only a few deaths could negatively impact the population. | Please provide a discussion on mitigation measures with respect to their effectiveness in minimizing mortality for bird species at risk, for which effects on a few individuals would not be acceptable. | | Accepted |
| IR-173 | - | ECCC | Migratory birds | Section 9.4.8 Monitoring and Follow-up | Context and Rationale: Monitoring and follow up programs are part of adaptive management and implementation of additional mitigations. In Section 9.4.8 the Proponent states: “Considering the Project planning, baseline survey results, and proposed mitigation measures, no follow-up programs are considered to be warranted at this time.” Project impacts related to mortality of birds, such as collisions with the transmission line, mortality along roads and use of waste and water management facilities should be monitored during all phases of the Project and adaptively managed. | Provide details on the follow-up program to monitor impacts to avian mortality. The follow-up plan should include: <ul style="list-style-type: none">• Monitoring of avian use of waste and water facilities• Monitoring of mortality along access roads• Monitoring of mortality related to transmission lines• Monitoring of effectiveness of avian deterrents. | | Accepted |
| IR-174 | - | ECCC | SAR – Bats | Appendix 9-B, Denison Mines Corporation Wheeler River Project, Terrestrial Environment, | Context: The Proponent conducted acoustic surveys for bats and confirmed presence of two Species at Risk Act (SARA) schedule 1 listed bat species in the Project area, little brown myotis (Myotis lucifugus) and northern myotis (Myotis septentrionalis). However, the Proponent did not do an effects assessment of either of these bat species. | 1. Conduct an effects assessment for little brown myotis and northern myotis, including the likelihood that tree clearing during the bat roosting period, is likely to ‘kill’, ‘harm’, or ‘harass’ Little Brown Myotis and Northern Myotis and its ability to carry out its life processes. | <u>Note to Denison:</u> There is additional text being drafted related to this topic, but it is still under review and may provide clarity on the outstanding request. Items one, three, and four have been accepted, but the response to item 2, regarding describing and mapping of locations of suitable myotis hibernacula and/or maternal roost | Not Accepted |

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| | | | | Wildlife and Vegetation Baseline Inventory, Section 2.1.4 Acoustic Bat Surveys | Rationale: Although bats are present in the study area, no work was done to identify hibernaculum or maternal roosting sites. All species at risk that are expected to be present in the Project area should be assessed and species-specific mitigations detailed. | 2. Describe and map locations of suitable myotis hibernacula and/or maternal roost habitat within the Local Study Area and Regional Study Area and explain how these habitats may be affected by Project activities. 3. Describe what mitigation measures will be taken to avoid the breeding period for bats. 4. Describe any pre-construction/pre- clearing surveys will be conducted to identify any hibernaculum and maternal roosting sites. Describe how monitoring will support adaptive management. | habitat within the Local Study Area and Regional Study Area and an explanation of how these habitats may be affected by Project activities, is outstanding. In responding to item two, the Proponent has provided a map of species detected and frequency of detection in the local study area over two days on July 22 and 23, 2019. ECCC notes that analysis is lacking for the regional study area, despite a few autonomous recording units (ARUs) that were placed outside the LSA. Data from two consecutive days in the same month is not an accepted method to document baseline occurrences associated with suitable habitat. The legend for Figure 2-9 is not clear in that frequency of detection is mapped based on two criteria: little brown myotis and little brown/northern myotis. The Proponent should use a scientifically defensible method to document baseline occurrences associated with suitable habitat. The Proponent should clarify the legend and explain the values found within it, including if the turquoise dot represent occurrence of both little brown and northern myotis. | |
| IR-175 | - | CNSC | Provincially Listed Species | Appendix 9-B; section 2.2.2 | Context: Vegetation and wildlife habitat characterization field surveys were completed in 2017, based on which ecosite factsheets were prepared. The factsheets list observations of two provincially listed plant species with a rank of S3 (vulnerable/rare to uncommon; Table 2.4-2) according to the Saskatchewan Conservation Data Centre, which are not discussed in the main EIS document: <ul style="list-style-type: none">Angle-leaved sundew (<i>Drosera anglica</i>) observed in ecosites BS19, BS20, BS22, BS25Neat Spike-rush (<i>Eleocharis nitida</i>) observed in ecosite BS25 Table 9.2-12 in section 9.2.6.2.1 of the EIS indicates that there may be indirect disturbance to some of these ecosites (BS19, BS20, BS25). In section 9.2.6.3.1 it is discussed that listed plant species are not likely to return once lost from a specific location. Rationale: Given that not all areas in the revised Project footprint were surveyed for listed plant species in baseline studies, there is uncertainty as to whether any species were missed, in particular those that have been observed in ecosites present in the LSA/RSA (e.g., <i>Drosera anglica</i> and <i>Eleocharis nitida</i> , see also Appendix 2 Table of Appendix 9-B). It should also be noted that rare plant surveys were completed in summer 2017 only (section 2.4.2 of Appendix 9-B), which may underestimate annual rare species that may be dormant in the seed bank in some years due to specific seed emergence requirements. | 1. Please provide a discussion on the potential risks from indirect effects on ecosites with observed rare plant species 2. Please provide additional information on the ecosites included in the planned pre-construction listed plant surveys Suggestions for mitigation and follow-up measures: CNSC recommends focusing monitoring on ecosites that have known observations of listed plant species outside of the Project Area (e.g., BS19, BS20, BS22, BS25). | | Accepted |

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| | | | | | <p>It is acknowledged that the Proponent committed to pre-construction listed plant surveys targeted on ecosites encountered in the Project Area but not previously surveyed, as well as ecosites within the Project Area with high potential to support listed plants.</p> <p>More information is requested on the potential indirect effects on rare plant species as well as the planned pre-construction surveys.</p> | | | |
| IR-176 | - | CNSC | Human Health with respect to radiation exposure | <p>Section 10.1.4.2.1 Section 10.1.6.1.4 Appendix 10-A (ERA)</p> | <p>Context: In section 10.1.4.2.1, the Proponent provides an evaluation of air quality constituents of potential concern to human health. It states: “A screening value for radon gas of 200 becquerels per cubic metre (Bq/m3) was available from Health Canada, which applies to total radon including background sources (Health Canada 2009). The radon concentrations which were predicted are incremental concentrations (i.e., above background) and were therefore compared to the applicable incremental screening value of 60 Bq/m3 for indoor air established by the Canadian Nuclear Safety Commission (CNSC) (Health Canada 2010a; Radiation Protection Regulations. SOR/2000-203).”</p> <p>The 60 Bq/m3 radon concentration value also appears in section 7.1.2 of Appendix 10-A (ERA).</p> <p>Further in section 10.1.6.1.4, it is stated: “Radon dose was calculated separately from the dose due to other radionuclides; however, the predicted radon concentration was compared against the CNSC incremental concentration limit of 60 Bq/m3.”</p> <p>The Radiation Protection Regulations do not stipulate a limit for radon above background for sites licensed by the CNSC. The effective dose limits for Nuclear Energy Workers (NEWs) and persons that are not NEWs are listed in section 13 of these regulations, and in subsection 1(3) of these regulations for the general public.</p> <p>The annual effective dose from all sources associated with the licensed activities and within the scope of the Nuclear Safety Control Act and Regulations must be compared to the applicable effective dose limit. For members of the public this limit is 1 mSv per calendar year.</p> <p>In Section 4.2.5.3 of Appendix 10-A (ERA), there appears to be no reference mentioned for the radon equilibrium factors. These factors are a significant input into the dose calculations for radon.</p> | <p>The EIS and appendices should be aligned with the Radiation Protection Regulations by:</p> <ol style="list-style-type: none">1. Removing the reference to a 60 Bq/m3 limit.2. Reporting the assessment results as the total dose, from all radionuclides combined including radon progeny, and by comparing this annual effective dose to the effective dose limit. <p>Provide a summary of the conservative assumptions that have been included in the dose calculations.</p> <p>Provide a reference that shows how the radon equilibrium factors were determined.</p> | | Accepted |

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| | | | | | Rationale: The reason for the requested change is to ensure consistency with the Radiation Protection Regulations. | | | |
| IR-177 | - | HC | Change to an environmental component due to radiological contaminants | Section 10.1.4.2.1 (p. 10-22) Appendix 10-A (ERA) : Appendix B Table B.9, Ref. 19-2638 Section 6, Table 6.1-1 (p. 6-7) | <p>Context: Section 10.1.4.2.1 states that, “Screening values for radionuclide concentrations in ambient air were not available. All relevant radionuclides were assessed in the HHRA in terms of their contribution to the total radiological dose to human and ecological receptors” (p. 10-22).</p> <p>Section 10 Appendix 10-A (ERA) states that, “No formal screening was conducted for radionuclides. However, since radiation dose to human receptors is of public and regulatory interest, the radionuclides in the uranium-238 decay series are carried forward as COPCs for further assessment” (Appendix 10-A (ERA): Appendix B Ref. 19-2638).</p> <p>Table 6.1-1 lists radionuclides as a key indicator for air quality, but only uranium and radon are considered in Section 6, and Section 10 Table B.9 does not include doses from uranium progeny in air.</p> <p>Rationale: Health Canada recommends using screening values that are available for radionuclides if they are appropriate for the dose and if the screening values have listed assumptions (such as particulate size and worker exposure time that can be adapted to in Denison’s models). Two examples are ICRP 96, which CNSC uses in their regulatory reports to derive reference air quality values for Pb-210, Ra-226, and Th-230 (CNSC: Regulatory Oversight Report for Uranium Mines and Mills in Canada 2019); and Health Canada’s Guidelines for Management of NORM (Health Canada: Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials, 2011).</p> | <p>1. Assess predicted radionuclides in Section 10 Appendix 10-A (ERA) using appropriate available screening values. Alternatively, provide a justification for why a screening wasn’t conducted for radionuclides despite the availability of screening values (e.g., ICRP 96 and NORM Guidelines, 2011).</p> <p>2. Clarify if uranium progenies in air are considered in the atmospheric transport and air quality modelling and are simply not reported, or if they are not included in the models because no screening criteria are available.</p> | Response is accepted, but also see AD-55 in the Advice to Proponent table. | Accepted |
| IR-178 | - | HC | Change to an environmental component due to hazardous contaminants | Section 10.1.4.2.1 (p. 10-22) Section 6.1.4.2, Potential Project Related Effects (p. 6-31) | <p>The Baseline + Project scenario was not provided for radon levels.</p> <p>Context: Section 6.1.4.2 states that the predicted levels for radon were not added to the respective baseline air quality levels (p. 6-31), and further explains that “In all modelled phases of the Project, annual average radon concentrations at receptors beyond the Property Boundary are expected to be indiscernible from background levels.”</p> <p>In Section 10.1.6.1.4, a different approach to evaluating predicted radon levels is mentioned: “the predicted radon concentration was compared against the CNSC incremental concentration limit of 60 BQ/m³”(p. 10-44).</p> | <p>1. Provide further information on whether and how baseline radon concentrations in air were determined.</p> <p>2. Include baseline radon concentrations in the predicted total concentrations when comparing to existing guidelines; alternatively, provide a rationale for why baseline concentrations of radon were not included.</p> <p>3. Discuss the potential health implications of the project-only increment-over-baseline radon levels</p> | | Accepted |

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| | | | | | Rationale: Without a rationale as to why baseline levels of radon were not included in the assessment, HC cannot fully evaluate the appropriateness of the air quality assessment. While Health Canada is of the opinion that using background radon levels as a screening value is appropriate in this case from a health perspective, different approaches to screening predicted radon levels in different sections appear to be used (i.e., background radon levels vs. CNSC incremental concentration). | | | |
| IR-179 | - | CNSC | Groundwater quality decommissioning objectives. | Section 10.1.4.2.2, Release of Treated Effluent to Whitefish Lake During Decommissioning | Context: It is stated that “This process would continue until the recovered water meets acceptable groundwater quality decommissioning objectives”. Rationale: The information provided does not include groundwater quality decommissioning objectives nor a reference to these objectives. | Please provide groundwater quality decommissioning objectives or a reference to the information. | | Accepted |
| IR-180 | - | CNSC | Human health with respect to hazardous contaminants | Section 10.1.6.1.1, Human Receptors Selection and Characterization | Context: Within the Human Health assessment, offsite receptors during the operation period are only considered downstream of Whitefish Lake. The only identified concern was for Se to the Fisher/Trapper located at Russel Lake. This section cites Indigenous Knowledge as informing the receptor selection and location. Rationale: While the assessment is fairly conservative in the assumptions made on intake and receptor habits, it stands to reason that if the trapper receptor was located closer to the operation, such as at McGowan or Whitefish Lakes, this exceedance of Se could be more pronounced. In terms of maintaining a conservative assessment, if the most vulnerable receptor can be shown to be protected at the point of highest expected COPC concentration, it can be concluded that this receptor would be protected further away from the Project. Considering this, why was the hunter/trapper receptor not also assessed at Whitefish or McGowan Lake? Was Indigenous Knowledge specific in mentioning Whitefish or McGowan Lakes were not used for the activities carried out by identified receptors? | Please provide justification for excluding a receptor from occupancy at lakes closer to the Project during operation (McGowan, Whitefish). Alternatively, conduct a risk assessment to a receptor at these lakes during operation to determine if there is a predicted risk that may require monitoring or mitigation. Suggestions for mitigation and follow-up measures: CNSC recommends the following: <ul style="list-style-type: none">Assessment of a receptor located closer to the point of effluent release may need to be considered to ensure there are negligible risksIf Se is expected to exceed hazard quotients further upstream, selenium removal technology may be required as part of the effluent treatment process as a mitigation measure. Other COPC’s exceeding an HQ of 1 may also be identified under this process that could require specific monitoring or mitigation measures. | Response is accepted, but also see AD-59 in the Advice to Proponent table. | Accepted |
| IR-181 | - | CNSC | Human Health with respect to radiation exposure | Section 10.1.6.1.4 | Context: In section 10.1.6.1.4, it is stated: “The maximum incremental radon concentration at the camp worker site during Operation was predicted to be 12.4 Bq/m3, which is below the CNSC limit of 60 Bq/m3 for incremental radon.” As per IR-176, there is no such CNSC limit for incremental radon. The camp worker would be considered a person who is not a nuclear energy worker (NEW) and subject to the dose limits of | The EIS and appendices should be aligned with the Radiation Protection Regulations by: <ol style="list-style-type: none">Removing the reference to a 60 Bq/m3 limit for incremental radon.Revising all references to the ‘public dose limit’ applied to camp workers (non-NEWs) to align with section 13 and 14 of the Radiation Protection Regulations. | | Accepted |

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| | | | | | <p>section 13 and 14 of the Radiation Protection Regulations, not the dose limit for the general public as per subsection 1(3) of the Radiation Protection Regulations. The CNSC has regulatory requirements for the ascertainment and recording of doses of radiation as per section 5 of the Radiation Protection Regulations. Every licensee must ascertain and record the magnitude of exposure to radon progeny, the effective dose and equivalent dose received by and committed to a person who performs duties in connection with any activity that is authorized by the Nuclear Safety and Control Act or is present at a place where that activity is carried on.</p> <p>The camp worker performs duties in connection with the licensed activity and is present at the location where the activity is carried out. Hence, they are not considered to be a member of the general public (who has no connection with the activity)</p> <p>Further, the Proponent indicates that the maximum incremental radon dose to the camp worker was estimated to be 0.13 mSv/year during Operation. The assessment assumes that the camp worker spends 100% of the time indoors. Table 10.1-11 shows the maximum total incremental dose for the camp worker to be 0.02 mSv/year. This appears to be a discrepancy.</p> <p>Table 5.2 in Appendix 10-C provides internal annual dose from radon inhalation. The radon doses to some NEW workers (9.44E-02 mSv/a Driller 1 and 1.03E-01 mSv/a Wellfield Operator 1, 2) here appear less than the radon dose (0.13 mSv/year from section 10.1.6.1.4) to the camp worker, who is a non-nuclear energy worker.</p> <p>Rationale: The reason for the requested change is to ensure consistency with the Radiation Protection Regulations and the environmental impact statement.</p> | <p>The Proponent should explain why the radon dose for the camp worker appears as 0.13 mSv/year in one instance and 0.02 mSv/year in another.</p> <p>The Proponent is also asked to provide the rationale as to why a non-NEW has a higher radon dose than a NEW.</p> | | |
| IR-182 | - | HC | Change to an environmental component due to radiological contaminants | Section 10.1.6.1.4, (p. 10-44) | <p>Context: Section 10.1.6.1.4 states, “The limit is incremental and is exclusive of natural background, such as natural levels of radon and medical exposures. A dose constraint of 0.3mSv/yr was established for the public from all radionuclides and all pathways for the Project, as recommended by Health Canada (2010a). The dose constraint represents a dose lower than the public dose limit that ensures the combined dose from multiple sources does not result in exceedance of the public dose limit. Radon dose was calculated separately from the dose due to other radionuclides; however, the predicted radon concentration was compared against the CNSC incremental concentration limit of 60 BQ/m3” (p. 10-44).</p> | <p>1. Provide clarification on how combined doses from all sources would be accounted for in respecting the public dose limit of 0.3 mSV/yr if radon concentrations are being calculated separately.</p> | Response is accepted, but also see AD-65 in the Advice to Proponent table. | Accepted |

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| | | | | | Rationale: Calculating radon separately from all radionuclides may underestimate the health risks by not considering combined doses from multiple sources when comparing to the public dose limit constraint of 0.3 mSv/yr recommended by Health Canada (2010a). | | | |
| IR-183 | - | CNSC | Human Health with respect to radiation exposure | Section 10.2 Appendix 10-C | Context: Exposure scenarios for workers have been identified and high-level summaries of the assumptions and resultant dose estimates have been provided. However, the detailed dose calculations have not been provided. Rationale: The method used to estimate effective, equivalent and committed dose is required to be verified. Sample dose calculations should be included, to confirm use of acceptable input data, for at least the most dose significant scenarios. | Provide the dose calculations for deriving the dose estimates for workers in all exposure scenarios, for at least the most dose significant scenarios. | | Accepted |
| IR-184 | - | CNSC | Human Health with respect to radiation exposure | Section 10.2 Appendix 10-C, 2.0 | Context: It is stated in Appendix 10-C, section 2.0 that: “In addition, the CNSC has proposed a 100 mSv 5-year equivalent dose to lens of eye, in accordance with recent recommendations of the International Commission for Radiological Protection (ICRP, 2012a). This implies an average annual equivalent dose to lens of 20 mSv/a and will be considered as an applicable dose limit for workers.” As per section 14 of the Radiation Protection Regulations, the equivalent dose limit for the lens of an eye for nuclear energy workers (NEWs), effective January 1, 2021, is 50 mSv in a one-year dosimetry period. Rationale: The reason of the requested change is to ensure consistency with the Radiation Protection Regulations. | The EIS and Appendix 10-C should be aligned with the Radiation Protection Regulations regarding the equivalent dose limit for the lens of an eye for NEWs. | | Accepted |
| IR-185 | - | CNSC | Human Health with respect to radiation exposure | Section 10.2.3.2 Appendix 10-C Table 3.10-3.12 | Context: The Geometries for External Exposure Scenarios Modelled in MicroShield for Sources in various locations were provided in tables 3.10-3.12 in appendix 10-C. The doses from those scenarios were omitted. Rationale: The method used to estimate effective, equivalent, and committed dose is required to be verified. Sample dose calculations should be included, to confirm use of acceptable input data. | The Proponent is asked to provide all the necessary information and assumptions required to perform the MicroShield calculations independently and to list the resulting calculated values from the listed scenarios. | | Accepted |
| IR-186 | - | CNSC | Human Health with respect to radiation exposure | Section 10.2.3.2.4 Section 10.2.3.2.6 Section 10.2.4 Appendix 10-C, Section 3.2 | Context: In sections 10.2.3.2.4 and 10.2.3.2.6, as well as section 3.2 of Appendix 10-C, the Proponent has stated that workers in the drying and packaging areas of the processing plant will be required to wear powered air purifying respirators (PAPR) to reduce/eliminate inhalation exposure. Further in section 10.2.4, which elaborates mitigation measures, it is stated: “For the drying and packaging/loading areas of the ISR plant, | Provide the rationale for mandating the use of respirators by workers in the drying and packaging areas of the processing plant. Include the demonstration of the application of the hierarchy of control for radiological protection within the design of these areas of the processing plant. | | Accepted |

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| | | | | | <p>use of PAPR has been assumed. It will be needed in these areas, and it has been planned in these areas to substantially reduce doses from inhalation of uranium dust. Dust levels in these areas will be monitored and kept ALARA.”</p> <p>The use of respirators appears to be in contradiction of the requirements of section 13 of the Uranium Mines and Mills Regulations, which states: <i>No licensee shall rely on the use of a respirator to comply with the Radiation Protection Regulations unless the use of the respirator (a) is for a temporary or unforeseen situation; and (b) is permitted by the code of practice referred to in the licence.</i></p> <p>The Proponent is also reminded that respirators should not be the first choice for dose reduction in workplaces. They should only be used when the hierarchy of control (elimination, substitution, engineering, or administrative controls) is not possible.</p> <p>Rationale: At this stage of the Project, the Proponent is expected to identify design improvements to these areas of the ISR plant/processing plant following the hierarchy of control for the radiological protection of workers, as per regulatory requirements and as described in REGDOC-2.7.1, <i>Radiation Protection</i>.</p> | Justify that this approach complies with section 13 of the Uranium Mines and Mills Regulations. | | |
| IR-187 | - | CNSC | Human Health with respect to radiation exposure | Section 10.2.3.2.4 Section 10.2.3.2.6 Appendix 10-C, Section 3.3, 6.0 | <p>Context: The exposure scenarios and assumptions for the workers in the drying area and the packaging/loading area of the processing plant include the wearing of PAPRs, which is assumed to provide a 1000-fold reduction in dust exposure.</p> <p>Further to reference IR-186, the use of a respirator as well as in worker dose predictions for the Project, appears to contravene section 13 of the Uranium Mines and Mills Regulations, and does not follow the hierarchy of controls for radiological protection of workers as described in REGDOC-2.7.1, <i>Radiation Protection</i>.</p> <p>Rationale: At this stage of the Project, the Proponent is expected to identify design improvements to these areas of the ISR plant/processing plant following the hierarchy of control for the radiological protection of workers, as per regulatory requirements and as described in REGDOC-2.7.1, <i>Radiation Protection</i>.</p> | <p>Modify the exposure scenarios and assumptions (i.e., remove the use of a respirator) for the workers in the drying area and the packaging/loading area of the processing facility.</p> <p>Assess the resultant exposures against CNSC regulatory dose limits and the ALARA principle.</p> <p>Identify mitigation measures as per the hierarchy of control for radiological protection.</p> | | Accepted |
| IR-188 | - | CNSC | Human Health with respect to radiation exposure | Section 10.2.4 | <p>Context: The following is stated in section 10.2.4: “Dust inhalation is also a potentially substantial component of worker dose at the core shack. At this location, PAPR will not be required; however, N95 masks will be used, and dust levels will be monitored here...It may be possible to increase air exchange in the core shack, above the planned six exchanges per hour, should this be necessary. This</p> | Provide details on how the control measures to reduce the exposure to both workers through the air exchange protocols in the core shack have been formally documented to ensure that it is incorporated in the engineered design of the core shack. | | Accepted |

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| | | | | | would also reduce radon exposure in the core shack.” If it is possible to increase air exchanges in the core shack, it is not clear why this was not assessed and incorporated in the design of the core shack. Rationale: It appears that a control measure (e.g., air exchange protocols in the core shack) to reduce the exposure to workers has been identified. However, it is not certain if it has been formally documented to ensure that it is incorporated in the engineered design of the core shack. | | | |
| IR-189 | - | CNSC | Woodland Caribou Ecological Model | Appendix 10-A (ERA) | Context: In the ERA (p. C.12, section 2.3.6 Woodland Caribou) it is stated: “For the ecological model a diet comprised of 50% browse, 20% lichen and 30% macrophytes is assumed for the woodland caribou.” In the EIS, section 9.3.3.3.1, it is stated: “Research has shown that up to 70% of the year-round diet of caribou may consist of ground and arboreal lichens.” Rationale: It is unclear whether the assumptions in the ecological model in the ERA regarding Woodland caribou diet are conservative, given only 20% lichen intake in the model. Lichen is known to accumulate COPC such as metals and dust from the atmosphere. | Please provide additional evidence to support that those Woodland Caribou who may have higher consumption rates of lichen as part of their diet, will remain protected. This can be provided through including a second model that assumes 70% lichen in the diet. See also related: IR-138. | | Accepted |
| IR-190 | - | HC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Table 3-8 (p. 3.31) and Table 3-9 (p. 3.36) Appendix 6, Table 5 (p. 16) | NO2 criteria is not being consistently compared. Context: Provincial and federal air quality criteria/screening values for NO2 have been used inconsistently. Table 3-9 in Appendix 10-A (ERA) uses the 2015 Saskatchewan Ambient Air Quality Standards (SAAQS) value of 300 µg/m3 to compare the maximum concentrations of NO2 at receptor locations for the 1-hour average period, while Table 5 of Appendix 6 uses the 2025 Canadian Ambient Air Quality Standards (CAAQS) of 79µg/m3 for the same average period time. Rationale: By utilizing the SAAQS screening value for NO2, the maximum concentrations at receptor locations exceed the 1-hour threshold solely during the decommissioning stage (Table 3-9). However, if the 2025 CAAQS are applied, the screening values would be exceeded at receptor locations for all project phases. It is best practice to use the more protective air quality standards to evaluate potential human health risks associated with project activities. | 1. Compare the predicted maximum concentrations to the most protective applicable air quality standards available. Alternatively, provide a rationale as to why the SAAQS for NO2 were used rather than the more protective 2025 CAAQS to determine potential exceedances and screen for the need for additional mitigation measures. Suggestions for mitigation and follow-up measures: Health Canada recommends use of the standards from the 2025 CAAQS for NO2 in future mitigation and follow-up plans. | The response to IR-190 acknowledges the predicted exceedances of the CAAQS for NO ₂ . However, the revised information does not appear to have been carried through to all the health risk assessment documents. HC notes that the new CAAQS for NO ₂ also recognizes that there is no population health threshold for human health effects; therefore, any increase in exposure will result in an incremental population risk (Environment Canada and Health Canada, 2012; CCME, 2000). In other words, NO ₂ is considered a non-threshold substance, meaning that health effects may occur at any level of exposure. Therefore, guideline values should not be construed as limits to which polluting up to is allowed. Please provide the following information: 1. Present modelled concentrations at the nearest human receptor site (i.e., Risk 2 - seasonal resident at McGowan Lake) in Tables 3-9, 3-10 and 3-11). 2. Correct/update Section 3.2.1.3.1: <i>Nitrogen Dioxide</i> , of Revised DRAFT EIS Appendix 10-A (February 2024), as follows: a. Remove references to the 1970’s National Ambient Air Quality Objectives (NAAQOs) for NO ₂ . These objectives are no longer relevant and do <u>not</u> support the exclusion of NO ₂ from further consideration as a COPC (Ref. AD-67); | Not Accepted |

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| | | | | | | | <p>b. Acknowledge that modelled results exceed the 1-h NO₂ CAAQs at the <i>camp workers location</i> and <i>fence line</i> during all project phases; and,</p> <p>c. Consider NO₂ a COPC for further quantitative assessment and characterize the potential health risk related to 1-h exposure to NO₂.</p> <p>3. Characterize potential health risks from 1-h exposure to NO₂ using HC’s guidance. Alternatively, use the updated 2021 WHO Global Air Quality Guidelines for annual and 24-h NO₂ exposures when calculating hazard quotients.</p> <p>4. Discuss how the proposed mitigation measures to minimize residual effects of the Project on air quality, as identified in Section 16.1.1 of the Revised DRAFT EIS (January 2024), address the health risks identified in Chapter 10. Also specify whether any additional air quality monitoring and/or mitigation measures are proposed specifically to address human health risks.</p> <p>Editorial Revisions</p> <p>1. Corrections are required for Table 3-11: <i>Summary of Air Quality Constituents that Exceed a Screening Value</i>, for NO₂ so that it remains consistent with the results presented in Tables 3-9 and Table 3-10 (i.e., 1-h exceedance at the <i>camp worker location</i> and <i>fence line</i> for all phases).</p> <p>2. Include the updated human risk receptor site names for Risk 2 and Risk 4 for consistency throughout the DRAFT EIS.</p> <p>a. “Risk 2 - trapper” is now “Risk 2 - seasonal resident at McGowan Lake.”</p> <p>b. “Risk 4 - seasonal resident” is now “Risk 4 - seasonal resident at Russell Lake.”</p> <hr/> <p>World Health Organization (WHO), 2021. WHO global air quality guidelines. Particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. 273 p. Available online at: https://apps.who.int/iris/handle/10665/345329</p> | |
| IR-190 | IR-190-R1 | HC | Change to an environmental component due to hazardous contaminants | Section 6.1.3.2.2 (p. 6-21) Table 6.1-8 (p. 6-22); and, Table 6.1-9 (p. 6-22) Section 6.1.8 (p.6-44) IR-190 Response from Denison | Limitations with the proposed use of passive NO ₂ monitoring would not allow comparison of measurement results to the 2025 CAAQS for 1-hour NO ₂ . Context: In response to IR-190, there was agreement to using the 2025 CAAQS for NO ₂ in future mitigation and follow-up plans, which Health Canada supports. However, the proposed air quality monitoring and follow-up plans (Chapter 6.1.8) anticipate continued use passive NO ₂ samplers, which do not measure hourly (1-hour) concentrations. Section 6.1.3.2.2 indicates that the assessment makes use of passive samplers to measure NO ₂ at two sampling locations. The results from those samplers are presented in tables 6.1-8 and 6.1-9, for a ~30-day sampling period (i.e., a total concentrations for NO ₂ in ambient air over ~30 days). | 1.Provide additional details on proposed air quality monitoring for NO ₂ that will allow for comparisons to both the 1-hour and annual 2025 CAAQS and how that will be used to support mitigation and follow-up plans. Distinguish between comparisons with measured and modelled monitoring data, as well as use of passive and active samplers. 2. If multiple approaches will be used to monitor NO ₂ (e.g., use of passive and/or active samplers, modifications due to differences between project phases, etc.), describe their intended contribution to the monitoring objectives and outcomes (e.g., determine the accuracy of predictions; assist with implementing or modifying mitigation measures). | <p><i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> <p>Please provide the following information:</p> <p>1. Clarify the conditions under which a switch from passive to continuous monitoring would be warranted (e.g., if the 30-d measured NO₂ concentration, after conversion to a 1-h concentration, approaches or exceeds the 1-h CAAQS value).</p> | Accepted |

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| | | | | | <p>While passive samplers provide measurement data for comparison to the annual 2025 CAAQS for NO₂, measurement data for the 1-hour NO₂ standard commonly requires use of an active sampler.</p> <p>Rationale: Health Canada encourages the monitoring of air contaminants when exceedances or near-exceedances of air quality criteria, standards and/or guidance values are predicted or reported, to:</p> <ul style="list-style-type: none">determine the accuracy of predictions;help verify whether standards are being met; and,assist with implementing or modifying mitigation measures. | | | |
| IR-191 | - | HC | Change to an environmental component due to hazardous contaminants | <p>Appendix 10-A (ERA), Table 3-9 (p. 3.36) and Table 3-10 (p. 3.46)</p> <p>Section 6.1.8 (p. 6-44)</p> | <p>Non-threshold substances are not included in screening and monitoring plans.</p> <p>Context: Fine particulate matter (PM2.5) is not being considered further in secondary air quality screening for short and long-term exposure at human and ecological receptors because it is not predicted to exceed the screening values of the Ontario Ambient Air Quality Criteria (OAAQC) or the Canadian Ambient Air Quality Standards (CAAQS) for both annual and 24-hour average periods (Tables 3-9 and 3-10). Furthermore, it is not compared against the baseline for analysis.</p> <p>Table 3-9 indicates that coarse PM (PM10) is predicted to exceed the 24-hour CAAQS during all phases of the Project. However, Appendix 10-A p. 3.46 states that, “There were no exceedances of PM2.5 which is generally considered to be a more reliable indicator of potential health effects. However, health effects would be infrequent and reversible, subsiding after exposure; therefore, PM10 was not considered for further quantitative assessment in the ERA.”</p> <p>PM10 and PM2.5 were not included in the air quality monitoring plan (Section 6.1.8).</p> <p>Rationale: Particulate matter and NO2 are considered non-threshold pollutants, meaning that health effects can occur at any level of exposure, The CAAQS for PM2.5 PM.10, and NO2 recognize that there is no population health threshold for human health effects; therefore, any increase in exposure will result in an incremental population risk (Environment Canada and Health Canada, 2012; CCME, 2000). The CAAQS values should not be construed as limits to which polluting up to is allowed. In addition, based on the principles of keeping clean areas clean and continuous improvement, proposed mitigation measures should not be</p> | <p>1. Include PM2.5 and PM10 in the secondary air quality screening for short and long- term exposure at human receptors.</p> <p>2. Include PM10 and PM2.5 in the air quality monitoring plan as they are non- threshold substances.</p> <p>3. Provide a discussion of the significance of predicted exceedances of health- based standards.</p> <p>4. Identify additional mitigation measures to reduce concentrations of non- threshold air contaminants associated with the Project.</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends use of the <u>2025 CAAQS Management Levels</u> to develop mitigation measures that reduce project contributions of non-threshold pollutants (e.g., PM2.5, NO2).</p> | | Accepted |

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| | | | | | <p>confined to meeting the standards but should also be targeted towards reducing population exposure to CACs associated with the proposed project.</p> <p>Furthermore, although health risks associated with PM2.5 are higher than those associated with PM10, both fractions are considered non- threshold pollutants and identified by IARC (2013) as causes of cancer.</p> <p>Reference: [1] International Agency for Research on Cancer (IARC). 2013. IARC monographs on the evaluation of carcinogenic risks to humans. Volume 109. Outdoor air pollution. Lyon: International Agency for Research on Cancer.</p> | | | |
| IR-192 | - | CNSC | Human Health with respect to radiation exposure | Appendix 10-A (ERA), Section 3.1.1.2, including Tables 3-1 and 3-2 | <p>Context: Section 3.1.1.2 in Appendix 10-A (ERA) provides the method of how select constituents including cadmium, chromium, selenium and lead-210 were determined. This section does not mention how the other constituents as listed in Tables 3-1 and 3-2 are determined.</p> <p>The values for Th-230 and U-238 in Table 3-1 are unexpected. Typically, these values should be at equilibrium.</p> <p>Rationale: The technical basis for the selection of constituents of concern is required as part of the environmental and human health risk assessments.</p> | <p>1. Provide the methodology of how all listed constituents are determined.</p> <p>2. Provide the rationale as to why Th-230 and U-238 are not in equilibrium.</p> | | Accepted |
| IR-193 | - | ECCC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Section 3.1.1.2 Section 8.2.4.2.3 | <p>Context: Appendix 10-A (ERA) Table 3-1 ‘Screening of Effluent Quality against Surface Water Quality Guidelines for the Wheeler River ERA’ does not include acute water quality thresholds for all COPCs compared against predicted effluent quality. For example, it is stated that the final effluent quality discharge target for uranium is 0.057 mg/L. However, the CCME water short term (acute) water quality guidelines for the protection of aquatic life is 0.033 mg/L. The proposed effluent discharge target for uranium exceeds the acute water quality guidelines, indicating effluent may pose the risk of being acutely lethal to aquatic biota at end-of-pipe.</p> <p>All water quality thresholds should be derived from receiving environment parameters, and there are discrepancies between the values used in Appendix 10-A (ERA) Table 3-1 and the values presented in Tables 8.2-8 and 8.2-10 in Section 8.2.4.2.3 of the draft EIS. No selected screening value for TSS has been calculated from baseline conditions. Un-ionized ammonia, which is a regulated Schedule 4 substance under the MDMER, has not been included.</p> | <p>1. Provide acute and chronic water quality thresholds for all required COPCs with monitoring required under the MDMER.</p> <p>2. Ensure all water quality thresholds are derived from receiving environment baseline parameters and that these thresholds are consistently applied throughout the draft EIS.</p> | <p>The previous round’s IR has not been fully met. When responding to item one, the Proponent did not update Table 3-1 in Appendix 10-A. And the rationale provided relates to Table 8.2-10, which is not part of the request. The Proponent should update Table 3-1 in Appendix 10-A to include un-ionized ammonia, mercury and phosphorous and should incorporate these parameters into the risk assessment as needed. The Proponent should also correct the following inconsistencies in Table 3-1 in Appendix 10-A:</p> <ul style="list-style-type: none">Table footnote #11 refers to the strontium guideline; strontium is not included in the table and the footnote is also not referenced in the table,Please refer to IR108 for comments on derivation of aluminum, chromium, copper, nickel, manganese and cobalt thresholds. <p>The Proponent responded to item two by modifying Tables 8.2-8 and 8.2-10 to include both acute and chronic water quality thresholds. The Proponent should update Table 3-1 in Appendix 10-A with the corrections flagged in comments IR-108 and IR-114 then update the risk assessment to incorporate these parameters and values as needed.</p> | Not Accepted |

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| | | | | | Rationale: A review of all modelling results for all COPCs under the MDMER will assist ECCC in understanding the potential risks to the receiving environment. | | | |
| IR-194 | - | ECCC | Aquatic species | Appendix 10-A (ERA), Section 3.1.1.2 and Section 3.1.2.3 | <p>Context: In the ERA, COPCs should be selected for further assessment based upon the following factors:</p> <ol style="list-style-type: none">1. COPC concentrations in effluent that exceed selected water quality guidelines for the protection of aquatic biota, and2. Baseline COPC concentrations in the LSA that exceed selected surface water and sediment quality guidelines for the protection of aquatic biota. <p>However, only COPCs that had concentrations in effluent that exceeded guidelines were assessed further. Baseline concentrations of COPCs in sediment were not considered. In addition to this, not all COPCs that require monitoring under the MDMER had predicted effluent concentrations. From Section 8.2.3.3 Table 8.2-2 of the Aquatic Environment Report, it appears Aluminum in McGowan Lake and Whitefish Lake South and North, and pH in Whitefish Lake North exceed water quality guidelines. Predicted effluent concentrations or near-field surface water concentrations for Aluminum and pH are not provided.</p> <p>Rationale: It is not possible to determine if there is risk from effluent to the receiving environment and aquatic receptors based on the current information provided.</p> | <ol style="list-style-type: none">1. As noted in IR-114, provide the information on predicted effluent quality for COPCs with required monitoring under the MDMER.2. Provide the information on predicted maximum receiving environment surface water concentrations for COPCs with required monitoring under the MDMER in IR-114.3. Update the ERA to assess the risk of any additional MDMER COPC concentrations in effluent that exceed water quality guidelines.4. Update the ERA to assess the risk of COPCs that had elevated baseline water and sediment quality concentrations in the receiving environment. | <p><u>Note to Denison:</u> There are multiple elements of this IR outstanding. This IR is being conditionally accepted for the purposes of the EA process, but these issues will need to be resolved during the licensing process. It is expected that a fully revised ERA that both incorporates revisions following closure of EA related IRs and addresses outstanding issues that will be further assessed during the licensing review. This commitment should be captured in the Commitments Register, and relates to various IRs in this table.</p> <p><i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> <p>Item one of the IR has been met. However additional information is required for items two, three, and four. Similar to ECCC's rationale provided for IR-124, "the ERA primarily relies on modelling results to identify the maximum predicted levels of COPCs in the receiving environment." However, due to the upper bound discharge rates being the only model input evaluated, it is unclear whether the model considered scenarios where maximum COPCs might occur as the exclusion of other environmental variables may have resulted in inaccurate maximum environmental concentrations of the COPCs.</p> <p>The Proponent's responses regarding baseline exceedances of COPC thresholds in the receiving waterbodies requires additional information. The modeling of surface water and sediment COPC's described in Appendix 10-A, Figures 6-1 and 6-2 respectively, show results for the receiving waterbodies. However, it is unclear if these modeled values are based on the worst-case scenarios that account for environmental variables such as seasonal changes in hydrology and chemistry, or if they have only accounted for changes in operational effluent discharge scenarios to consider the upper bound discharge rates. Including the upper bounds of operational effluent discharges regardless of the variability of the receiving environmental conditions is important factor for determining whether the baseline data and risk assessment fully considered the effects of the operations of the proposed mine, including environmental concentrations of the COPCs, on water quality.</p> <p>The Proponent should provide baseline data and a risk assessment that includes consideration of maximum COPC scenarios for the receiving water bodies, including seasonal variability and sediment depositional areas. The Proponent should provide supplemental information to identify if the environmental model has considered environmental variability such as seasonal changes in water levels, flows and sedimentation. The Proponent should also demonstrate that the model has considered a reasonable expected worst case scenario, such as a 100 year return.</p> | Accepted |
| IR-195 | - | ECCC | Change to an environmental component due | Appendix 10-A (ERA), Section 3.1.2.1 | <p>Context: Figure 3-2 depicts modelled concentrations of COPCs in the receiving environment surface water during all Project phases. Effluent discharge rates during Operations and Decommissioning</p> | <ol style="list-style-type: none">1. Provide further information on modelled maximum COPC concentrations for each individual Project phase with estimated | Item one has been partially met. The corrections made to Table 3-3 of Appendix 10-A do not match the values which were submitted as the first round IR response (Tables IR195-1 and IR195-2 (Modelled Maximum COPC Concentrations in Sediment by Individual Project Phase)). | Not Accepted |

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| | | | to hazardous contaminants | | are not anticipated to differ significantly. However, COPC concentrations seem to decrease rapidly after the end of the operations period despite effluent releases continuing into the decommissioning phase. Rationale: There has been no information provided on predicted changes in effluent COPC concentrations and discharge rates during the decommissioning phase. It remains unclear how COPC concentrations would decrease so quickly following the end of operations. | timing for peak concentrations to appear in the receiving environment. 2. Provide further information on predicted effluent quality during the Project decommissioning phase. 3. Update ERA figures and conclusions as needed. | The Proponent should confirm which table contains the correct information, and make any necessary corrections to the revised draft EIS with an explanation for the differences. | |
| IR-196 | - | ECCC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Section 3.1.2.3 | Context: Table 3-6 provides predicted maximum sediment concentrations of COPCs compared to sediment quality guidelines. Several selected sediment screening values are not the most stringent sediment quality guidelines, with no justification provided. Additionally, copper and lead appear to be missing guidelines that are available from the Burnett-Seidel and Liber (2013) study. Rationale: The most stringent guidelines should be used for the sediment quality risk assessment in the ERA. Use of the most stringent guidelines will allow the most protective assessment to analyze risks to the receiving environment, aquatic and terrestrial biota. | 1. Provide further information and justification for the selection of less stringent thresholds. 2. Update the ERA as needed. | | Accepted |
| IR-197 | - | ECCC | Aquatic species | Appendix 10-A (ERA), Section 3.2 | Context: It remains unclear if atmospheric deposition from Project related emissions has been incorporated into modelling for the ERA and surface water and sediment quality assessments. Rationale: While expected Project air emissions are unlikely to have direct impacts on the aquatic receiving environment and aquatic biota, this Project effect pathway may have indirect effects through accumulation of COPCs over time or deposition of contaminants that are not expected in effluent, which should be evaluated with predicted emissions data incorporated into water quality modelling predictions. | Incorporate atmospheric deposition from Project-related emissions into water quality modelling and assess any Project related effects to aquatic receptors from this pathway. | The Proponent is not using the correct CSA standard to address this information requirement. The response refers to guidance from CSA N288.1 (i.e., <i>Guidelines for modelling radionuclide environmental transport, fate and exposure associated with the normal operation of nuclear facilities</i>), however, the information requirement specifies CSA N288.6, which is a different standard. In lieu of requesting information on atmospheric deposition of all contaminants of potential concern (COPC) to surface water and associated effects, the Proponent should: <ol style="list-style-type: none">1. Provide an estimate of atmospheric deposition of mercury (all species) from Project-related emissions. Include a sensitivity analysis as well as expected seasonal variations in the deposition rate with an emphasis on accumulated deposition for the lake ice breakup period.2. Update water quality mercury predictions (all species) for Whitefish Lake using scenario(s) that incorporate atmospheric deposition from Project-related emissions. Based on the findings, assess any Project-related effects to aquatic receptors from mercury (all species). Discuss potential effects on sediment quality.3. Discuss how the response was informed by the CSA N288.6 standard (i.e., <i>Environmental risk assessments at class I nuclear facilities and uranium mines and mills</i>. CSA Group; February 2022). | Not Accepted |

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| IR-198 | - | HC | Change to an environmental component due to radiological contaminants | Appendix 10-A (ERA) Appendix B, Tables B.7 and B.8 Ref. 19-2638 Appendix 10-A (ERA), Table 4-3 Ref. 19-2638 (p. 4.17) | <p>Context: Section 10 Appendix 10-A (ERA) contains Table 4-3 (p. 4.17), which lists ingestion rates for traditional foods and includes the category “organs” for Mammals.</p> <p>Tables B.7 and Table B.8 in Section 10 Appendix 10-A (ERA) Ref. 19-2638 provide the predicted concentrations of radionuclides for ecological receptors during the Project phases and during future centuries, respectively. They list the concentrations of radionuclides in moose and in moose organs, which is presented as a single cumulative organ value. Other terrestrial and aquatic animals (such as the black bear and woodland caribou) that are a part of the traditional diet of nearby Indigenous communities have higher concentrations of radionuclides than moose, yet concentrations are not provided for organs of these species.</p> <p>Rationale: While Health Canada is not aware of transfer factors to individual organs, or to organs in animals that are not ruminants, it would be beneficial to have a better understanding of radionuclide concentrations in the organs of other animals that may be consumed by local Indigenous communities.</p> | <p>1. Provide more clarification on how the mammalian organ ingestion rates are calculated (which animals and relative contribution percentages).</p> <p>2. Provide a rationale for why concentrations of radionuclides were not assessed in organs of animals (other than moose) that are consumed as country foods by Indigenous people harvesting in the area.</p> | <p><u>Note To Denison:</u> we are in discussions about this IR being conditionally accepted and a potential commitment.</p> | |
| IR-198 | IR-198-R1 | HC | Change to an environmental component due to radiological contaminants | Annex 1 Response to Information Requests (Denison Mining) – August 18, 2023 IR-198 Response from Denison – COPC Concentrations in Organs (<i>Pages 74, and 354-357 of 419</i>) Appendix 10-A (ERA) | <p><i>Environmental Risk Assessment for Wheeler River</i> (September 9, 2022) does not include an assessment of radionuclides based on their mass concentrations in country foods (the assessment is only based on radionuclide concentrations).</p> <p>Context: As part of the response to IR-198 estimated Pb-210 concentrations in moose organ and caribou organ of 7.15 and 49.4 mg/kg (ww) are reported, respectively. However, Appendix 10-A: <i>Environmental Risk Assessment for Wheeler River</i> (September 9, 2022) does not include an assessment of lead among the non-radionuclide COPCs.</p> <p>Using the organ meat consumption figure from the Patuanak community (16.2 g/day), exposure to Pb-210 from caribou organ meat is estimated at over 11 ug/kg bw per day (based on the response to IR-198) which would be close to 10 times greater than the 95th percentile dietary lead exposure estimates for the general Canadian population consuming retail foods.</p> <p>Rationale: While the abundance of radionuclides may pose a health risk with respect to radioactivity, their presence as chemical contaminants may also have an impact on health. This is demonstrated by the case of Pb-210 described above. Due to their potential toxicological significance to human health, Health Canada recommends assessing arsenic, cadmium, lead and</p> | <p>1. Provide a rationale on why radionuclide mass concentrations were not assessed for their impact to human health.</p> <p>2. Provide an assessment of Lead (Pb) as a chemical contaminant (non-radionuclide) COPC to better understand potential health risks and inform management, mitigation, monitoring and/or follow-up planning.</p> | <p><u>Note To Denison:</u> This IR is being conditionally accepted. If Denison commits to monitoring lead and mercury in country foods, as well as including these in any further assessment conducted to determine their potential risk to human health from consumption of country foods, this IR can be resolved.</p> <p>This commitment would include:</p> <ol style="list-style-type: none">1. Establishing/confirming baseline concentrations of Hg in water, sediment, and fish tissues before construction;2. Regular monitoring during construction, operation and post-closure; and,3. Undertaking an HHRA should monitoring results exceed established/confirmed baseline levels, to inform decisions on adaptive management and mitigation measures. <p><i><u>This Proposed rationale text for posting:</u> Denison has captured their commitment related to monitoring lead and mercury in country foods, as well as including these in any further assessment conducted to determine their potential risk to human health from consumption of country foods. This commitment includes:</i></p> <ol style="list-style-type: none">1. Establishing/confirming baseline concentrations of Hg in water, sediment, and fish tissues before construction;3. Regular monitoring during construction, operation and post-closure; and,4. Undertaking an HHRA should monitoring results exceed established/confirmed baseline levels, to inform decisions on adaptive management and mitigation measures | Accepted |

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| | | | | | mercury as part of country food assessment, regardless of the method employed to determine COPCs. | | <i>This IR has been accepted for the purposes of the current EA process, and the aforementioned issues will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i> | |
| IR-199 | - | ECCC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Sections 3.2.1 and 3.3.1, Wheeler River Project IMPACT Model | <p>Context: Model calibrated concentrations of selenium, uranium, and lead- 210 are under-predicted compared to measured baseline concentrations for water quality in the IMPACT modelling based on Figure 3-2. Calibrated concentrations of cobalt are under-predicted and there is poor agreement between model calibrated and measured concentrations of arsenic, lead-210, polonium-210, and radium-226 for sediment quality in Figure 3-3.</p> <p>Rationale: It is unclear how poor agreement between model calibrated and measured baseline concentrations of COPCs impacts the near-field and far-field modelling predictions of COPCs during all Project phases. It is also unclear why measured concentrations of COPCs could not be used directly as model inputs when there was poor agreement.</p> | <p>1. Provide justification as to why model calibrated concentration inputs of COPCs were preferable for use in predictive modelling of water and sediment quality over measured baseline concentrations.</p> <p>2. Provide a rationale detailing how under- or over-predicted model calibrated COPC concentration inputs influence IMPACT model predictions and uncertainty for water and sediment quality. Provide specific details on how this may impact the risk analysis for parameters that have been highlighted as having poor agreement between calibrated and measured concentrations (i.e., arsenic, selenium, uranium, lead-210, polonium-210, and radium-226).</p> | <p><i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> <p>The Proponent has not fully responded to either item for this IR. In the response for item one, the table provided in the response supports the statement added to Section 3.2.1 of Appendix A from Appendix 10-A, that there is little difference between the geometric and arithmetic means for parameter concentrations in water. It is important to clarify if this is also the case for sediment. Apart from arsenic and radionuclides, all modelled sediment concentrations are at or below geometric mean for sediment. Given that geometric means are typically lower than arithmetic means (and at most equal) this might indicate a consistent underestimation by the model for parameter concentrations in sediment. The proponent indicates that the geometric mean is more representative of the central value of the data distribution. ECCC does not support this view because a median or mode would be used to find a central value, depending on what was meant. The geometric mean may have been used because it is less influenced by outlier values, but these should be analyzed and removed if necessary before calculating the mean, as described in Section 6.3.3.6 of CSA N288.6:22. The only reference to geometric means in CSA N288.6:22 is for calculating means of literature values. Otherwise, when considering field data, an arithmetic mean is referred to.</p> <p>Typically, parameter concentration statistics are calculated individually for each site to highlight differences and help identify more sensitive sites. Differences between sites are expected because of differences in lake size, catchment area and other environmental factors. Pooling data from all sites smooths out high and low values, which compounds the smoothing done by using a geometric mean. This reduction in precision causes unreliability when evaluating model predictions, since the range of parameter concentrations at baseline is not well characterized.</p> <p>To address the lack of clarity, the Proponent should provide a table comparing arithmetic and geometric means for parameter concentrations in sediment, as they have done for water concentrations. If differences are significant, then modify graphs in Figure 3-3 of Appendix A from Appendix 10-A to compare arithmetic means of baseline data with modelled results. For parameters with sufficient data to calculate meaningful statistics, the Proponent should demonstrate that concentrations in Russell Lake are not significantly different than those in McGowan and Whitefish Lakes. If water quality is significantly different between lakes, then the Proponent should modify graphs in Figure 3-2 of Appendix A from Appendix 10-A to compare lake-specific baseline and modelled concentrations.</p> <p>In the response to item two, the statement “<i>it is not appropriate to calibrate the model to baseline conditions as we are most interested in impacted conditions</i>” is incorrect, because the point of calibration is to demonstrate the model correctly simulates site conditions to predict concentrations. Inaccurate model predictions during baseline indicate the site and its system of interactions is not well understood, and the model would not be able to produce accurate</p> | Accepted |

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| | | | | | | | <p>predictions during operations either. Section 7.3.6 of CSA N288.6:22 states “<i>The models may be calibrated to give the best possible agreement with available monitoring data so that risk assessors can have confidence in model-predicted concentrations for areas and media that are poorly represented in monitoring programs.</i>” The monitoring data is insufficient to characterize baseline concentrations for most of the parameters in water since there are often less than 50% of samples with concentrations above the detection limits. This limits the parameters that can be used to evaluate the model to concentrations in water of chloride, sulphate and arsenic, as well as concentrations in sediment. The Proponent should demonstrate the accuracy of the model by comparing model outputs with measured concentrations for those parameters where there is sufficient data to calculate meaningful averages, quantify model uncertainty, and discuss the influence of uncertainty on risk assessment conclusions.</p> <p>Denison is expected to:</p> <ol style="list-style-type: none">1. Calculate the model to baseline conditions, compare arithmetic and geometric means for parameter concentrations in sediment;2. Calibrate model to baseline conditions;3. Calculate parameter concentration statistics individually for each site; and4. Modify graphs as needed if significant differences are observed. | |
| IR-200 | - | HC | Indigenous Peoples' health / Socio- economic conditions | Section 10 (p. 4.10) Appendix 10-A (ERA), Table 4-4 (p. 4.19) | <p>Indigenous consultation should be included in the Country Foods analysis.</p> <p>Context: The Proponent obtained country food consumption data through engagement with a single local fisher/trapper and from a dietary survey administered by CanNorth to the English River First Nations (ERFN) in 2017. However, the potential health risks to consumers of traditional food were only assessed using the data obtained from the CanNorth dietary survey. Section 10 of the EIS <i>states the following:</i> “The diet assumptions for the fisher/trapper are conservative and are based on engagement with a local fisher/trapper. The diet of the fisher/trapper is representative of one person, who consumes a unique composition and quantity of traditional foods (e.g., ingestion rate of 175 kg/yr of caribou, equivalent to approximately 2 to 3 servings per day). Most people fishing, hunting, and trapping in the Local Study Area and Regional Study Area would consume traditional foods more consistent with the average traditional foods consumer diet which was developed from the ERFN country foods study. In comparison, the ERFN country foods study in Section 10 Appendix 10-A (ERA) Table 4- 4 indicates a caribou ingestion rate of 2.6 kg/yr (1 to 2 servings per month) and a total game ingestion rate of 21.3 kg/yr” (p. 4.10).</p> <p>Rationale: Health Canada is in general agreement that the dietary habits of the local fisher/trapper may be an outlier and not necessarily representative of most of the local population. However, a rationale has not been provided to demonstrate whether and how the 2017 ERFN dietary survey results are representative of</p> | <ol style="list-style-type: none">1. Evaluate the suitability of using the 2017 EFRN survey results and consider surveying additional community members (such as local hunters/trappers) to obtain more representative country food consumption rates for use in the traditional foods risk assessment, and for communicating the results to the communities.2. Additionally, consider evaluating consumption patterns (and applicable TRVs) of sensitive or vulnerable populations (e.g., elders, toddlers, women of childbearing age) in the traditional food risk assessment and provide risk levels for these sub-groups separately. <p>Suggestions for mitigation and follow-up measures: Health Canada recommends providing the community with the opportunity to validate the ERFN 2017 survey results.</p> | | Accepted |

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| | | | | | consumption patterns of local Indigenous communities. Also, it is unclear whether or how the ERFN dietary survey results account for the consumption patterns of vulnerable or more sensitive subgroups (e.g., heavy consumers, children and women of child-bearing age) | | | |
| IR-200 | IR-200-R1 | HC | Indigenous People'' health / Socio- economic conditions | Section 10 (p. 4.10) Appendix 10-A (ERA), Table 4-4 (p. 4.19) IR-200 Response from Denison | <p>The traditional foods risk assessment should be updated to include an “Intense Land User” scenario and consider all relevant sub-groups.</p> <p>Context: See ‘Rationale for Status’ in IR-200</p> <p>Rationale: Health Canada notes that the response to IR-1 confirms that the use, diet and consumption rates used to assess the “Trapper” receptor are representative of “intensive land users” from the ERFN and possibly others. This change in the assumption is significant and should be integrated into the traditional foods risk assessment. Suggestions and follow-up measures have been provided to assist in responding to this information request, which benefits from the clarity provided in response to IR-1.</p> <p>Health Canada also notes that the response to IR-200 did not consider evaluating consumption patterns (and applicable TRVs) of sensitive or vulnerable populations (e.g., elders, toddlers, women of childbearing age) in the traditional food risk assessment and provide risk levels for these sub-groups separately.</p> | <p>1. Update assumptions used in the risk assessment to reflect the new information provided in response to IR-1. (e.g., the <i>ERFN Trapper’s use of the area as representative of current and future land users</i>).</p> <p>2. Update the risk assessment in the EIS and ERA for the “Trapper” receptor (i.e., Intensive Land Users) to account for the representative nature of their described diet (i.e., consumption rates and composition).</p> <p>3. Update the rationale and decisions related to management, mitigation, monitoring and follow-up. Include a specific discussion for those COPCs that contribute to elevated health risks among “intensive land users” and those raised by Indigenous communities (i.e., selenium, mercury & cadmium).</p> <p>4. Revise receptor’s descriptor/title from “Trapper” to “Intensive land users” throughout the EIS and ERA to be consistent with proposed revisions made in response to IR-1.</p> <p>Consider evaluating consumption patterns (and applicable TRVs) of sensitive or vulnerable populations (e.g., elders, toddlers, women of childbearing age) in the traditional food risk assessment and provide risk levels for these sub-groups separately. Alternatively, provide a fulsome rationale to justify their exclusion.</p> | | Accepted |
| IR-201 | - | ECCC | Aquatic species | Appendix 10-A (ERA), Section 5.0 | <p>Context: For the ERA methodology the Proponent followed CSA N288.6-12 for the assessment of risk to aquatic biota from radionuclide and non-radionuclide COPCs. This is the 2012 version, and a more recent 2022 version was publicly released.</p> <p>Rationale: The Proponent should review the most up-to-date version of the standard to ensure no changes to the methodology of the COPC exposure assessment are required for the ERA.</p> | Update the COPC exposure assessment methodology in the ERA using the most recent CSA N288.6-22 standard, as needed. | | Accepted |
| IR-202 | - | CNSC | QA/QC | Appendix 10-A (ERA), Section 6.0- Quality Assurance | <p>Context: This section provides only Quality Assurance (QA) of the ERA, including planning and preparation of the ERA.</p> <p>Rational: The Quality Control (QC) aspects are not included. Both QA and QC aspects provide confidence that ERA results are defensible and fit for use in decision-making.</p> | Please include appropriate QC aspects, as per a Clause 10.2 of the N288.6. | | Accepted |

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| | | | | | The N288.6 (Clause 10.2) requires that “Appropriate QA/QC requirements shall exist for all aspects of the ERA and should be specified prior to conducting the ERA”. | | | |
| IR-203 | - | CNSC | Sediment Quality and Benthic Invertebrates | Appendix 10-A (ERA), Section 6.2 Future Centuries Sensitivity Analysis | <p>Context: This section of the ERA states “If treated effluent was released at the maximum upper bound discharge rate, the modelled concentrations of all COPCs are expected to be below their corresponding sediment quality guidelines.” It appears from Figure 6-2: “Comparison of maximum concentrations of COPCs in sediment at expected and upper bound discharge rate” that cadmium and vanadium would be over their sediment quality guidelines indicated if maximum upper bound discharge rates are used.</p> <p>Rationale: It is not clear which is correct; the statement that no exceedances of sediment quality guidelines when considering the maximum upper limit effluent release, or the figures indicating there could be exceedances for cadmium and vanadium. This discrepancy in the ERA should be explained and corrected.</p> | Please provide clarity on if cadmium and vanadium are expected to be over the sediment quality guidelines for the maximum upper bound discharge rate scenario. | | Accepted |
| IR-204 | - | CNSC | Human health with respect to hazardous contaminants | Appendix 10-A (ERA), 7.1.1, Non-radiological Human Health Risk Assessment | <p>Context: In the human health risk assessment of the non-radiological COPCs, it was determined that the Project incremental HQ was predicted to remain below 0.2 for all non-carcinogens and all pathways during all phases of the Project, except for selenium for the fisher/trapper at Russell Lake from the fish ingestion pathway.</p> <p>Rationale: Given that the fisher/trapper receptor will likely be exposed to higher concentrations of selenium from the consumption of fish at Russell Lake, there is an elevated risk of selenosis in exposed individuals. This potential for selenosis would be further exacerbated in individuals who consume fish taken from other lakes closer to the mining operation. There is, however, no discussion of mitigation of these risks to exposed individuals.</p> | <p>Please provide a discussion of measures that could be applied to mitigate the risk of selenosis in exposed individuals who consume fish from Russell Lake and other waterbodies closer to the mining operation.</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends the following:</p> <ul style="list-style-type: none">• Selenium abatement technologies may be considered to eliminate or reduce selenium in effluent entering the lake system.• If HQs continue to exceed 0.2, then it may be necessary to post fish consumption advisories, in consultation with the Medical Officer of Health for the jurisdiction where the Project is located. | | Accepted |
| IR-205 | - | CNSC | Geology and Groundwater | Section 7, appendix H | <p>Context: In this appendix the analytical concentration of various groundwater samples taken from monitoring wells is reported.</p> <p>Rationale: There is one sample labeled as “Tracer Tank” with no definition available in the current report. It is difficult to judge whether the results presented are relevant to the EIS and how it may impact the findings therein.</p> | Please clarify the definition of “tracer tank”. | | Accepted |
| IR-206 | - | CNSC | Current use of lands and resources for traditional purposes | Section 11 Section 12 Section 15 Section 16 | <p>Context: Impacts to Lands and Resources Use have been identified by Indigenous Nations and communities.</p> <p>Rationale: Additional information is required to demonstrate whether Indigenous Nations and communities were engaged</p> | Please describe any outstanding or residual issues or concerns raised by Indigenous Nations and communities that Denison was unable to address. In addition, outline any plans to find solutions or continue discussions with the potentially impacted Indigenous Nations and communities. | | Accepted |

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| | | | | | directly by Denison regarding the cumulative effects assessment, significance determination and residual effects, and thus the overall conclusions on potential adverse impacts of the Project on the potential or established Indigenous and/or treaty rights and effects of changes to the environment on Indigenous peoples, pursuant to paragraph 5(1)(c) of the CEAA 2012. | | | |
| IR-207 | - | CNSC | Current use of lands and resources for traditional purposes | Section 11, Perceived Risks to Lands and Resources | <p>Context: The EIS states: “Resource users may also experience changes in their perception of the quality of resources for consumption such as the palatability of fish or wildlife or have apprehensions about the safety of resources for consumption. These changes may affect the patterns of ILRU during all Project phases including Post Decommissioning. The ERFN refer to this indicator as a “psycho-social’ effect, meaning that even if people know their fears are “<i>perceived fears, the fear ... is real and has real impacts on ERFN members’ perception of their overall health and well-being</i>” (ERFN and SVS 2022a).” (p. 11-11)</p> <p>Resource harvesters may experience Project-related disturbances and, depending on how these changes are perceived, it may cause some resource harvesters to avoid the Project Area.</p> <p>Reductions in harvests may occur based on fear or uncertainty about the ongoing quality of country foods. For example, “<i>People stopped picking berries in this area when Key Lake mine was established because of concerns about health impacts</i>” (ERFN and SVS 2022b).</p> <p>Rationale: CNSC’s Generic Guidelines for the Preparation of an EIS state: “The EIS will document specific suggestions raised by Indigenous groups for mitigating the effects of changes to the environment on Indigenous peoples (section 5(1)(c) of CEAA 2012). For the mitigation measures intended to address the effects of changes to the environment for Indigenous peoples, the Proponent must discuss the residual effects with the Indigenous groups prior to submitting the EIS.”</p> <p>These changes may affect the patterns of ILRU during all Project phases including Post Decommissioning.</p> | <p>How does Denison plan to work directly with Indigenous Nations and communities who currently use the potentially impacted areas, including the RSA, to mitigate and monitor the perceived risks and/changes to the RSA?</p> <p>Has Denison had discussions with the potential impacted Indigenous Nations and communities on how fear and avoidance behaviors and related impacts on traditional land use will be mitigated, especially within the RSA?</p> <p>Additional information is needed to determine if Denison has engaged directly with the Indigenous Nations and communities to develop potential mitigation measures to address fear and avoidance impacts, such as a community monitoring program, which could help to reduce the perceived risk to lands and resource use through education, collaboration, and long-term monitoring with Indigenous Nations, in order to build trust.</p> <p>Suggestions for mitigation and follow-up measures: It is recommended that Denison consider engaging with potentially impacted Indigenous Nations and communities on the collaborative development and implementation of a monitoring program to help address concerns about potential impacts on lands and resources as a result of the Project. The program(s) could help to monitor changes over time related the potential perceived risk of contamination of the land from Project activities and subsequent effects on the quality of fish, vegetation, and wildlife resources, which in turn could affect the safety of traditional foods and human health, and impacts on culture practices, and overall community well-being that travel to region yearly.</p> | Response is accepted, but also see AD-60 in the Advice to Proponent table. | Accepted |
| IR-208 | - | CNSC | Indigenous physical and cultural heritage | Tables 11.1-3, 11.1-4 and 11.1-5 Section 11.1.3.2.6 | <p>Context: Black bear is listed as a species hunted by several Indigenous nations, including Pinehouse residents. CNSC participated in an in-person engagement with Pinehouse residents in October 2022 and bears eating waste was identified as a concern for hunting and consumption.</p> | Please specify measures that Denison will take to ensure bears and other animals do not scavenge from waste facilities. | | Accepted |

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| | | | | | Rationale: Perceived risk of eating animals that are contaminated by hazardous or radiological wastes could deter community members from harvesting animals that are normally part of their traditional diet. Fencing for waste was specified as a deterrent for human trespassers, not animals. | | | |
| IR-209 | - | CNSC | Indigenous Peoples' health / Socio-economic conditions | Section 12.1.4.2.1 (p. 12-22) Section 12.1.5 Section 12.1.6.2 | Context: KML indicates that working at a mine camp could inhibit community members from participating in cultural activities and sharing them with family and community members, resulting in a loss of cultural knowledge and language, thus impact knowledge transmission (p. 12-22). Rationale: Denison addresses this by briefly identifying culturally sensitive policies which would eliminate residual effects (p. 12-30) | Please provide detailed proposed mitigation measure for KML's concerns related to loss of cultural knowledge and language should they work for Denison. | | Accepted |
| IR-210 | - | CNSC | Current use of lands and resources for traditional purposes | Section 12.1.4.2.2, Potential Effect 2: Change in Traditional Diet, Perceived Suitability of Country Foods (p. 12-26) | Context: The EIS states: "Project activities could change the perceived suitability of country foods. An ecological risk assessment (ERA) was conducted to consider both radiological and toxicological risks to ecological receptors such as terrestrial and aquatic invertebrates, terrestrial and aquatic vegetation, fish, and terrestrial and aquatic mammals and birds. Results for the radiological assessment predicted no exceedances of the radiation dose benchmark for the ecological receptors. For non-radiological COPCs, no exceedances were predicted except for selenium in fish from Russell Lake, based on a conservative dietary assumption for one resource user. The traditional foods diet for the fisher/trapper is conservative as it assumes that their annual fish consumption (183 kg of fish per year) would be obtained from Russell Lake, meaning the exceedance of the benchmark for selenium from fish would only occur if fish were only sourced from this one lake. This one exceedance could potentially change the perceived safety of country foods for community members and make country foods a less desirable part of a traditional diet. <u>Experience from other uranium operations in northern Saskatchewan suggests that resource use will continue despite the potential selenium exceedance. An examination of members of the Hatchet Lake Denesų́łíné First Nation who live in Wollaston Lake near the Rabbit Lake operation found that over years of being active on the landscape both with and without the presence of the uranium industry, members had developed their own culturally appropriate practice of risk assessment and management based on their relationship with the land. Hatchet Lake Denesų́łíné First Nation members appear to be more concerned with the direct effects of uranium mining on the local environment and less concerned about uranium mining's effects on their health through consumption of plants and animals. This is likely due to their high</u> | Given concerns with psycho-social impacts and the influence of perception discussed by ERFN earlier on in the EIS, does Denison have information on the perspectives from Indigenous Nations and communities to validate this conclusion is applicable? | | Accepted |

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| | | | | | <p><u>level of confidence in recognizing affected plants and wildlife and avoiding them (Elias et al. 1997).</u></p> <p>The usage patterns of the ERFN Trapper have similarly allowed for continued use and access to areas proximal to other uranium operations. The ERFN Trapper had a positive relationship with other uranium operations in the ILRU LSA. He also continued to trap (i.e., used his trapline in Fur Block N-18), fish, and opportunistically pick berries, and consumed those resources during operations (KPI Program 2021). Good relationships between Denison and a new trapper who eventually takes over the trapline from the ERFN Trapper would promote continued use.” (p. 12-26)</p> <p>Rationale: The underlined reference suggests that negative perceptions may not prevent traditional resource users from continuing to consume, due to adaptation to potential risks in the environment.</p> | | | |
| IR-211 | - | CNSC | Accidents and Malfunctions | Section 14.6.1, Bounding Scenario 1, Vehicle Accident and Aquatic Release of Radioactivity | <p>Context: Scenario 1 describes a spill of uranium concentrate into the lake. It’s not clear how the ecological risk assessment was performed. It is stated that sediment concentrations in post-remediation conditions are expected to exceed the benthic invertebrate benchmark and that these results indicate that a spill of uranium concentrate could potentially affect benthic invertebrate populations following a spill, but the spatial extent would be limited. For water, it is stated that when evaluating the potential effect, a comparison was made between the results of the estimated short-term water quality 1,892 µg/L (1.892 mg/kg) and the guideline (33 µg/L). This indicates that there may be some aquatic species that could be affected, but the effects are expected to be transient as the water concentration quickly drops to a long-term level of 0.19 µg/L. However, when looking at dose to other receptors, the results of the ecological risk assessment indicated short-term ingestion of contaminated water resulting from an accident would not result in potential risks to grouse, vole, or deer, however rationale for how these receptors were chosen is not provided.</p> <p>Rationale: It’s not clear from the EIS, why the receptors grouse, vole, and deer were chosen to evaluate ecological effects from a potential spill, and why they differ from receptors in the ERA. It is also not clear if the pathway from sediment ingestion/contact was considered for semi-aquatic receptors as they could be exposed to the increased concentrations post-spill. It is also not clear if SARA species exposure to sediment and water post-spill was considered.</p> | Please clarify why grouse, vole, and deer were chosen as receptors for the ecological risk assessment performed for accidents and malfunctions scenario 1 and clarify if the sediment pathway to receptors post-spill was considered, as well as if SARA species were considered. | | Accepted |

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| IR-212 | - | HC | Human health with respect to hazardous contaminants | Section 14 (p. 14-3) Appendix 16-C (p. 14 & 15) | <p>The follow-up plan does not sufficiently describe how various parties will be engaged in the design, implementation, and review of monitoring programs.</p> <p>Context: Section 14 of the EIS states that “The overarching fear of contamination from the mine is woven in to almost every other concern noted by participants in the TK study. It is worth acknowledging this concern separately given the potential for mental health impacts related to people’s experiences of fear and anxiety” (p. 14- 3).</p> <p>The commitment regarding monitoring and follow-up activities appears limited to “<i>shar[ing] information in a transparent manner with the General Public, and specifically those Communities of Interest and Nearby Land Users with whom Denison is regularly engaging about the Project. Such an information-sharing program would consider the involvement of the Regulators to make sure the information available addresses the issues identified as concerns</i>” (p. 14).</p> <p>Rationale: Country food safety is not regulated federally unless foods are sold commercially. Certain aspects of country food safety and availability may be covered by provincial regulators. It is unclear whether and how various levels of government and potentially affected communities would be involved in the development of the follow-up and monitoring program. It is also unclear what the information sharing program entails and how it would inform any adaptive management if monitoring results deviated from the prediction</p> | <p>1. Provide details of how local, provincial and federal authorities, and Indigenous Nations and communities will be engaged in developing the follow-up and monitoring program, including the information-sharing program.</p> <p>2. Describe the steps that will be taken if there are any exceedances of established benchmarks or deviation from predictions.</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends that the Proponent’s plan for communicating follow-up results (environmental and country foods) aims at, among other things, responding to community concerns regarding country foods to minimize avoidance of this resource. This goes beyond a passive dissemination of information and developing a strategy based on dialogue and the direct involvement of communities in monitoring, surveillance, and risk communication activities.</p> | | Accepted |
| IR-213 | - | CNSC | Accidents and Malfunctions | Section 14.5.3 Appendix 14-A | <p>Context: The Proponent states that the assessment of accidents and malfunctions began with the initial identification of hazard scenarios. Hazard scenarios were identified using a systematic approach that considered the existence of sources of hazards and initiating events for the Project in consideration of Project activities and components.</p> <p>The hazard identification was conducted to identify a comprehensive list of potential project-related accident and malfunction scenarios associated with the key project components and activities with further details provided in Appendix 14-A. The initial hazards were then screened qualitatively based on likelihood and consequence to determine overall risk level using a risk matrix approach. Bounding scenarios were then selected from this initial list of hazard scenarios.</p> <p>The results of numerical analyses (RESPEC, 2021) of detailed strip model suggest that the deformation imposed on the cemented steel</p> | <p>Please include the hazard of steel casing yield or damage in the table of hazard identification evaluation and conduct an initial risk screening and further detailed assessment as required.</p> | | Accepted |

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| | | | | | <p>casing from downward movement of the rock mass may exceed the assumed casing-strain yield limits and the failure limit locally after extracting the uranium ore. However, this potential hazard is not identified in the hazard identification.</p> <p>Rationale: Exceedance of steel casing yield limits and failure limit would either compromise the steel casing integrity or damage the steel casing and result in the leakage of injected solution, which could impact on mine operation and contaminate the surrounding groundwater.</p> | | | |
| IR-214 | - | CNSC | Accidents and Malfunctions | Section 14.5.3 Appendix 14-A, section 3.2.3 | <p>Context: Hazard scenarios were identified using a systematic approach that considered the existence of sources of hazards and initiating events for the Project in consideration of Project activities and components. Details for how each of these project components and activities are considered in the initial hazard scenario identification process are provided in the accidents and malfunctions TSD (see Appendix 14-A; Ecometrix 2022).</p> <p>However, in Table 3-1 to Table 3-14 in Appendix A of Appendix 14-A, the following inconsistencies were identified:</p> <ul style="list-style-type: none">i. consequences for the hazards ID# 1.1, 1.5, 1.7, 14.2 include occupational major injuries; however, the severity (S) is denoted as number 2 that appears to be inconsistent with consequence rating number in Figure 14.5-2ii. Hazard ID# 1.5 has a L=2, but it is described as a highly unlikely event, which is inconsistent with the term in Figure 14.5-2iii. Hazards ID# 3.6 and 3.7 have a L=1, but they are described as low probability event that is inconsistent with the term in Figure 14.5-2iv. Hazards ID# 8.2, 8.3, 9.1, 10.1 to 10.5, 11.1, 11.5 have a L=1, but they are described as unlikely events, which are inconsistent with the term in Figure 14.5-2. Rationale needs to be provided how stockpile erosion is considered to have a L=1v. Hazard ID# 12.1 has a L=2 and S=3, but it's risk ranking is moderate, which is inconsistent with the term in Figure 14.5-2vi. Hazard ID# 13.3 has a L=2. Based on the operation experience in the similar projects in the northern Saskatchewan, ponds lining failure and leakage is a very likely event. Rationale needs to be provided to support L=2 or change the number for L. <p>Rationale: Inconsistent or inaccurate/incorrect information was included in Accidents and Malfunctions assessment.</p> | Please clarify or correct all inconsistent and/or inaccurate information in Tables 3-1 to 3-14 in Appendix A of Appendix 14-A. | | Accepted |

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| IR-215 | - | CNSC | Human health with respect to hazardous contaminants | Section 14.6 | <p>Context: One of the potential risks of a uranium mine and mill is a spill of untreated effluent.</p> <p>Rationale: In the EIS, it doesn't appear that the scenario of a spill of untreated effluent to the environment has been considered.</p> <p>A failure of the piping containing the untreated effluent could result in an uncontrolled release to the environment and could affect the groundwater, soil quality, and terrestrial biota.</p> | Please evaluate and provide the results for a bounding scenario of a spill of untreated effluent or provide justification for its exclusion. | | Accepted |
| IR-216 | - | CNSC | Human Health with respect to radiation exposure | Section 14.6.1 Section 14.6.7 Appendix 14-A | <p>Context: Radiological doses to human receptors, including workers (i.e., driver(s) of the vehicles), from the Bounding Scenarios 1 (Vehicle Accident Including Rollover, Collision, Run Off Road) and 7 (Vehicle Accident Including Rollover, Collision, Run Off Road) have not been assessed.</p> <p>Rationale: An estimate of the effective doses to human receptors, including workers, are required to determine whether the expected doses meet the dose limits set out in the Radiation Protection Regulations.</p> | Provide estimates (including calculations) of the potential radiological doses to human receptors, including workers, resulting from Bounding Scenarios 1 and 7. | | Accepted |
| IR-217 | - | CNSC | Accidents and Malfunctions | Sections 14.6.1 and 14.6.2 | <p>Context: Highway 914 crosses the Wheeler River 10 km southwest of the access road junction. A vehicle accident, including a rollover, collision, or run off road, at or near the bridge could potentially result in a release of uranium concentrate and release of fuels and chemicals into the surface water at this location. Denison believes that a release of uranium concentrate and a release of fuels and chemicals at this location would bound the releases at any other water crossing along the transportation corridor. However, no information on what other water crossings along the transportation corridor exist and how bounding scenarios 1 and 2 would bound the risk of releasing uranium concentrate and fuels and chemicals at other crossings.</p> <p>Rationale: The release of uranium concentrate and fuels and chemicals at water crossings would contaminate the water body at the crossings and pose a risk to the environment and public health.</p> | Please provide information on all water crossings along the transportation corridor and justification why bounding scenarios 1 and 2 would bound the effects of the accidental releases of uranium concentrate and fuels and chemicals at these crossings. | | Accepted |
| IR-218 | - | CNSC | Accidents and Malfunctions | Sections 14.6.1.1 and 14.6.1.4 | <p>Context: Table 14.6-1 indicates that the average flow of Wheeler River south of Russel Lake is 17,340 L/s or 17.34 m3/s. This rate is used for uranium dissolution rate calculation. However, in section 14.6.1.4, it states that the average annual flow is 24.3 m3/s. In Table 14.6-3, the last two rows appear to be added wrongly.</p> <p>It also states that sediment quality results are shown in Table 14.6-5</p> | Please clarify and correct the inconsistent information on average flow rate of Wheeler River at the crossing and incorrect information in Table 14.6-3, and average sediment concentration and porewater concentration under average and maximum flow conditions in Table 14.6-5. | | Accepted |

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| | | | | | <p>for post-remediation conditions. During minimum flow conditions, the affected volume is expected to be smaller, resulting in a higher sediment concentration. In comparison, higher flow conditions are expected to result in a greater footprint and lower concentrations. However, in Table 14.6-5, the average sediments concentration and porewater concentration appear to be incorrect and switched between average flow and maximum flow.</p> <p>Rationale: Inconsistent/inaccurate information provided in the EIS.</p> | | | |
| IR-219 | - | CNSC | Accidents and Malfunctions | Sections 14.6.1.1.1 and 14.6.1.4.1; Sections 5.1.1 and 8.1 of Appendix 14-A | <p>Context: When assessing the release characterization of Bounding Scenario 1, the Proponent assumed that 95% of the released uranium concentrate can be recovered from the release location without sufficient justification, and that different water column depths, i.e., 10 cm and 5 cm, and average water depth of 1.2 m at the release location were used without explanation.</p> <p>Rationale: As the recovery rate of the uranium concentrate would have an impact on the assessment of its potential effects, it is necessary to understand how the recovery rate and water level were selected for assessing this bounding scenario.</p> | Provide further rationale for assuming 95% recovery rate and for using different water column depths for uranium concentrate release characterization. | | Accepted |
| IR-220 | - | CNSC | Accidents and Malfunctions | Section 14.6.1.1.1 Appendix 14-A, Section 5.1.1 | <p>Context: The Proponent states that based on drum deformations performed in a previous analysis (McSweeney et al. 2004), if a drum experienced a crush force of 100,000 lbs., then the deformation of the drum would cause the lid to detach from the drum. Using this drum failure mechanism, and assuming the drums weigh 450 kg and are arranged four across in the truck, at a speed of 48 km/h, the front 25% of the drums would fail, at 60 km/h to 97 km/h 55% would fail, at 145 km/h 75% would fail, and at ≥193 km/h all would fail. Given that the speed of the truck is likely between 60 km/h to 97 km/h, it was concluded that less than 55% of the drums would fail upon a traffic accident scenario.</p> <p>It is assumed to be 40 drums per shipment, so some stacking or rows of drums should be expected in this scenario. The drums stacked above could be at greater risk of deformation in a traffic accident. It is not clear whether drums stacking was considered in the previous study cited by the Proponent and whether less than 55% fail is still an adequate percentage of drum failures in such traffic accident scenarios if drums stacking is needed.</p> <p>Rationale: Drum failure percentage will impact the release quantity of uranium in such an accident scenario and then impact the consequence assessment. Therefore, the drum failure should be adequately assessed and supported with sufficient information and justification.</p> | Please provide information and/or rationale as to whether drum stacking would impact drum failure at different speeds and confirm whether 55% drum fail for such an accident is still valid. | | Accepted |

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| IR-221 | - | CNSC | Accidents and Malfunctions | Section 14.6.1.3, Appendix 14-A, Section 7.1 | <p>Context: It is projected that there would be about 100 drums packaged per mill operating day. One trip per day for 330 days per year is assumed for the probability evaluation. This means 100 drums per trip, which is inconsistent with description in section 14.6.1.1.1 where assuming 40 drums in one shipment per day.</p> <p>Rationale: Shipments per day will impact the probability evaluation, and number of drums per trip will impact the release of uranium during an accident.</p> | Please clarify the number of shipments per day and number of drums per shipment that are expected and re-calculate the probability as necessary. | | Accepted |
| IR-222 | - | CNSC | Accidents and Malfunctions | Section 14.6.2.4 | <p>Context: Bounding Scenario 2 consists of the aquatic release of fuel and hazardous chemicals due to traffic accidents. The EIS states that amongst the fuels considered for this scenario, the consequences of the release of gasoline and solvents are bounded by the consequences associated with the release of diesel. Both gasoline and solvents are lighter with higher vapour pressure; therefore, they have a shorter half-life in the aquatic environment and a lesser tendency for adsorption to sediments and suspended solids in the water column. There is no other justification provided to show that the release of diesel can bound other chemicals such as sulfuric acid and sodium hydroxide that are heavier than diesel.</p> <p>Rationale: The release of either sulfuric acid or sodium hydroxide during accident could change the water PH significantly at the releasing location, which would post a negative impact on the local environment.</p> | Please provide further justification that the consequences of the release of sulfuric acid and sodium hydroxide can be bounded by the consequences associated with the release of diesel. | | Accepted |
| IR-223 | - | CNSC | Accidents and Malfunctions | Section 14.6.4.1 Appendix 7-A, Appendix K | <p>Context: The EIS states that the 3D strip numerical model predicted that stresses and displacements did not show instability in the altered sandstone or basement rock at the location where a freeze wall would be placed around the Phoenix Deposit boundary (RESPEC 2021). The potential damage to the freeze wall due to mine-induced stresses and displacements under this scenario is excluded.</p> <p>Rationale: One outer section of the freeze wall (i.e., north-east freeze wall of the phase 4 mining area) and some internal cross walls are located in the desilicified zone. The RESPEC 2021 report (i.e., Appendix K of Appendix 7-A) appears not to have included the desilicified zone in the geomechanical modeling, nor is provided the stresses and the displacements/deformation of the area northeast of the phase 4 ore body where a significant extent of the desilicified zone exists.</p> | <p>Please provide information on the stresses and displacements/deformation of the area northeast of the phase 4 ore body from the geomechanical studies to demonstrate the resulted stresses and displacements will not impact on the freeze wall integrity after IRs for geomechanical studies for ore extraction are addressed.</p> <p>Technical Discussion Required: Yes</p> | | Accepted |
| IR-224 | - | CNSC | Human Health with respect to | Section 14.6.5.4 Appendix 14-A | <p>Context: For the Bounding Scenario 5 (Process System and Piping Failure), doses to receptors at distances of 100 and 500 metres (0.25 and 0.01 mSv respectively) are predicted. The assessment also</p> | Provide the dose calculations for deriving the dose estimates for workers and members of the public for Bounding Scenario 5 (Process System and Piping Failure). | | Accepted |

| Original IR# | Follow-Up IR # | SME | Project Effects Link | Reference to EIS, appendices, or supporting documentation | Context and Rationale | Information Requirement (IR) | Rationale for Status | Status |
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| | | | radiation exposure | | <p>indicated that the dose to the unprotected worker staying inside the processing plant during the spill could exceed the 50 mSv dose limit specified by CNSC if workers did not leave the area quickly after the spill.</p> <p>The Proponent did not provide the dose calculations for deriving the dose estimates.</p> <p>Rationale: The method used to estimate effective, equivalent, and committed dose is required to be verified. Sample dose calculations should be included, to confirm use of acceptable input data.</p> | | | |
| IR-225 | - | CNSC | Human Health with respect to radiation exposure | Section 14.6.5.4 Appendix 14-A | <p>Context: With the Bounding Scenario 5 (Process System and Piping Failure), the Proponent states that Denison ensures that the process is designed to include control measures to reduce the exposure to both workers and members of the public as low as achievable. The measures would ensure that the processing plant is adequately ventilated, and that spills or leaks are detected by loss of system pressure, observation, or flow imbalance.</p> <p>It is not indicated where these additional measures have been detailed/elaborated within the EIS.</p> <p>Rationale: Control measures to reduce the exposure to both workers and members of the public as low as achievable, that are identified in the assessment of Bounding Scenario 5, must be formally documented to ensure that they are carried over into the engineered design of the processing plant.</p> | Provide details on how the control measures to reduce the exposure to both workers and members of the public, identified in the assessment of Bounding Scenario 5, have been formally documented and incorporated in the engineered design of the processing facility. | | Accepted |
| IR-226 | - | CNSC | Accidents and Malfunctions | Sections 14.6.6.1 and 14.6.6.4 | <p>Context: It is stated that in the case of the accident and for a release amount of 1 kg inside the processing plant, the dose to offsite receptors at 200 m from the Project site was calculated to be less than the CNSC public dose limit of 1 mSv. The analysis also indicated that the dose to a worker in a full-face-piece powered air-purifying respirator who stays in the area would be 88 mSv, which exceeds the annual worker dose limit of 50 mSv.</p> <p>Rationale: Section 14.6.6.1 indicates that 2 kg of uranium concentrate could be released in case of the accident. No rationale is provided why 1 kg rather than 2 kg uranium concentrate is used for dose calculation. If 2 kg is used as the source term, the dose to offsite receptors at 200m and workers in the area would be higher.</p> | Please provide the rationale for using a source term of 1 kg rather than 2 kg of uranium concentrate for the dose calculation to offsite receptors and workers. If sufficient rationale cannot be provided, the doses to offsite receptors and workers should be recalculated using 2 kg uranium concentrate, and the results provide. | | Accepted |
| IR-227 | - | CNSC | Accidents and Malfunctions | Section 14.6.6.1.1 | <p>Context: Bounding Scenario 6 involves a fire and/or explosion within the processing plant, resulting in the release of a large amount uranium to the atmosphere. The airborne source term for this scenario is estimated with equation developed by the United</p> | Provide rationale for only considering 10 mm and smaller particles for the respirable fraction. | | Accepted |

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| | | | | | <p>States Department of Energy (USDOE), where the respirable faction is assumed to only include particles of 10 mm and smaller.</p> <p>Rationale: No rationale was provided to support the consideration of only 10 mm and smaller particles. As provided in Table 14.6-3, the particle size of uranium <15 mm is less than 20%. Majority of the uranium particle size is larger than 10 mm. The airborne source term is an important factor for the effects assessment and should be calculated with transparent and justified information/data.</p> | | | |
| IR-228 | - | CNSC | Human Health with respect to radiation exposure | Section 14.6.6.4 Appendix 14-A | <p>Context: For the Bounding Scenario 6 (Facility Fire and/or Explosion), the predicted dose is less than 1 mSv to a member of the public 200 metres away from the Project site. The analysis also indicated that the dose to a worker in a full-face powered air-purifying respirator who stays in the area would be 88 mSv, which exceeds the annual worker dose limit of 50 mSv.</p> <p>The Proponent did not provide the dose calculations for deriving the dose estimates.</p> <p>Rationale: The method used to estimate effective, equivalent, and committed dose is required to be verified. Sample dose calculations should be included, to confirm use of acceptable input data.</p> | Provide the dose calculations for deriving the dose estimates for workers and members of the public for Bounding Scenario 6 (Facility Fire and/or Explosion). | | Accepted |
| IR-229 | - | CNSC | Human Health with respect to radiation exposure | Section 14.6.6.4 Appendix 14-A | <p>Context: With the Bounding Scenario 6 (Facility Fire and/or Explosion), the Proponent states that Denison would ensure that the design of the plant includes control measures to reduce the exposure to both workers and members of the public to levels that are as low as achievable. The measures would ensure that the processing plant is adequately ventilated.</p> <p>It is not indicated where these additional measures have been detailed/elaborated within the EIS.</p> <p>Rationale: Control measures to reduce the exposure to both workers and members of the public as low as achievable, that are identified in the assessment of Bounding Scenario 6, must be formally documented to ensure that they are carried over into the engineered design of the processing plant.</p> | Provide details on how the control measures to reduce the exposure to both workers and members of the public, identified in the assessment of Bounding Scenario 6, have been formally documented and incorporated in the engineered design of the processing facility. | | Accepted |
| IR-230 | - | CNSC | Accidents and Malfunctions | Section 14.6.7.4 | <p>Context: It is stated that a conservative penetration time of 15 min was applied in the assessment. Based on this assumption, the maximum depth of contamination could be 90 cm (for penetration rate of 0.1 cm/s). It is not clear why the penetration time of 15 minutes is considered conservative as the penetration time would depend on the time needed for the emergency response team to respond.</p> | Please provide justification for applying 15 minutes of penetration time, and why it is considered conservative. In addition, please provide information on how the groundwater travel distance of 0.15 m and 100 m was obtained. | | Accepted |

| Original IR# | Follow-Up IR # | SME | Project Effects Link | Reference to EIS, appendices, or supporting documentation | Context and Rationale | Information Requirement (IR) | Rationale for Status | Status |
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| | | | | | <p>It is also stated that the wide range of the calculated velocities is a result of variation of soil conditions and the slope of the surface. The distance that the groundwater can travel under these extreme (i.e., conservative) conditions ranges from 0.15 m to 100 m. It is not clear how the groundwater travel distance of 0.15m and 100m is calculated.</p> <p>Rationale: The penetration time will influence the penetration depth of the released materials, which in turn, considering the groundwater travel distance, will impact the potential areas and volumes of contaminated soils and shallow groundwater.</p> | | | |
| IR-231 | - | CNSC | Accidents and Malfunctions | Sections 14.6.6.4 and 14.6.6.5 | <p>Context: The EIS states that in the unlikely event of an unmitigated accidental release of uranium due to a dryer explosion, doses to the workers are expected to have a moderate effect, while doses to members of the public are expected to have a minor effect. Based on this evaluation, the severity of the consequences of this accident and malfunction scenario is predicted to be moderate. In consideration of both probability and consequences, the overall risk related to Bounding Scenario 6 is predicted to be low.</p> <p>Rationale: When there is an explosion within the process plant, it is likely there will have worker fatality. The severity of the consequences of an explosion would be catastrophic and the risk of Bounding Scenario 6 would be higher.</p> | Please re-evaluate the consequence and the risk of Bounding Scenario 6 by considering the potential worker fatality resulted from an explosion. | | Accepted |
| IR-232 | - | ECCC | Change to an environmental component due to hazardous contaminants | Appendix 14-A, Table 3-7, ID# 7.1 Appendix 14-A, Table 5-5 | <p>Context: The Proponent indicates in Appendix 14-A, Table 3-7 that a release of sulfuric acid is a low consequence event therefore would not require further assessment. However, according to a Safety Datasheet on high concentrated sulfuric acid (ICSC–0362 - SULFURIC ACID, concentrated (> 51% and < 100%) (ilo.org)), the substance is incompatible with certain materials and can give off toxic fumes. Furthermore, it reacts with various metals to produce hydrogen gas, which is explosive.</p> <p>The Proponent provides estimates of chemicals, including sulfuric acid, to be transported to site in Appendix 14-A, Table 5-5. The annual consumption of sulfuric acid is estimated at 15,417 m3, in 617 trucks per year, but the concentration is not stated.</p> <p>Rationale: Given the high reactivity and inherent corrosive nature of sulfuric acid combined with the volume and concentration that may be stored on site, ECCC requests that the Proponent provide a detailed risk assessment related to a terrestrial spill of sulfuric acid, specifically at the processing plant.</p> | <ol style="list-style-type: none">1. Provide the volume and the concentration of sulfuric acid that will be stored on site.2. Provide a detailed risk assessment of the fate and behavior of sulfuric acid during a release into the environment. | | Accepted |

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|--------------|----------------|--------------|---|---|--|--|----------------------|--------------|
| IR-233 | - | HC | Human health with respect to hazardous contaminants | Appendix 14-A, Section 8.7 (p. 8.10) | <p>An effects assessment for a transportation accident scenario involving radioactive materials was not included.</p> <p>Context: The Proponent provided an effects assessment relating to a diesel spill on the ground (Section 14 Appendix 14-A, Section 8.7). However, no information was provided regarding the potential human health effects of a uranium concentrate release at the two locations considered (Section 14 Appendix 14-A p. 8.10).</p> <p>Rationale: An accident involving radioactive material may have an impact on human receptors, based on the proximity of receptors and the proposed response protocols.</p> | <p>1. Assess and describe the potential health effects (chemical and radiological) of a transportation accident involving a uranium concentrate spill at the following locations:</p> <ul style="list-style-type: none">a) km 160 of Hwy 914, which is the location of a cultural camp that has been established by the ERFN.b) km 67 of Hwy 914, which is a gathering location for the Kineepik Métis Local associated with the Northern Village of Pinehouse.c) All other potential sites of importance for the public and Indigenous peoples. | | Accepted |
| IR-234 | | CNSC | Effect of Environment | Section 15.2.2 | <p>Context: Effects of seismic events on the uranium extraction and post decommissioning are not assessed.</p> <p>Rationale: Seismic events could further exacerbate the stability of the voids induced by the uranium extraction, which will result in extra stresses and displacements/deformation in the overlying rock formations. These extra stresses and displacements/deformation could impact on the mine operation and post decommissioning groundwater flow and contaminant transport.</p> | <p>Please provide an assessment of seismic events on the mine-induced voids stability and the resulted effects on the mine operation and post decommissioning.</p> <p>Technical Discussion Required: Yes</p> | | Accepted |
| IR-235 | - | ECCC CNSC | Fish and fish habitat | Section 15.5.2, Expected Environmental Conditions | <p>Context: In this section it is stated that: “Table 15.5-1 and Table 15.5-2 summarize the predicted mean values of the climate variables for the Tomblin Lake regional grid unit, following the RPC4.5 and RCP8.5 scenarios, respectively, as indicated by the Climate Atlas (PCC 2019).”</p> <p>RCP4.5 represents predicted climate conditions of a moderate carbon future.</p> <p>RCP8.5 represents predicted climate conditions under a high carbon future.</p> <p>The values shown in Tables 15.5-1 and 15.5-2 show averages of 25.9 and 26.7 mm for RCP4.5 and 25.9/27.5 mm for RCP8.5. These values do not correspond to the source indicated by the Proponent.</p> <p>Rationale: Based on the Proponent’s description we would expect to find the same values for “Max 1-Day Precipitation (mm)” in the Climate Atlas for RCP4.5 and RCP8.5 scenarios. ECCC was unable to duplicate the results.</p> <p>ECCC queried the Climate Atlas for Tomblin Lake and returned a result of “Region Geikie River.” https://climateatlas.ca/find-local-data</p> | <p>1. Provide the source of the data displayed in Max 1-Day Precipitation (mm) category in Tables 15.5.1 and 15.5-2.</p> <p>2. Provide detailed calculations for the following average values:</p> <ul style="list-style-type: none">• 25.9 mm 26.7 mm in Table 15.5-1: Predicted Climate Conditions of a RCP4.5 Moderate Carbon Future• 25.9 mm 27.5 mm in Table 15.5-2: Predicted Climate Conditions of a RCP8.5 High Carbon Future <p>3. Explain how the data shown in Tables 15.5.1 and 15.5.2 were used in the precipitation risk assessment.</p> <p>4. Denote the differences between “mean”, “value/max value”, and “fluctuation”, in the calculation of extreme event risk.</p> <p>5. Compare model derived data against:</p> <ol style="list-style-type: none">1. Natural variability of the observed data.2. Variability in the statistics generated via observation based time series. <p>Technical Discussion Required: Yes</p> | | Not Accepted |

| Original IR# | Follow-Up IR # | SME | Project Effects Link | Reference to EIS, appendices, or supporting documentation | Context and Rationale | Information Requirement (IR) | Rationale for Status | Status |
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| | | | | | <p>ECCC then queried the Climate Atlas for Max 1 Day Precipitation (mm). https://climateatlas.ca/data/grid/782/maxdaypr_2030_85/line https://climateatlas.ca/data/grid/782/maxdaypr_2030_45/line</p> <p>The results displayed an array of values ranging from 83.6 mm (2050) to 87.3mm (2092) for a Regional Concentration Pathway RCP8.5 scenario and values ranging from 48.9mm (2050) to 89.5 mm (2083) for an RCP4.5 scenario.</p> <p>These values do not match the averages shown in Tables 15.5-1 and 15.5-2.</p> | | | |
| IR 236 | - | ECCC ERAD | Fish and fish habitat | Section 15.5.2, Expected Environmental Conditions | <p>Context: It is stated that, “Table 15.5-1 and Table 15.5-2 summarize the predicted mean values of the climate variables for the Tomblin Lake regional grid unit...”</p> <p>As per the Proponent’s description, Tomblin Lake was chosen as representative location for Wheeler when Climate Atlas was used as data source.</p> <p>Rationale: In those two tables, for the “Max 1-Day Precipitation (mm)” the historical average is given as 24.1mm. Local time series analysis for the climatic region in which Wheeler Project is located provide averages (for 1-day max precipitation) of approximately 30+ mm.</p> <p>It is the Proponent’s responsibility to keep the required database current and up to date, because the length of the time series influences all derived statistics. Statistical analysis of extreme events is highly dependent of the mean with extreme values reaching values 3 to 4 times higher than the mean.</p> | <p>1. Provide a clear explanation on how the historical mean for 1-Day Max Precipitation was calculated.</p> <p>2. Compare the values obtained via various means (ex: copied from the internet, modeled via some online algorithm, derived from specialty literature), against time series analysis based on observations.</p> <p>Technical Discussion Required: Yes</p> | | Not Accepted |
| IR-237 | | CNSC | EA follow-up and monitoring program | Appendix 16-C throughout, including Table 1.5-1: Wheeler River Monitoring and Follow-up Program Summary (p. 8-15) | <p>Context: CNSC’s Generic Guidelines for the Preparation of an EIS state: “The EIS should provide discussion on the follow-up program’s requirements, and include:</p> <ul style="list-style-type: none">objectives and structure of the follow-up program and the VCs targeted by the programtabular summary and explanatory text of the main components of the program including:<ul style="list-style-type: none">a description of each monitoring activity under that component | <p>It is recognized that this document will evolve over the planning process and be finalized prior to the EA Decision; however, as plans are developed and revised, CNSC staff expect that updates will be made to this document and provided with any future versions of the EIS.</p> <p>Appendix 16-C Summary of Monitoring and Follow-up Programs must include sufficient details to allow CNSC staff to determine the likelihood that it will deliver the type, quantity and quality of</p> | | Accepted |

| Original IR# | Follow-Up IR # | SME | Project Effects Link | Reference to EIS, appendices, or supporting documentation | Context and Rationale | Information Requirement (IR) | Rationale for Status | Status |
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| | | | | | <ul style="list-style-type: none">○ <u>which of the two generic program objectives the activity is relevant to (e.g., verify EA predictions, determine effectiveness of mitigation measures)</u>○ the specific statement from the EA that goes along with that generic objective and will be the focus for that activity (e.g., program objective: verify predicted effects; environmental assessment effect: no potential adverse effects)○ the specific monitoring objective for that activity○ planned schedule• <u>roles and responsibilities to be played by the Proponent, regulatory agencies, Indigenous people, local and regional organizations and others in the design, implementation and evaluation of the program results</u>• <u>possible involvement of independent researchers</u>• <u>program funding sources</u>• information management and reporting (reporting frequency, methods and format)• <u>possible opportunities for the Proponent to include the participation of the public and Indigenous groups, during the development and implementation of the program</u> <p><u>The follow-up program plan should be sufficiently described in the EIS to allow independent judgment as to the likelihood that it will deliver the type, quantity and quality of information required to reliably verify predicted effects (or absence of them) and confirm the effectiveness of mitigation measures.”</u> (Section 11)</p> <p>Rationale: The Summary of Monitoring and Follow-up Programs provided in Appendix 16-C contains very high-level information, and while some of the aspects detailed in the Generic EIS Guidelines are included, the aspects underlined are missing or appear incomplete.</p> <p>Further, all information from throughout the EIS should be incorporated into this Summary. For example, the EIS notes that: “Groundwater samples will be collected at least monthly and semi-annually in the wells within the freeze wall and on the freeze wall perimeter, respectively” (p. 7-109) and that “At least five to seven multi-well clusters are proposed across the mined area (Figure 7.8-2). Sampling will include KI parameters or the full suite of COPC at different times in the remediation process” (p. 7-111).</p> <p>These details (only examples) are not included in Appendix 16-C.</p> | <p>information required to reliably verify predicted effects (or absence of them) and confirm the effectiveness of mitigation measures. This includes concrete monitoring plans (sampling locations, frequency, etc.).</p> <p>Additionally, please incorporate any relevant information included in the EIS into this Summary.</p> | | |
| IR-238 | - | CNSC | Current use of lands and resources for | Various sections of the EIS, including: Section 8 | Context: The EIS indicates that “further detailed [follow-up and monitoring programs] will be developed as Project designs are finalized that may influence the nature, frequency, and locations of | Please provide additional information to demonstrate whether Indigenous Nations and communities were engaged directly on the potential mitigation and monitoring measures to address the | This response has not been accepted. | Accepted |

| Original IR# | Follow-Up IR # | SME | Project Effects Link | Reference to EIS, appendices, or supporting documentation | Context and Rationale | Information Requirement (IR) | Rationale for Status | Status | |
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| | | | traditional purposes | Section 9 Section 10 Section 11 Section 12 Section 15 Section 16 Appendix 16-C (p. 3) | monitoring. In addition, input from regulatory agencies, the public and Indigenous Peoples will be considered.” (Appendix 16-C, p.3) It is not clear in several section(s) of the EIS and the Indigenous Engagement Report, whether Denison has provided the interested Indigenous Nations and communities with the opportunity to participate in the development, implementation, and review of monitoring and mitigation measures, as per the guidance of REGDOC-3.2.2 and CNSC’s Generic EIS Guidelines. Rational: As outlined in Section 11 of CNSC’s Generic Guidelines for the Preparation of an EIS , please include roles and responsibilities to be played by the Proponent, regulatory agencies, Indigenous people, local and regional organizations and others in the design, implementation and evaluation of the monitoring program results as well as possible opportunities for the Proponent to include the participation of the public and Indigenous Nations and communities, during the development and implementation of the program. | concerns raised regarding potential impacts of the Project on the potential or established Indigenous and/or treaty rights. Provide a rationale if this engagement has not been completed. As the Project develops, please provide concrete actions Denison will take in the follow-up and monitoring programs to engage Indigenous Peoples to alleviate concerns and incorporate their interests, and when this engagement is planned to take place. | Please provide additional information and updates on engagement activities to the EIS and IER (to date) that demonstrate whether Indigenous Nations and communities have been engaged directly on the potential mitigation and monitoring measures to address the concerns raised regarding potential impacts of the Project on the potential or established Indigenous and/or treaty rights. See also AD-62 in the Advice to Proponent table. | | ⁱ Additional Lung Cancer Mortality from PM2.5: Recommended Approach and Sample Calculation Health Canada, Water and Air Quality Bureau, October 2022 Health Canada (2022) provides a quantitative estimate of the risk of lung cancer associated with exposure to PM2.5 in Canada. The pooled |

hazard ratio (HR) for lung cancer mortality in the Canadian population is 1.127 (95% CI: 1.085, 1.170) per 10 µg/m3 increase in long-term exposure to ambient PM2.5. The slope coefficient (β) for this relationship is 0.01196, as derived below:

$$e^{(\beta \times 10 \text{ }\mu\text{g}/\text{m}^3)} = \textit{pooled hazard ratio per 10 }\mu\text{g}/\text{m}^3$$

$$e^{(\beta \times 10 \text{ }\mu\text{g}/\text{m}^3)} = 1.127$$

$$\beta \times 10 \text{ }\mu\text{g}/\text{m}^3 = \ln 1.127$$

$$\beta = (\ln 1.127)/(10 \text{ }\mu\text{g}/\text{m}^3) \text{ `}$$

$$\beta = 0.01196$$

The additional lung cancer mortality (over the baseline rate) from PM2.5 derived from a given source can be determined using the equation below, based on the attributable fraction or (HR-1)/HR (Greco et al. 2020):

$$ALCM = \left[\left(e^{\beta \cdot Exposure} - 1 \right) / e^{\beta \cdot Exposure} \right] \cdot Baseline \textit{ rate} \cdot Years$$

ALCM = additional lung cancer mortality cases per 100,000 population

β = 0.01196 (slope coefficient from meta-analysis in Health Canada (2022))

Exposure = estimated PM2.5 exposure concentration from the relevant source(s) (µg/m3) (does not include baseline PM2.5 exposure)

Baseline rate = 45.5 per 100,000 (current Canadian Age Standardized Mortality Rate (ASMR) for lung cancer from Canadian Cancer Statistics Advisory Committee 2021); the Canadian baseline rate is appropriate as the slope coefficient was derived from Canada-wide studies and an updated ASMR of Canada (if available) would be appropriate for use in the calculation

Years = years of project or project phase

Sample calculation:

Project estimates an exposure from relevant source(s) of 0.067 µg/m3 over 50 years of operation

$$ALCM = \left[\left(e^{\beta \cdot Exposure} - 1 \right) / e^{\beta \cdot Exposure} \right] \cdot Baseline\ rate \cdot Years$$
$$ALCM = \left[\left(e^{0.01196 \cdot 0.067} - 1 \right) / e^{0.01196 \cdot 0.067} \right] \cdot 45.5 \cdot 50$$

ALCM = 1.8 additional lung cancer mortality cases per 100,000

References:

- [1] Canadian Cancer Statistics Advisory Committee in collaboration with the Canadian Cancer Society, Statistics Canada and the Public Health Agency of Canada. Canadian Cancer Statistics 2021. Toronto, ON: Canadian Cancer Society; 2021. Available at: cancer.ca/Canadian-Cancer-Statistics-2021-EN
- [2] Greco, S.L., MacIntyre, E., Young, S. et al. An approach to estimating the environmental burden of cancer from known and probable carcinogens: application to Ontario, Canada. BMC Public Health 20, 1017 (2020). <https://doi.org/10.1186/s12889-020-08771-w>
- [3] Health Canada. Lung cancer and ambient PM2.5 in Canada: a systematic review and meta-analysis.
- [4] Health Canada, 2022. Available online at: <https://publications.gc.ca/site/eng/9.907038/publication.html>

Annex 2

Federal Indigenous Review Team (FIRT) Review of Denison Responses to Information Requests (IRs) and Supporting Documents Received February 10, 2024

| Original IR# | Follow-Up IR # | SME | Project Effects Link | Reference to EIS, appendices, or supporting documentation | Context and Rationale | Information Requirement (IR) | Rationale for Status | Status |
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| IR-01 | - | English River First Nation (ERFN) | Current use of lands and resources for traditional purposes | General | <p>Context: Denison has not gone far enough in terms of learning from and incorporating information from ERFN provided in the <i>Traditional Knowledge Study and Health and Socio-Economic Study Report</i>. It appears Denison put a disproportionate amount of reliance on the views and interests of one ERFN land user. While we applaud the efforts of Denison to seek feedback from ERFN land users directly and to work closely with such land users, ERFN’s rights and interests in the region of the Project (and the potential of the Project to adversely impact such rights and interests) extend well beyond that of just one land user.</p> <p>Rationale: It is important for the Proponent and regulators to understand that while the rights and interests of individual ERFN members are important to consider, the Elders and elected leaders of ERFN represent the collective rights and interests of ERFN as a Nation. The results of the scoping study indicated that ERFN holds firmly established rights to the area where the planned project is located. Numerous studies conducted over several decades have examined ERFN’s relationship and connection to land use and occupancy of the region where the proposed mine is located from traditional land use, subsistence harvesting, ecological, and sociocultural and economic perspective.</p> | <p>The draft EIS should be revised to reflect the totality of ERFN TK and land use information.</p> <p>Denison and CNSC must continue to work with ERFN to ensure that impacts on ERFN rights are appropriately and fully considered, mitigated, and accommodated.</p> | | Accepted |
| IR-02 | - | Canadian Nuclear Safety Commission (CNSC) | Mitigation Measures | General Appendix 16-C | <p>Context: Denison’s 2019 Wheeler River Terms of Reference states: “The EIA will also discuss the monitoring programs required to demonstrate regulatory compliance and compliance with the commitments Denison has made to its Indigenous and non-Indigenous Stakeholders.”</p> <p>The CNSC’s Generic Guidelines for the Preparation of an Environmental Impact Statement (EIS), also state: “The EIS will then describe mitigation measures that are specific to each environmental effect identified. Measures will be written as specific commitments that clearly describe how the Proponent intends to implement them and the environmental outcome the mitigation is designed to address.</p> <p>Rationale: The EIS and the Summary of Monitoring and Follow-up Programs provided in Appendix 16-C contains very high-level information. It is not clear which monitoring programs will be employed to demonstrate regulatory compliance, and compliance with the commitments Denison has made to its Indigenous and non-Indigenous Stakeholders.</p> | <p>CNSC staff expect Denison to provide a comprehensive list of commitments along with the next version of the EIS, including any commitments made to Indigenous Nations and communities and other stakeholders (As committed in the Wheeler River Terms of reference, and as noted in the November 28th, 2022 email from CNSC staff to Denison: <i>Future Submission of a Commitments Table for Wheeler River EIS</i>).</p> | | Accepted |

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| IR-03 | - | CNSC | Site preparation | Section 1.3.2 Temporal Boundaries Appendix 10-A (ERA) | Context: The EIS and TSD-ERA provide assessment on the Project timeframe, including construction, operation, and decommissioning phases. Rational: The site preparation phase is not included in the timeframe (EIS and TSD-ERA). As per REGDOC 2.9.1, the sub-section 4.1.1 Complexity of the environmental risk assessment requirements states that “The applicant or licensee shall identify facility characteristics and activities that may interact with the environment during the relevant phase of the facility or activity’s lifecycle (for example, site preparation, construction, operation, and decommissioning.” | Please provide an assessment of those facility characteristics and activities that may interact with the environment during the site preparation phase, along with an assessment of their potential effects, in order to reflect the entire lifecycle or provide a rationale for its exclusion. | | Accepted |
| IR-04 | - | Environment and Climate Change Canada (ECCC) | Fish and fish habitat | Section 2, Project Description Section: Glossary | Context: The Proponent defines ‘clean waste rock’ as “Waste rock generated as sandstone cuttings and core from drilling activities associated with well and freeze hole development that does not have uranium containing materials”. ECCC notes that the use of the term “Clean Waste Rock” could be misunderstood to mean that the waste rock is devoid of any contaminant. Even when the waste rock referred to as “clean waste rock” does not contain uranium materials, it could contain other metals or contaminants that could have adverse environmental effects. It is also not clear whether the “clean waste rock” is characterized for Acid Rock Drainage/Metal Leaching (ARD/ML) given that some portion of the basement rock is to be drilled out to anchor the freeze walls and may have ARD/ML potential. Rationale: The current definition of ‘clean waste rock’ in the draft EIS could lead to inappropriate handling and disposal if it is assumed to be devoid of any metals or other contaminants that might negatively affect the environment. | Provide a clear and more detailed definition of the term ‘clean waste rock’. | | Accepted |
| IR-05 | - | CNSC | Change to an environmental component due to hazardous contaminants | Section 2.2.1.2 | Context: Water volumes for mud/diamond drilling is listed as minimal as the mud will be re-used. The mud is identified as a mixture of water, clay, and environmentally friendly polymers that clean out the cuttings and help to keep the drilling bit cool. Rationale: Although the mud for drilling will be re-used, there could be environmental impacts should there be an accident while drilling. | Please identify the components of the environmentally friendly polymers for the drilling mud and potential environmental impacts should the mud not be recovered. | | Accepted |
| IR-06 | - | CNSC | Geology and groundwater | Section 2.2.1.4, Wellfield for In Situ Recovery Mining | Context: This Section of the EIS indicates that a tracer test was completed in 2021 and a feasibility field test was initiated in 2022. No information from these tests is included in the EIS and no reporting timelines are provided. Rationale: Guidance from the IAEA (2001) and best practices | 1. Please provide a summary of the results of field tests (i.e., tracer tests, wellfield leach tests, and remediation trials) in the EIS, or provide a technical supporting document with this information, and ensure the documentation is appropriately referenced in the EIS. | | Accepted |

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| | | | | | <p>highlighted by regulatory regimes in other countries such as the United States (IAEA, 2016) and Australia (Geoscience Australia, 2010) indicates that single and multi-well trial (feasibility) testing for mining and remediation techniques should be carried out before a licence for full-scale operations can be granted. This is part of the requirement for Proponents to demonstrate to government authorities that all potential risks have been considered during the life of operation and post-remediation of the mine.</p> <p>Additionally, Section 8.5.2 of the Generic EIS Guidelines states: “Units may be characterized as aquifers or aquitards, and unit descriptions should include their geochemical characteristics, vertical and lateral permeabilities, transport mechanism (diffusion versus advection) and the directions of groundwater flow”,</p> <p>And that “The applicant or licensee should present a conceptual and numerical hydrogeological model that discusses the hydrostratigraphy and groundwater flow systems”.</p> <p>Outcomes from the tracer test inform model parameters such as effective porosity (see IR-78), dispersion, and dispersivity (see IR-96). The wellfield leach tests and remediation trails ultimately inform environmental monitoring during site activities, and the source term for the groundwater model. This source term represents the contaminants which flow through the desilicified zone into Whitefish Lake, which represents a source of contamination considered in the ERA.</p> <p>References: [1] International Atomic Energy Agency (IAEA). 2001. Manual of Acid in Site Leach Uranium Mining Technology. IAEA-TECDOC-1239. Vienna. 283 p. [2] International Atomic Energy Agency (IAEA). 2016. In Situ Leach Uranium Mining: An Overview of Operations. IAEA Nuclear Energy Series No. NF-T-1.4. Vienna. 76 p. [3] Commonwealth of Australia (Geoscience Australia). 2010. Australia’s in situ recovery uranium mining best practice guide. ISBN 978-1-921672-95-8. Canberra. 33 p.</p> | <p>2. Please indicate how outcomes from these field tests inform the design of In Situ Recovery. This information should include:</p> <ul style="list-style-type: none">• feasibility of meeting remediation targets.• groundwater flow conditions and validation of flow models.• mobilization of contaminants (e.g., Al, Se or V).• potential for free gas evolution/two-phase flow.• identifying composition of lixiviant and production solutions.• success despite presence of >2% carbonate minerals (siderite, FeCO3) in the ore zone (see Table 4-3 of Appendix 7-A).• site-specific data to parameterize, validate, and refine solute transport models (hydraulic conductivity, effective porosity, dispersivity, diffusion, etc.). <p>3. Please provide further information of proposed operations including % recovery, uranium concentrations, optimal liquid/solid ratios, anticipated reagent consumption, etc.</p> | | |
| IR-06 | IR-06-R1 | CNSC | Geology and groundwater | Section 2.2.1.4, Wellfield for In Situ Recovery Mining | <p>Context: This Section of the EIS indicates that a tracer test was completed in 2021 and a feasibility field test was initiated in 2022. No information from these tests is included in the EIS and no reporting timelines are provided.</p> <p>Rationale: Guidance from the IAEA (2001) and best practices highlighted by regulatory regimes in other countries such as the United States (IAEA, 2016) and Australia (Geoscience Australia,</p> | <p>1. Please provide a summary of the results of field tests (i.e., tracer tests, wellfield leach tests, and remediation trials) in the EIS, or provide a technical supporting document with this information, and ensure the documentation is appropriately referenced in the EIS.</p> <p>2. Please indicate how outcomes from these field tests inform the design of In Situ Recovery. This information should include:</p> | | Accepted |

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| | | | | | <p>2010) indicates that single and multi-well trial (feasibility) testing for mining and remediation techniques should be carried out before a licence for full-scale operations can be granted. This is part of the requirement for Proponents to demonstrate to government authorities that all potential risks have been considered during the life of operation and post-remediation of the mine.</p> <p>Additionally, Section 8.5.2 of the Generic EIS Guidelines states: “Units may be characterized as aquifers or aquitards, and unit descriptions should include their geochemical characteristics, vertical and lateral permeabilities, transport mechanism (diffusion versus advection) and the directions of groundwater flow”,</p> <p>And that “The applicant or licensee should present a conceptual and numerical hydrogeological model that discusses the hydrostratigraphy and groundwater flow systems”.</p> <p>Outcomes from the tracer test inform model parameters such as effective porosity (see IR-78), dispersion, and dispersivity (see IR-96). The wellfield leach tests and remediation trails ultimately inform environmental monitoring during site activities, and the source term for the groundwater model. This source term represents the contaminants which flow through the desilicified zone into Whitefish Lake, which represents a source of contamination considered in the ERA.</p> <p>References: [1] International Atomic Energy Agency (IAEA). 2001. Manual of Acid in Site Leach Uranium Mining Technology. IAEA-TECDOC-1239. Vienna. 283 p. [2] International Atomic Energy Agency (IAEA). 2016. In Situ Leach Uranium Mining: An Overview of Operations. IAEA Nuclear Energy Series No. NF-T-1.4. Vienna. 76 p. [3] Commonwealth of Australia (Geoscience Australia). 2010. Australia’s in situ recovery uranium mining best practice guide. ISBN 978-1-921672-95-8. Canberra. 33 p.</p> | <ul style="list-style-type: none">feasibility of meeting remediation targets.groundwater flow conditions and validation of flow models.mobilization of contaminants (e.g., Al, Se or V).potential for free gas evolution/two-phase flow.identifying composition of lixiviant and production solutions.success despite presence of >2% carbonate minerals (siderite, FeCO3) in the ore zone (see Table 4-3 of Appendix 7-A).site-specific data to parameterize, validate, and refine solute transport models (hydraulic conductivity, effective porosity, dispersivity, diffusion, etc.). <p>3. Please provide further information of proposed operations including % recovery, uranium concentrations, optimal liquid/solid ratios, anticipated reagent consumption, etc.</p> | | |
| IR-07 | - | ECCC | Fish and fish habitat | <p>Section 2.2.1.4.2, Wellfield Operation</p> <p>Section 2.2.1.4.2.2, Secondary Containment of Mining Solution – Pumping</p> | <p>Context: The description in Sections 2.2.1.4.2 and 2.2.1.4.2.2 refer to the differential rates of injection and withdrawal, which implies that more solution will be withdrawn through the recovery well than volume of mining solution injected. According to the description of the site, a freeze wall will create a barrier between the uranium deposit to be mined and outside the isolated area to prevent inflow of groundwater from the sandstone outside the freeze wall. Secondly, it was indicated that the basement rock below the uranium deposit will prevent infusion of groundwater from below.</p> | <p>Clarify where the extra groundwater will come from to sustain this differential rate of injection and withdrawals during operation and if this extra water has been accounted for in the model and the amount of water that ends up in the receiving environment.</p> | | Accepted |

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| | | | | | <p>The Proponent stated that inward hydraulic gradient will be created by recovering more solution than is being injected. In general, the wellfield will operate to draw a minimum of 1% more solution out of the wellfield compared to solutions injected in. This will help avoid increased subsurface pressures from injection pressure build up within the deposit.</p> <p>Rationale: It is not clear where the extra groundwater will come from that will sustain this differential rate of injection and withdrawals as the freeze wall and bedrock basement will isolate the injection well from groundwater.</p> <p>If it is assumed that there is limited amount of groundwater present in the sandstone layer above the uranium deposit, that amount of groundwater in the sandstone layer is finite and will be exhausted at some point. Therefore, it is not clear where the extra groundwater will come from. If the extra volume of water is not accounted for in the modelling, that would ultimately affect the volume of water that ends up in the receiving environment and likewise the amount of contaminants contained.</p> | | | |
| IR-08 | - | ECCC | Change to an environmental component due to radiological contaminants | Section 2.2.1.4.2.2 Project Description | <p>Context: This section describes how an inward hydraulic gradient will be created within the mining area as a secondary containment method for control of mining solution. While the process is described, there is no information on contingency measures in place for pump failure or system maintenance solutions. There is also no information on how quickly the hydraulic gradient, and therefore secondary containment, would be compromised if any pumps stopped working. It is also unclear how primary containment (i.e., well design) failure, such as physical/mechanical issues compromising casings, would affect the creation of the hydraulic gradient and secondary containment as well.</p> <p>Rationale: It is important to have contingency planning in place in the event that there are any issues with the hydraulic gradient and secondary containment system for control of the acidic mining solution.</p> <p>There is no information in this section on how the hydraulic gradient (i.e., secondary containment) would be maintained if a well or pump (i.e., Primary containment) experienced problems.</p> | Provide further information regarding how the inward hydraulic gradient system functions, with particular focus on how the hydraulic gradient and secondary containment will be maintained if any wells or pumps were compromised. | | Accepted |
| IR-09 | - | CNSC | Geology and Groundwater | Section 2.2.1.4.2.2 | <p>Context: This section indicates that mining solution within the mining area can primarily be controlled by maintaining an inward hydraulic gradient. The inward hydraulic gradient will be created by recovering more solution than is being injected.</p> | Please clarify if any measure will be implemented to avoid excessive drawdown and develop contingency measures to address such accident. | | Accepted |

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| | | | | | Rationale: If, for some reason, the recovered solution is much more than that being injected, an excessive drawdown could be created. If, by accident, mining solution is leaking into the upper sandstone aquifer through crack in injection/recovery well casing at the same time, it would be challenging to remediate the upper sandstone aquifer in dry conditions (due to excessive drawdown). | | | |
| IR-10 | - | ECCC | Fish and fish habitat | Section 2.2.1.4.2.3, Tertiary Containment of Mining Solution - Freeze Wall | <p>Context: The Proponent stated that as a tertiary means of containment for the mining area, the uranium deposit is proposed to be surrounded by a freeze wall that extends from the surface to the basement rock, isolating the mining area from regional groundwater. Current plans are for the freeze wall to be a minimum of 10 m thick, be installed 25 m away from the uranium deposit, and extend 30 m into the basement rock (Figure 2.2-6).</p> <p>As explained in Section 2.2.1.4.2.2, mining solution will be injected into the ore zone under pressure and will likely react, not just with the uranium in the ore zone, but also the binding or cementing material in the sandstone. This means that some portion of the sandstone above the uranium layer and perhaps some portions of the freeze wall will dissolve, thereby creating more void than just the thickness of the uranium layer or horizon. The void may affect the integrity of the freeze wall as containment.</p> <p>Rationale: It is not clear how the Proponent will monitor the freeze wall to verify whether portions of the freeze wall are being dissolved in the mining process and how it plans to verify the integrity of the freeze wall as a containment for the mining solution. In addition, if the dissolution reaction of the uranium ore is exothermic, then the heat generated may also affect the integrity of the freeze wall.</p> | <p>1. Explain how the integrity of the freeze wall will be maintained as a means of containment that prevents migration of the mining solution out of the ore zone into the receiving environment.</p> <p>2. Demonstrate that the mining solution injected under pressure will not compromise the integrity of the freeze wall as a containment.</p> <p>3. Demonstrate how both exothermic and chemical reactions of the mining solution used to dissolve the uranium ore will not compromise the integrity of the freeze wall as a containment.</p> <p>Technical Discussion Required: Yes. ECCC would like to better understand the chemical constituents that compose the mining solution and the chemical reactions that it will cause.</p> | The Proponent’s response is accepted but see AD-50 in the Advice to Proponent table. | Accepted |
| IR-11 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 2.2.3 Project Description | <p>Context: It is unclear how much contact water may be produced during the drilling of the mine well field during the construction phase of the proposed Project. Figure 2.2-14 indicates that no water will be produced during the drilling process in the construction phase. In Section 2.2.1.2 both mud rotary drilling and diamond drilling are proposed for the creation of wells. Both processes require water, however only mud rotary drilling produces liquid mud that is then reused in the drilling process.</p> <p>Rationale: It is unclear if the liquid mud produced during drilling can be reused indefinitely with further water additions, or if this eventually becomes the clean sand grain cutting and how it will be disposed of (i.e., liquid or solid waste). If the mud produced from drilling is classified as liquid waste and disposed of as contact water, it is not clear if this is accounted for in the site water management plan and water balance during the construction</p> | Provide further information on potential wastewater produced during the construction phase from drilling processes, and if proposed infrastructure can contain any water produced. | | Accepted |

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| | | | | | phase. Contact water from well drilling during the construction phase has not been quantified or accounted for in Figure 2.2-1, and therefore it is unclear if proposed infrastructure during the construction phase has the capacity to contain this waste stream in addition to the waste streams currently outlined in Figure 2.2-1. | | | |
| IR-12 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 2.2.3, Project Description | <p>Context: There is not enough information provided within the draft EIS and site water infrastructure designs to determine if the infrastructure will sufficiently contain mine site contact and non-contact water runoff. It is unclear how water management will occur during all proposed Project stages at the Project airstrip, which is located away from the main Project site. No information has been provided regarding water that may come into contact with fuels and oils from machinery on the air strip, how and where that contaminated water will be treated, and how surface runoff around the airstrip will be managed. Additionally, it is unclear if contaminants from heavy machinery on roads have been considered during runoff collection plans throughout the mine Project site. Water management at the airstrip and roads can have impacts on surface water quality and sediment quality and contaminants (e.g., Hydrocarbons) from these sources should be considered in overall site water management plans.</p> <p>In Section 2.2.3.1 a site drainage plan for contact and non-contact water has been provided in Figure 2.2-17, and water balances have been provided for the different Project phases in Figures 2.2-14 to 2.2-16. In Section 2.2.3.4 a volume of 30,000m3 for the process water pond is provided, and it is stated that the process water pond has the capacity to contain Probable Maximum Precipitation (PMP) event estimated to be 483.3mm while allowing for 1.0m of freeboard. However, there are no estimates on the total volume of water that may be drained from the overall site infrastructure (i.e., the well field, processing areas, etc.) during a 24-hr PMP event. Additionally, in Figure 2.2.17 culvert locations are provided, however there is no further information on culvert designs, flow ratings and capacity for PMP events.</p> <p>Rationale: In order to be able to understand site water management and flood risk potential, more information needs to be provided regarding the site water infrastructure designs and capture volumes during PMP events. This information will aid ECCC in understanding how contact and non-contact water will be conveyed throughout the site. Runoff from roads and the site airstrip will contain contaminants from vehicles, heavy machinery, aircrafts and de-icing practices. Additional information on the runoff collection systems and expected contaminant concentrations for the site airstrip and roads is needed to</p> | <ol style="list-style-type: none">1. Provide information on how contact and non-contact water from the site airstrip will be managed. Include information on potential contaminant characterization and loadings and an assessment of risk to the environment.2. Provide further information on how potential contaminants in runoff from roads have been considered in the site water management. Include information on potential contaminant characterization and loadings and an assessment of risk to the environment.3. Provide estimated volumes of water to be drained from overall site infrastructure (such as the mine terrace, airstrip, camp area etc.), during a 24-hr PMP event.4. Provide additional information on culvert designs and conveyance capacity for PMP events. | <p>Item one of the IR has been accepted, but a follow-up item of advice can be found within the Advice to the Proponent table [reference to come].</p> <p>There is outstanding information required to resolve item two. The Proponent did provide the requested proposed water management structures in Attachment IR-12; however, for the road to airstrip and the airstrip, the water management strategy does not include any containment structures or information about runoff quality.</p> <p>Deleterious substancesContaminants may be contained in non-contact water from all site infrastructure, including the airstrip, roads, and the camp area. This information is required in order to make a determination on significant adverse effects, as it relates to potential impacts to water quality and fish, which are assessed as part of the EA process.</p> <p>The Proponent should confirm that the proposed water management structures, for the roads, camp pad, operation, substation and airstrip, will be included in the Final EIS. The Proponent should also describe how quality of runoff from infrastructure will be monitored, and what proposed mitigation and management measures will be taken if necessary.</p> <p><i>With regards to items three and four, these have been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> <p>Denison is expected to address the following:</p> <ol style="list-style-type: none">3. From FIRT’s Information Request Rationale (2023-12-05): CNSC requests that Denison use a PMP value that is estimated using historical rainfall data that includes the most up to date meteorological data or provide justification on the validity of the current PMP.4. From Denison submission of responses to IRs (2023-08-18): Details related to culvert design and conveyance capacity are being developed as part of ongoing engineering activities. Culverts will be a designed with a sufficient size and length to convey water around the site during a PMP event. | Not Accepted |

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| | | | | | determine if the receiving environment and aquatic and terrestrial receptors are protected. | | | |
| IR-12 | IR-12-R1A | ECCC | Change to an environmental component due to hazardous contaminants | Section 2.2.3, Project Description Proponent response to IR-12 | <p>Context: Runoff water from site infrastructure such as the airstrip and roads may be categorized as non-contact water because it does not come into contact with contaminants of potential concern (COPCs) directly from mining operations infrastructure. However, it still has the potential to contain deleterious substances from mine-related activities such as operation of vehicles, including heavy machinery and aircraft, spills, fire management practices, and snow removal practices. The <i>Metal and Diamond Mining Effluent Regulations</i> (MDMER) pursuant to the <i>Fisheries Act</i> requires all mine effluent and seepage from the mine site that contains deleterious substances be discharged through a final discharge point. This includes deleterious substances in non-contact water from all site infrastructure including the airstrip, roads, and camp area.</p> <p>Rationale: All mine effluent and seepage that contains deleterious substances must be discharged through a final discharge point. This includes site non-contact water which has the potential to contain deleterious substances such as those released from vehicles, machinery, aircrafts, spills, and de-icing practices. The Proponent has not included how non-contact water runoff from site infrastructure will be captured within site water management planning. To understand the potential effects of contaminants from non-contact water on the surrounding environment, site water management planning needs to be updated to include the capture of non-contact water.</p> | <ol style="list-style-type: none">1. Update site water management plans to include management of potentially deleterious substances contained in non-contact water from all site infrastructure.2. Provide updated estimates of water volumes to be drained and managed from overall site infrastructure (including runoff from roads, airstrip, camp area, etc.) during the different Project phases. Include updated information on water treatment flows, capacity and effluent discharge during normal operations, and a 24-hr Probable Maximum Precipitation (PMP) Event. | <p>The Proponent has not adequately answered either part of the IR.</p> <p>An updated site water management plan that includes the management of all water that has been in contact with project infrastructure and updated estimates of water volumes to be drained and managed from overall site infrastructure (including runoff from roads, airstrip, camp area, etc.) are required to understand the potential effects of contaminants on the surrounding environment. The Proponent should include updated information on water treatment, flows, capacity and effluent discharge during normal operations, and a 24-hr Probable Maximum Precipitation (PMP) Event.</p> | Not Accepted |
| IR-12 | IR-12-R1B | ECCC | Water Quality - Change to an environmental component due to hazardous contaminants | Section 2.2.3, Project Description Proponent response to IR-12 | <p>Context: The Proponent has clarified that there is no infrastructure in place for management of non-contact water from site infrastructure that may contain COPCs, including but not limited to roads, the airstrip, and the campground.</p> <p>Rationale: To understand the potential effects of contaminants from non-contact water on the surrounding environment, site water management planning needs to be updated to include the type of infrastructure and its location for the capture of non-contact water.</p> | Provide a map marking the locations of proposed surface drainage structures for runoff collection including collection ditches, culverts, diversion ditches, perimeter berms, collection ponds and other similar structures. | | Accepted |
| IR-13 | - | ECCC CNSC | Fish and fish habitat | Section 2.2.4, Waste Management Section 2.2.7.7, Borrow Area | <p>Context: The Proponent indicates that a borrow area is planned for an area northeast of the processing plant. The borrow material or overburden will be used during construction for roads, airstrip, pads, and in the batch plant for concrete production needs, during Operation for ongoing maintenance of various Project components and during decommissioning for fill and cover material. Suitable construction fill material will be sourced from the proposed borrow</p> | <p>Please provide:</p> <ol style="list-style-type: none">1. Information on whether the waste rock from the basement rock is potentially acid generating and metal leaching;<ol style="list-style-type: none">a. Confirm that any borrow material to be used for construction will be characterized for potential ARD/ML.b. Confirm that the part of waste rock recovered from the basement rock, will also be tested for potential ARD/ML. | <p><u>Note to Denison:</u> This IR is conditionally accepted. This commitment should be captured in the Commitments Register.</p> <p>Once Denison has added a commitment to develop the waste rock segregation criteria and to develop <u>appropriate mitigations and management a lined storage pad</u> for potentially acid generation (PAG) material in the Commitments Register, this can be accepted.</p> | Accepted |

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| | | | | Section 2.3.1.3 Site Preparation and Earthworks | <p>area and any suitable clean sandstone generated during freeze wall and well drilling (Section 2.2.7.7).</p> <p>It was also noted in Sections 2.2.1.3 and 2.2.14 that the freeze wall will be established by drilling over 300 vertical holes from surface to the basement rock. The freeze holes will extend 30 m into the basement rock and will produce waste rock from basement rock (Figure 2.2-6). However, there is no information whether the waste rock from basement rock would potentially be acid generating and/or metal leaching. This means that all the extra 30 m of basement rock should also be characterized for potential ARD/ML to determine use or appropriate disposal.</p> <p>Rationale: ECCC notes that the Proponent did not indicate whether the borrow material and the drill out part of the sandstone layers and basement rock will be tested for Acid rock drainage/metal leaching (ARD/ML) potential before they will be used during construction, operation and decommissioning. ARD/ML is an environmental hazard that will have an adverse effect on waterbodies frequented by fish.</p> <p>Potential acid generating and metal leaching waste rock could pose negative impacts on the environment if they are not managed adequately.</p> | <p>2. Criteria for segregating the potential acid generating and metal leaching waste rock, if it exists, from clean waste rock; and,</p> <p>3. A plan to manage the potential acid generating and metal leaching waste rock, if it exists.</p> | <p><i>Proposed rationale text for posting:</i> Denison has captured their commitment to develop the waste rock segregation criteria and to <u>appropriate mitigations and management develop a lined storage pad</u> for potentially acid generation (PAG) material in the Commitments Register, so this IR has been accepted.</p> <p><i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> | |
| IR-14 | - | CNSC | Wastes and Decommissioning | Section 2.3.3.1.3 Decontamination, Demolition, and Disposal (p. 2-82) Table 4.3-2: Key Issues and Concerns from English River First Nation (p. 4-33) | <p>Context: The EIS states “Concrete foundations will be left in place. Any portions of concrete foundations remaining above grade will be levelled and rebar will be cut-off at grade. Large slabs will be perforated on a 2-m grid to permit drainage. Concrete slabs will be covered with 0.5 m of development rock or locally stockpiled till.” (p. 2-82)</p> <p>Further, Denison notes that “Concern about responsible authority for restoring the environment, including contaminants when mining concludes. How long will it take to have the environment fully restored and, if Denison is no longer the operator, how will this be completed?” (p. 4-33). This comment status is noted as <i>Complete</i>.</p> <p>Rationale: Permanent structures will remain following decommissioning, according to the excerpt above. It’s unclear how engagement activities influenced Denison’s planned decommissioning approach, or how the comment above has been addressed or received.</p> | How has the proposal to leave these foundations in place been received by the Indigenous Nations and communities during engagement sessions? Have engagement activities influenced Denison’s planned decommissioning approach? Describe in additional detail how the comment from p. 4-33 has been addressed and how this has been received by those who expressed this concern? | <p><u>Note to Denison:</u> This IR is conditionally accepted. This commitment should be captured in the Commitments Register.</p> <p>Once Denison has added a commitment to address concerns from Indigenous Nations and communities in the Preliminary Decommissioning Plans as they are developed, in the Commitments Register, this can be accepted.</p> <p><i>Proposed rationale text for posting:</i> Denison has captured their commitment related to addressing concerns from Indigenous Nations and communities on their decommissioning approach within the Preliminary Decommissioning Plans in the Commitments Register, so this IR has been accepted.</p> | Accepted |
| IR-15 | - | ECCC | Fish and fish habitat | Section 2.2.3.4 Project Description Section 8.1.3.4.2, | <p>Context: In Section 2.2.3.4 it is stated that the estimated PMP event for Project infrastructure planning is 483.3mm. In Section 8.1.3.4.2 it is stated that the PMP is 489.3 mm.</p> | Provide the correct PMP value and verify that Project infrastructure has been designed utilizing the correct value. | | Accepted |

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| | | | | Aquatic Environnement | Rationale: It is unclear which value is the correct PMP value and if Project infrastructure has been planned correctly. | | | |
| IR-16 | - | CNSC | Human health with respect to hazardous contaminants | Section 2.2.3.8 | <p>Context: The EIS and technical supporting documents do not provide sufficient justification for the selection of the proposed wastewater treatment systems for the industrial wastewater treatment plant or the domestic wastewater treatment plant.</p> <p>In addition, it is not clear how the upper bound of the industrial wastewater treatment plant effluent quality was obtained.</p> <p>Rationale: Draft REGDOC-2.9.2 formally documents the CNSC’s expectations to licensees for controlling releases to the environment. For proposed new facilities, these expectations include conducting a best available technology and techniques, economically achievable (BATEA) Assessment, and determining key parameters necessary to support the EIS. These include identifying:</p> <ul style="list-style-type: none">• environmental release targets to inform the design of wastewater treatment systems to constrain the quantity and concentration of contaminants and physical stressors released into the environment,• the best available technology and techniques through an options analysis; and• the anticipated influent characteristics, overall treatment efficiencies, and maximum predicted design release as the output of the assessment. <p>Consideration of the principle of pollution prevention and BATEA is also a requirement of REGDOC-2.9.1.</p> <p>CNSC staff have met with Denison to discuss the expectations in draft REGDOC-2.9.2.</p> | <p>Please provide a summary of the BATEA assessment to justify the selection of the wastewater treatment plant system.</p> <p>As part of the summary, please identify the anticipated environmental release targets used to inform the design, as well as the maximum predicted design release concentrations and loadings to the receiving environment. The maximum predicted design releases should be used in the ERA to demonstrate protection of people and the environment.</p> | | Accepted |
| IR-17 | - | CNSC | Human health with respect to hazardous contaminants | Section 2.2.3.8 | <p>Context: It is also acknowledged that Denison stated in meetings with CNSC staff that Denison intends to propose final release targets to the CNSC as part of the licence application submission.</p> <p>Rationale: It is not clear in the submission whether Denison has considered whether any applicable technology-based performance standards exist in Canada or internationally, and would be relevant as effluent discharge targets, in order to ensure principles of pollution prevention are applied. Consideration of this would help ensure that the proposed effluent discharge targets harmonize with existing federal, provincial/territorial, and/or municipal requirements. For example, there are release limits for radium-226, TSS, and pH outlined in the federal Metal and Diamond Mining Effluent Regulations, which have been demonstrated to be</p> | Denison should harmonize their proposed Effluent Release Targets with the technology-based performance standards that exist in the Metal and Diamond Mining Effluent Regulations where applicable, or other suitable international regulations. | | Accepted |

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| | | | | | <p>achievable in the uranium mine and mill industry.</p> <p>In addition, countries like the United States, where in-situ recovery has been conducted in the past, have specific technology-based limits. These are known as New Source Performance Standards and are identified in US Code of Federal Regulations (US CFR) 40, Chapter 1, Subchapter N, Part 440 – Ore Mining and Dressing Point Source Category. It is not clear whether these have been considered in Denison’s assessment. These should be considered when identifying suitable achievable technologies.</p> | | | |
| IR-18 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 2.2.3.9, Project Description Appendix 8-E | <p>Context: In Table 2.2-1 the upper bound Industrial Wastewater Treatment Plant (IWWTP) effluent quality final discharge targets for Constituents of Potential Concern (COPCs) are provided. General parameters (e.g., temperature, pH, etc.), and several Schedule 4 Substances with maximum authorized concentrations (lead, nickel, suspended solids, and un-ionized ammonia) under the Metal and Diamond Mining Effluent Regulations (MDMER) have not been provided in this table. There are several COPCs (aluminum, mercury, iron, nitrate, thallium, phosphorus and manganese) for effluent characterization under Schedule 5 Section 4 of the MDMER that have not been provided in this table. Additionally, no information on water quality guidelines has been provided in this table.</p> <p>Furthermore, it is stated that the final effluent quality discharge target for uranium is 0.057 mg/L. However, the Canadian Council of Ministers of the Environment (CCME) water short term (acute) water quality guidelines for the protection of aquatic life is 0.033 mg/L. The proposed effluent discharge target for uranium exceeds the acute water quality guidelines, indicating effluent may pose the risk of being acutely lethal to aquatic biota at end-of-pipe.</p> <p>Rationale: ECCC requests the Proponent include the general water quality parameters that influence water quality thresholds, parameters in Schedule 4 and Schedule 5 Section 4 of the MDMER, and their respective water quality guidelines for consideration and transparency.</p> <p>Discharges from the proposed Project will alter water quality in the immediate receiving area, and this may include some sublethal effects on aquatic biota, which must be minimized. It remains the Proponent’s responsibility to adhere to the MDMER to ensure that effluent at the end-of-pipe from all final discharge points be non-acutely lethal and meet requirements for prescribed deleterious substances under Schedule 4 of the regulations.</p> | <ol style="list-style-type: none">1. Update Table 2.2-1 and Appendix 8-E to include all general parameters required for environmental effects monitoring: pH, temperature, hardness, alkalinity, and conductivity.2. Update Table 2.2-1 and Appendix 8-E to include missing Schedule 4 Substances under the MDMER with maximum authorized concentrations: lead, nickel, suspended solids, and un-ionized ammonia.3. Update Table 2.2-1 and Appendix 8-E to include missing Schedule 5 Section 4 parameters required for effluent characterization under the MDMER: aluminum, mercury, iron, nitrate, thallium, phosphorus and manganese.4. Include all acute and chronic water quality thresholds for each parameter in Table 2.2-1 and Appendix 8-E.5. Describe additional mitigation measures that can be considered to minimize impacts to aquatic biota from uranium concentrations in effluent. | <p>Item 3 remains outstanding and is an issue that also needs to be addressed in IR 108, 114 and 115.</p> <p>With regards to items one and four, these have been accepted for the purposes of the current EA process and will be further assessed as part of licensing technical reviews, prior to the granting of a license.</p> <p>Denison will be expected to address the following:</p> <ul style="list-style-type: none">For item 1, the requested parameters (pH, temperature, hardness, alkalinity and conductivity) were added to Table 2.2-1 in the revised draft EIS and the tables in Appendix 8-E. However, the predicted conductivity presented would not be possible given the TDS reported in Table 2.2-1, and this inconsistency has been found throughout Section 8 and its appendices. Conductivity in µS/cm is typically 1.25-2 times TDS in mg/L, whereas the value in the table is 0.0034 times the TDS concentration. This item is not resolved, but can be carried over to licensing. The Proponent will be expected to correct the proposed effluent conductivity added to Table 2.2-1 and in Appendix 8-E.For item 4, the proponent will have to follow the guidance and requirements in REGDOC 2.9.2 to develop effluent discharge targets. The CNSC will engage with ECCC during this process as necessary. <p><u>In response to the FIRT’s previous review, Denison provided responses to the following outstanding requests from ECCC:</u></p> <ol style="list-style-type: none"><u>1. Update Table 2.2-1 and Appendix 8-E to include all general parameters required for environmental effects monitoring: pH, temperature, hardness, alkalinity, and conductivity.</u><u>2. Update Table 2.2-1 and Appendix 8-E to include the following missing Schedule 5 Section 4 parameters required for effluent characterization: aluminum, iron, nitrate, thallium, and manganese. Provide further explanation if this information is not available.</u><u>3. Include all acute and chronic water quality thresholds for each parameter in Table 2.2-1 and Appendix 8-E. Include information on the concentrations of modifying environmental factors (i.e. pH, hardness, etc.) used to calculate these guidelines as footnotes.</u><u>4. Provide a clear commitment to ECCC for continued consultation on developing effluent discharge targets including a review of final predicted effluent discharge targets once available.</u> | Not Accepted |

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| | | | | | | | <p>The Proponent has resolved item two of the above, but items one, three, and four require additional follow up.</p> <p>For item one, the requested parameters (pH, temperature, hardness, alkalinity and conductivity) were added to Table 2.2-1 in the revised draft EIS and the tables in Appendix 8-E. However, the predicted conductivity presented would not be possible given the TDS reported in Table 2.2-1, and this inconsistency has been found throughout Section 8 and its appendices. Conductivity in µS/cm is typically 1.25-2 times TDS in mg/L, whereas the value in the table is 0.0034 times the TDS concentration. This item is not resolved, but can be carried over to licensing. The Proponent will be expected to correct the proposed effluent conductivity added to Table 2.2-1 and in Appendix 8-E.</p> <p>Follow up for item three is addressed in IR-108, IR-114 and IR-115.</p> <p>To address item four, the Proponent will have to follow the guidance and requirements in REGDOC-2.9.2 to develop effluent discharge targets. The CNSC will engage with ECCC during this process as necessary.</p> | |
| IR-19 | - | ECCC | Change to an environmental component due to radiological contaminants | Section 2.2.4 Project Description | <p>Context: In this section, it is proposed that the IWWTP precipitate pond will have a single geosynthetic composite liner system, which is used for ponds/pads that only store non-radioactive materials.</p> <p>However, from Section 2.2.3.9 on industrial wastewater treatment, it is unclear if the precipitates from the stage three neutralization process that are pumped to the IWWTP precipitates pond will have any residual radioactivity.</p> <p>Rationale: For the protection of the surrounding environment, it is important that any ponds/pads that are expected to store radiological contaminants be designed to have proper controls (i.e., liners with monitoring systems) in place.</p> | <p>1. Confirm the characterization of the precipitates that are to be stored in the IWWTP precipitate pond.</p> <p>2. If radiological constituents are expected within those precipitates, update the draft EIS to ensure the proposed geosynthetic liner system for the IWWTP precipitate pond will be adequate to ensure the protection of the surrounding environment.</p> | | Accepted |
| IR-20 | - | NRCan | Fish and fish habitat | Section 2.3.3.1.1 Appendix 7-C | <p>Context: The Proponent's objective for mining area remediation is to restore the groundwater within the confines of the freeze wall to an acceptable remediation target (EIS, sec. 2.3.3.1.1). The Proponent's acceptable decommissioning objectives for groundwater quality are provided in EIS Table 2.3-3 and in Table 3-5 of Appendix 7-C. These objectives were based on laboratory core flood tests performed by flushing samples of ore with groundwater and groundwater amended with sodium hydroxide or sodium bicarbonate. The composition of the remediated groundwater observed in the core flood tests serves as the source term for the post-decommissioning reactive transport modeling presented in section 4 of Appendix 7-C.</p> <p>Rationale: In NRCan's opinion, it is important for reviewers to be able to assess the level of remediation achieved in order to reach</p> | NRCan requests that the Proponent revise Table 3-5 of Appendix 7-C to show the water quality in lixiviant remaining in the ore zone at the end of mining, prior to remediation activities. | | Accepted |

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| | | | | | the Proponent's decommissioning groundwater quality objectives. Therefore, the Proponent should provide complete water quality data for the pregnant lixiviant that remains in the ore zone after the end of mining and prior to any remediation. | | | |
| IR-21 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 2.3.3.1.3, Project Description | <p>Context: The decommissioning process for the wellfield and associated infrastructure is discussed, however there is no information provided on the potential risk for subsidence of the ground above the depleted uranium deposit. After the uranium has been dissolved and pumped to the surface, a cavity will be formed in the area where the uranium used to exist. This could destabilize the overlying substrates, causing the ground at the surface to sink in the future. There is currently no information regarding this risk, and how it may alter the overlying environment, surface water features, runoff, or existing nearby waterbodies.</p> <p>Rationale: From a surface water and sediment quality perspective, it is important to understand how potential subsidence in the future post-decommissioning may affect the existing environment. It is currently unclear if there is any risk to the aquatic environment if subsidence were to occur and alter existing waterbodies, create new surface water features, or if there will be any risk to the decommissioned onsite industrial landfill and industrial wastewater treatment plant precipitate pond.</p> | Provide further information on the potential risks from subsidence including the probability of occurrence, how it may affect surface water features, and if there exists any risk to the planned decommissioning of waste management infrastructure. | | Accepted |
| IR-22 | - | NRCan | Fish and fish habitat | Section 2.10 Appendix 2-C, section 1.1.1.4 | <p>Context: With respect to the choice of In-Situ Recovery (ISR) mining solution, two alternatives were assessed: alkaline and acidic lixiviants (Appendix 2-C, sec. 1.1.1.4). In the consideration of technical and economic feasibility of the alternatives (Table 2, Appendix 2-C), the Proponent concludes that: Option 1 (alkaline) is not technically feasible based on the uranium deposit geochemistry. Option 2 (acidic) is technically and economically feasible based on the uranium deposit geochemistry and ability to dissolve uranium. Accordingly, the alkaline alternative was not carried forward into the Environmental Assessment (EIS, Table 2.10-1; Appendix 2-C, Table 3).</p> <p>While acidic ISR solutions are widely used internationally (e.g., Kazakhstan), in the United States, where the environmental regulatory regime is more strict, alkaline solutions have been used exclusively since 1970.</p> <p>Rationale: In NRCan's opinion, the Proponent should provide a more thorough technical justification for adopting an acidic ISR lixiviant.</p> | In the Alternative Means Assessment (Appendix 2-C), NRCan requests that the Proponent provides a more thorough technical justification for selecting an acidic ISR lixiviant rather than a less environmentally problematic alkaline leach used exclusively in the USA. | | Accepted |
| IR-23 | - | CNSC | Alternative Means | Section 2.10.2 Alternative Means | Context: There are multiple rows in the Indigenous Tables for Appendix 2-A where comments and concerns raised by Indigenous | Please explain how comments and concerns collected during Denison's engagement sessions were considered or influenced | | Accepted |

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| | | | | Appendix 2-A PD Engagement Tables Appendix 2-C Alternative Means Assessment (p. 3) | <p>Nations and communities and other members of the public were taken into consideration in the Alternative Means Assessment. However, it is unclear how these were considered.</p> <p>A few examples:</p> <ul style="list-style-type: none">16-EN-DesNd-101.1: Interested in any future business opportunities that may be available as Denison advances their Wheeler River Project.16-EN-ERFN-100.15: In that territory near the Wheeler River there are a lot of spawning and calving areas for moose, caribou; those creeks are for whitefish spawning. There's lots of heavy muskeg there. A lot of us have been there, and we'd like to know there'll still be access to the area.6-EN-ERFN-100.17: Today because of climate change, things are starting to happen that normally didn't happen. Even the permafrost is now further down. In the Wheeler River area, where there's some permafrost, have your environment guys seen a change? Will there be a change? These are some of the questions that need to be answered in order to come out with a positive spin. <p>Rationale: Appendix 2-C, Alternative Means assessment, states (p.3): "Engagement with Interested Parties naturally included alternatives means and the engagement input was included in the evaluation of alternative means. Refer to the references list below and <i>Appendix 2-A Engagement Database Summary – Project Description</i> for details of engagement information referenced in this alternative means assessment."</p> <p>It is unclear in section 2.10.2 of the EIS, Appendix 2-A or Appendix 2C how the comments documented by Denison have been considered or influenced the alternative means assessment.</p> | the alternative means assessment. Please include this information in the EIS and/or it's appendices. | | |
| IR-24 | - | CNSC | Alternative Means | Section 2.10.2 Alternative Means | <p>Context: While Appendix 2-C (Alternative Means Assessment) is detailed and includes all aspects of the Alternative means assessment that are required, the summary of the analysis and conclusions in Section 2.10.2 of the EIS lacks the level of detail required to understand the methodology used, and how Denison arrived at these conclusions.</p> <p>Rationale: As noted in the Agency's Operational Policy Statement on Addressing "Purpose of" and "Alternative Means" under the CEAA 2012: "If a preferred means is selected, the analysis and the rationale for the choice should be explained from the perspective of the Proponent, and be documented in the EIS in sufficient detail to provide context for public and technical comment periods during</p> | <p>Please summarize the analysis of the alternative means assessment within the body of the EIS, in sufficient detail that a reader of the EIS has adequate information to understand the methodology used, and how Denison arrived at these conclusions.</p> <p>*Note: In addition to the adding text to summarize, Table 6 in Appendix 2-C could be useful to understanding table 2.10.1 in the EIS.</p> | | Accepted |

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| | | | | | the project EA, and ultimately to allow the decision maker to understand the choice.” | | | |
| IR-25 | - | CNSC | Current use of lands and resources for traditional purposes | Section 3, Sections 4, Section 5, Section 11 (and all other applicable once Métis Knowledge Use Study is completed) | <p>Context: The EIS states that Denison is currently negotiating an agreement with MN-S and no traditional land use information is included throughout the EIS given no agreement was signed or Traditional land use information was shared at the time the EIS was being drafted.</p> <p>As noted in the EIS Denison has committed that: “As information becomes available from the agreed-upon process between the Métis Nation – Saskatchewan and Denison, it will be incorporated into the final EIS.” (p. 11-36)</p> <p>Rationale: More information is required to better understand the issues and concerns, valued components, and current use of lands and resources for traditional purposes by MN-S near the Project area.</p> <p>Requirements are detailed in CNSC’s Generic EIS Guidelines, section 8.9: Indigenous land and resource use.</p> | <p>Please update the revised Draft EIS to reflect the integration of the Métis Use and Knowledge Study in the Draft EIS where applicable, when this study is completed and provided to Denison.</p> <p>In addition, please include an updated Issues and Concerns table that includes relevant information from the MN-S as a result of engagement activities and relevant MN-S studies in the next version of the EIS, as appropriate.</p> <p>Should this information not be made available to Denison at the time of revising the draft EIS, the next version of the EIS and the response to this IR should provide a status update on discussions and engagement with MN-S and next steps.</p> | | Accepted |
| IR-26 | - | CNSC | Precautionary principle and approach | Section 3.4.8 Lands Taken Up from an Indigenous Perspective (p. 3-14) | <p>Context: Denison states: “Discrepancies among IK and western scientific information provide an opportunity for Denison to take a precautionary approach. Examples of concrete actions to address uncertainty in cases where IK and LK have differing conclusions on predicted Project effects include addressing uncertainty through monitoring and follow-up programs and communicating results of those monitoring and follow-up programs to demonstrate they have been responsive to the IK shared.” (p. 3-14)</p> <p>Rationale: CNSC’s Generic Guidelines for the Preparation of an EIS state: “In documenting the analyses included in the EIS, the Proponent will demonstrate that all aspects of the Project have been examined and planned in a careful and precautionary manner in order to avoid significant adverse environmental effects.</p> <p>A document by Canada’s Privy Council Office, A Framework for the Application of Precaution in Science-based Decision Making About Risk, sets out guiding principles for the application of precaution to science-based decision making.” (Section 2.5)</p> | Please clarify how the precautionary principle, and the Privy Council Office’s, A Framework for the Application of Precaution in Science-based Decision Making About Risk, sets out guiding principles for the application of precaution to science-based decision making has been considered and incorporated into the EA described in the EIS. | | Accepted |
| IR-27 | - | CNSC | Cumulative Effects Analysis | Section 3.4.8 | <p>Context: During an outreach and engagement trip by CNSC in October 2022, an abandoned exploration camp adjacent to the proposed Wheeler River site was observed. This site has not been identified within the EIS as part of the cumulative effects assessment. As noted in section 3.4.8, KML has also raised concerns</p> | Please specify why abandoned exploration camps and industrial waste aren’t taken into consideration when completing cumulative effects assessment. | | Accepted |

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| | | | | | <p>with Denison related to abandoned camps and industrial waste left with no programs for clean-up.</p> <p>Rationale: Section 9.4.3 of CNSC’s Generic Guidelines for the Preparation of an EIS states that “The applicant shall assess any residual adverse environmental effects of the Project in combination with other past, present or reasonably foreseeable projects and/or activities within the study area.”</p> | | | |
| IR-28 | - | CNSC | Current use of lands and resources for traditional purposes | Section 4, IER and engagement appendices, including: Appendix 2-A Appendix 6-B Appendix 7-B Appendix 8-A Appendix 9-A Appendix 10-B Appendix 11-A Appendix 12-A Appendix 13-A Appendix 14-B | <p>Context: The summary of issues tables do not appear to include all of the key issues identified by the Indigenous Nations and communities.</p> <p>For example, some Indigenous Nations and communities have shared concerns with respect to accident prevention and overall safety on the Key Lake road (Highway 914) due to increased traffic, impacts on treaty rights and section 35 rights due to cumulative impacts, and decommissioning, that were not captured in the issues and concerns and summary tables in Section 4.3.2 and in the IER.</p> <p>The tables in the engagement appendices include a column titled “Response (From Denison)”. The “Response” column does not include responses, but instead points the reader to where this comment or concern was considered. When navigating to the sections referenced, it is often unclear how this information was considered or influenced the assessment.</p> <p>Rationale: Additional detail is required in order to ensure the key issues are all identified and to understand the status of validation for each issue raised and the response provided.</p> | <p>1. Update the summary of issues and concerns tables to include all relevant issues and concerns raised by each of the Indigenous Nations and communities to date, including concerns raised in the Indigenous Knowledge studies provided, additional engagement, and Draft EIS comments.</p> <p>2. Please include a column in the issues and concerns tables to clearly articulate the specific mitigation/monitoring measures that Denison have committed to, or any other measures, in order to address the concerns raised by each Indigenous Nation and community during the engagement process to date.</p> <p>3. Denison must demonstrate that each Indigenous Nation and community has validated that the summary of issues and concerns table reflects their understanding or agreement, and/or a path forward to complete the validation throughout the EIS and the updated IER.</p> <p>Validation must be complete by the time the technical review is complete, prior to submission of a final EIS. Should Denison not be able to fully address issues, concerns or feedback raised by any Indigenous Nation or community, through mitigation and monitoring measures, this should be documented, and a rationale provided.</p> <p>4. Update the response column of the Engagement tables to describe how these were considered in the sections referenced. Consider renaming this column to reflect the nature of the content (i.e., how the information was considered).</p> | <p>Note to Denison: This text is still in draft, but will likely have some minor revisions.</p> <p>This response has been accepted. Denison has provided fully updated information as of January 2024.</p> <p>It will be expected that a fully updated IER and issues and concerns tables for each Nation as per the original IR, be provided in future submissions, for CNSC staff awareness of progress on this work. This includes updates on the validation from all Nations and communities, or updated paths forward to validation, if applicable.</p> <p><u>Note: In the IER Denison provides this information in charts categorized by Nation and in the Appendix 4-B of the EIS, Denison instead includes one large chart with the concerns categorized by key topic. CNSC would recommend using only one method for both the IER and EIS, preferring the format used in the IER by Indigenous Nation and/or community.</u></p> | Accepted |
| IR-29 | - | CNSC | Current use of lands and resources for traditional purposes | Section 4.3.2 and IER | <p>Context: In this section, Denison includes the engagement with BNDN and includes a summary of issues and concerns table for the Nation. Within the history of interactions (Section 4.3.3.2.1).</p> <p>Rationale: Denison states that they have been providing information on the Project to BNDN in 2019, 2021 and again in 2022 and that Denison and BNDN have not responded to date in order to advance further engagement and dialogue.</p> | Please ensure updated information of any additional engagement activities that Denison has completed with BNDN related to understanding their current and traditional land use and potential interests near the proposed project is provided. | | Accepted |

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| IR-30 | - | CNSC | Indigenous physical and cultural heritage | Section 4.3.2.1.3, Table 4.3.2 | Context: Concerns were raised during engagement sessions that “Elders are not being consulted as most of the engagement has been through online means and without a translator”. Rationale: There’s no indication that a translator has been employed to engage with Elders since 2021 in the engagement Table 4.3.2. | How has Denison adapted engagement with Elders from the ERFN since receiving this comment on March 31, 2021? | | Accepted |
| IR-31 | - | CNSC | Indigenous Engagement | Section 4.4.2.1.3, Key Engagement Activities (p. 4-88) | Context and Rationale: Regarding the following: “An open house for the general public was planned to be hosted in 2022 on preliminary effects and mitigation, but due to concerns identified by MN-S about hosting a public open house in a community with a significant Métis population, this meeting was postponed by Denison. Denison looks forward to rescheduling the meeting in collaboration with the MN-S.” (p. 4-88) | Please provide an update on the evolution or progress of this engagement with local communities, following collaboration with MN-S (or otherwise). | | Accepted |
| IR-32 | - | CNSC | Current use of lands and resources for traditional purposes | Section 5.3 Section 9.0 Terrestrial Environment | Context: Some sections of the EIS (such as Fish and Fish Habitat, Indigenous Lands and resource use) indicate that Indigenous and/or local knowledge was considered when defining the spatial boundaries. However, this is not included in other sections, such as Terrestrial Environment. Rationale: Section 5.2.2 of CNSC’s Generic EIS Guidelines require that spatial boundaries be defined by considering, but not limited to, the following criteria: Community and Indigenous traditional knowledge, ecological and technical considerations. | Please provide any additional details about how any comments or concerns raised were considered in defining the spatial boundaries with Indigenous Nations and communities with respect to spatial boundaries, for the Terrestrial Section and which specific Indigenous Nations and communities were engaged on these topics and how their input and knowledge was incorporated into the EIS. If already presented in the EIS text body, please indicate where this information can be found or link to Section 4 of the EIS or in the IER. | | Accepted |
| IR-33 | - | CNSC | Residual Effect Characterization | Section 5.8.1, Definitions for Residual Effects Characterization and Significance Section 5.8.1.1, Residual Effects Characteristics Section 8, Table 8.3-9: Fish and Fish Habitat - Surface Water Quality | Context: Denison uses specific criteria (Residual Effect Characteristics: Direction, magnitude, geographic extent, duration, frequency, reversibility, context and likelihood) and associated ratings (e.g., adverse/positive, low/moderate/high) for the predicted effects assessment. However, it is unclear whether an aggregation method was used in order to determine whether impacts will be significant or not significant, depending on the combination of rating categories (i.e., weightings that were calculated, use of decision rules). For example, medium term and long term are both used to represent the same time category: “Effects are expected to last between 3 to 38 years (i.e., effects expected during Construction through to the end of post-Decommissioning).” (See table 8.4-13 on p. 8-200 compared to table 8.4-12 on p. 8-199 and table 8.5-9 on p. 8-246). Rationale: The Generic Guidelines state: “The method used to describe the level of the adverse effect should be transparent and reproducible.” | If an aggregation method was used and ratings (e.g., High, medium, low) were weighted, what weightings were used, how were these calculated? Please also describe any decision rules that informed the determination of significance. If no aggregation was used, how did Denison ensure that results were consistent, given the varying rankings for each of the key criteria, and varying combination? Regarding inconsistencies in ratings, please use consistent terminology for same rating. | | Accepted |

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| | | | | | <p>In Table 8.3-11, duration was moderate, but again uses same rationale. There is no 'moderate' in Table 8.3-8, and by the same rationale, this should be medium-term to be consistent with definitions provided and summary Table 8.3-12.</p> <p>It was noted that all three tables should be deemed medium-term based on definitions of ratings outlined in Table 8.3-8. Frequency was also showing up as "continuous" and "continuously" in these tables.</p> | | | |
| IR-34 | - | CNSC | Cumulative Effects Analysis | Section 5.9.2.2 (p. 5-41) | <p>Context: Denison identifies the Gryphon deposit as a project that is not reasonably foreseeable. The direct quote from the EIS indicates that the “Development of the Gryphon deposit as an underground mine was evaluated at the prefeasibility level in 2018 but has not advanced to feasibility study or EA. Denison has not announced an intent to proceed with the development of the Gryphon deposit.” (p. 5-41)</p> <p>Rationale: The guidance Assessing Cumulative Environmental Effects under the CEEA, 2012 defines <i>Reasonably Foreseeable</i> as a “physical activity [that] is expected to proceed, e.g. the Proponent has publicly disclosed its intention to seek the necessary EA or other authorizations to proceed.”</p> <p>In a press release by Denison Mines (2018: Denison announces decision to advance Wheeler River Project following positive PFS results), Denison publicly disclosed intention to seek the necessary EA for Gryphon to proceed: “After careful consideration of the risks and opportunities associated with permitting and concurrent advancement of project engineering activities, the Company has decided to submit a PD and initiate the EA process in early 2019 for the Phoenix ISR operation, and to bring the Gryphon operation forward, at a later date, as required to achieve the PFS plan of Gryphon first production by 2030.”</p> <p>Further, Denison’s Wheeler River Webpage references a “start of pre-production activities for the Gryphon operation in 2026”</p> | Please update the cumulative effects assessment in the EIS to include the Gryphon deposit as a Present or Reasonably Foreseeable Project. | | Accepted |
| IR-35 | - | CNSC | Change to an environmental component due to hazardous contaminants | Section 6, Chemicals of Potential Concern | <p>Context: The use of petroleum products (e.g., propane, gasoline, and diesel) at the Denison Mines Wheeler River site is associated with vehicles and periodic operational testing of emergency generators as well as stationary pumps for emergency power or fire water systems. Thus, the air emissions will contain acrolein.</p> <p>Rationale: This chemical of potential concern (COPC) poses potential risks to human health via inhalation, but acrolein appears to have been missed or deemed insignificant. However, its</p> | Please consider acrolein in the assessment or provide a rationale for its exclusion. | | Accepted |

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| | | | | | consideration in the assessment will provide information on the significance of the associated risk. | | | |
| IR-35 | IR-35-R1 | Health Canada (HC) | Change to an environmental component due to hazardous contaminants IR-35 Response from Denison | Section 6, Chemicals of Potential Concern | Context: Potential health risks from long-term exposure to acrolein were not considered in the Proponent’s response to IR-35. Rationale: No annual predicted concentrations for acrolein were provided in the draft EIS or in the response to IR-35. Concentrations were modelled for short-term exposure (1h and 24h) only in the draft EIS and compared to the 1-hour and 24-hour Ontario Ambient Air Quality Criteria for acrolein. It is Health Canada (HC) guidance to assess both potential short and long-term health effects. The predicted annual concentrations for acrolein should be compared against chronic reference concentrations (e.g., the USEPA Reference Concentration (RfC) ¹ (0.02 µg/m³) and the Tolerable Concentration (TC) from Environment and Climate Change Canada and Health Canada’s Priority Substances List Assessment Report ² (0.4 µg/m³)). | Use predicted annual concentrations and available chronic reference concentrations to account for potential health risks from long-term exposure to acrolein to support the decision to screen out acrolein as a COPC from further assessment. | <u>Note to Denison:</u> This IR is conditionally accepted. Once Denison has made the requested edits from HC, this IR can be accepted. Please update Table 3-10 in the Revised DRAFT EIS (January 2024; Appendix 10-A - Environmental Risk Assessment) to include the predicted maximum annual concentration for acrolein at the fence line, as noted in Denison’s Response to IR-35. | Accepted |
| IR-36 | - | CNSC | Other | Section 6, Table 6.1-11 Baseline External Gamma Monitoring | Context: For one of the exposures in the summary table for baseline external gamma monitoring (Table 6.1-11), the cell states "Destroyed in Field". Rationale: No rationale or indication as to why or how it was destroyed is provided. | Please provide any additional info available as to how equipment was destroyed. | | Accepted |
| IR-37 | - | CNSC | Air Quality | Section 6.1.1.1, CALPUFF model | Context: "The Saskatchewan Ministry of Environment (SK MOE) has developed the Saskatchewan Air Quality Modelling Guideline (SK MOE 2012a) to assist Proponents in conducting air dispersion modelling assessments in a consistent manner. The guideline defines the recommended approach for dispersion modelling assessments in Saskatchewan, including model selection, emission source characterization, and the determination of compliance criteria to apply." Rationale: Saskatchewan air quality guideline requires consultation on use of CALPUFF model, where it states" The ministry acknowledges that there will be situations where specialized air dispersion models such as CALPUFF, CALQ3HCR and others may be applicable. The use of specialized models requires consultation with the ministry” OR “Pre-consultation with the ministry must be undertaken prior to the facility conducting specialized modelling (p. 3)." It is not clear if Denison Mines consulted with Saskatchewan MOE on use of CALPUFF model. | Please confirm and provide a summary of the consultation with the Saskatchewan MOE on the use of CALPUFF model for the Wheeler River EIS as per provincial air quality guidelines. | | Accepted |

¹ https://iris.epa.gov/static/pdfs/0364_summary.pdf
² https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/hecs-sesc/pdf/pubs/contaminants/psl2-lsp2/acrolein/acrolein-eng.pdf

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| | | | | | Noted that Section 6.1.4.2 is again referring to Saskatchewan MOE guidance for justification, but no indication that they consulted with them (a requirement). | | | |
| IR-38 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 6.1.4.1, Potential Interactions Between the Project and Valued Component / Key Indicators | <p>Context: In this section, the Proponent identifies primary interactions between Project activities and air quality valued components and their associated key indicators. These primary interactions may result in an adverse effect on the valued component. Among the primary interactions are the use of emergency generators in a backup role should there be an interruption of the provincial electrical grid. However, it is not evident what is the anticipated frequency and duration of interruption to grid power.</p> <p>Rationale: The Proponent states in the conservative operation scenario that while the site will be powered from the provincial grid at the operations stage, the back-up power generators were assumed to be operating under emergency conditions as a worst-case scenario. ECCC acknowledges the positive impact of extending the electrical grid to the Project site with resultant reduction in generator emissions. The impact of an interruption in grid power would be greatest during the winter months when energy use would be greatest and surface-based temperature inversions, which vertically trap emissions, would be strongest.</p> | Provide an evaluation of a worst-case scenario of grid power interruptions (i.e., average aggregate length of power outages) during the winter months for this section of the electrical power grid. | | Accepted |
| IR-39 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 6.1.4.2, Potential Project-Related Effects | <p>Context: In this section, the Proponent discusses the approach taken for air dispersion numerical modelling. Using their CALMET data set, the Proponent’s CALPUFF model runs indicated exceedances for 24- hour total suspended particulates, 24-hour particulate matter (PM10), 1-hour nitrogen dioxide, and 24-hour uranium concentrations. However, there is no mention of possible diurnal and seasonal occurrences of the exceedances.</p> <p>Rationale: Adequate assessment of the modelling results requires knowledge of the temporal characteristics for the exceedances. For example, wintertime exceedances may be due to strong temperature inversions, especially during the overnight to morning hours. These strong inversions are challenging for numerical models to capture. Exceedances during warmer months may be due to specific wind directions, which transport emissions directly to downwind receptors.</p> | Provide additional information on any diurnal and seasonal influences of the modelled exceedances. | | Accepted |
| IR-40 | - | CNSC | Air Quality | Section 6.1.6.2.1, Air quality significance determination | <p>Context: Significance determination was not conducted for air quality due to interconnectedness with other assessment endpoints.</p> | Please provide additional information to demonstrate where and how these air quality assessment endpoints were factored in. | | Accepted |

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| | | | | | Rationale: It is not clear where and how these air quality assessment endpoints were factored into the assessment. | | | |
| IR-41 | - | CNSC | Air Quality | Section 6.1.6.2.2, Background concentrations | <p>Context: The EIS states that "Conservative regional background concentrations from the Saskatchewan Air Quality Modelling Guideline (SK MOE 2012a) and based on the La Loche monitoring station were used for particulate matter, NO2, SO2, and CO. The La Loche monitoring station is located near anthropogenic sources, while the Project is in a remote area removed from anthropogenic sources."</p> <p>Rationale: If La Loche monitoring station is located near anthropogenic sources and the Project is not, use of this data is not a conservative or realistic representation of background.</p> <p>For a realistic approach, background data considered should be upper 95th percentile (or max if n<10) from an area representative of project location</p> <p>For a conservative approach, background data from an area located even further from anthropogenic sources (if this exists) should be used, or an upper limit of background less than upper 95th should be applied as the background.</p> <p>Upper limit of background is used to screen out COPCs or often subtracted from total to ascertain relative contribution / impact from source, so using a higher upper limit may result in COPCs screening out or appear to have a lower relative contribution. If background was added to source, then approach used would be conservative. If this is the case, confirmation and reference to where this is discussed in methodology should be provided.</p> | Please provide additional rationale to justify the appropriateness of La Loche monitoring station concentrations as background for project location. | | Accepted |
| IR-42 | - | HC | Physical stressors (noise and vibration) | Section 6.2.4.2.2, (p. 6-66) Section 6, Section 6.2.9, (p. 6-72) | <p>Nighttime noise impacts are not adequately considered for human receptors.</p> <p>Context: The EIS states in Section 6.2.9 that, "While the predicted sound levels were less than the guideline values, the increase from baseline was predicted to be noticeable" (p. 6-72). No information is provided on individual noise events occurring during the nighttime period.</p> <p>Rationale: While the increase from baseline is predicted to be noticeable, it is important to also consider that changes to the characteristics of the sound from baseline (e.g., a change in frequency, changes in sound modulation, increased impulsiveness or tonality, or a shift in noise from the daytime to being more at night) may cause noise to be even more noticeable. Consult ANSI S12.9-2005/Part 4, clause A.1.3 for further information.</p> | <p>1. Provide a description of the project- related nighttime noise sources that may impact human receptors as well as a qualitative discussion of the resulting potential impacts on perception considering not only changes in sound levels but also sound characteristics (e.g., tonality, impulsivity).</p> <p>2. Confirm whether individual nighttime noise events exceeding 45 dBA LAMax outdoors (or 30 dBA indoors) are expected to occur more than 15 times over the nighttime period at any nearby potentially noise-sensitive human receptor location(s). This may be of particular concern if some construction and/or operations activities occur during sleeping hours.</p> | | Accepted |

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| | | | | | In particular, consideration should be given to potential impacts on sleep, where adverse impacts are reported to begin when sound levels inside bedrooms exceed 30 dBA for continuous noise sources and 45 dBA LAmax for discrete noise events (WHO, 1999). | | | |
| IR-43 | - | HC | Physical stressors (noise and vibration) | Section 6.2.5, (p. 6-66) Section 6.2.5, (p. 6-71) | <p>Mitigation measures for project-related noise were not identified for the Construction phase.</p> <p>Context: The mitigation measures provided in Section 6.2.5, including a complaint management system is also to be implemented as part of the EMS, are only proposed for the operations phase.</p> <p>However, construction activities are predicted to last more than one year. Construction noise will involve the use of equipment operating at the site, construction of surface facilities, drilling, and partial operation of the freeze plant. It will also include regular truck trips and air traffic for personnel changes.</p> <p>Rationale: It is unclear if listed mitigation measures also apply to the construction phase (or only to the operations phase).</p> | <p>1. Clarify whether mitigation measures and the proposed EMS apply to the Construction phase. If not, identify mitigation measures for noise impacts related to Construction phase activities, and consider applying the EMS to the Construction phase and implementing the community complaints and response procedure from the beginning of construction activities.</p> <p>2. Health Canada suggests that construction noise lasting longer than 1 year be assessed as operational noise, and that noise mitigation measures be applied also to the construction phase. Special consideration should be given to mitigation measures for construction noise that occurs at night, in order to minimize impacts on sleep (i.e., avoiding tonal or impulsive noise sources at night).</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends use of Appendix H of Health Canada (2017), which identifies additional construction noise mitigation measures that could also be considered to reduce project-related noise.</p> | | Accepted |
| IR-44 | - | HC | Physical stressors (noise and vibration) | Section 6.2.8, (p. 6-71) | <p>The noise complaints resolution and response procedure is not sufficiently described in the EIS.</p> <p>Context: Section 6.2.8 discusses Monitoring and Follow- up. The Proponent indicates: “The EMS will also include a community complaints and response procedure” (p. 6-71).</p> <p>Rationale: Details have not been provided regarding how the complaints would be received, addressed or what the timelines will be for providing a response or resolution. It is important to provide information to potentially affected communities in advance of particularly noisy activities. Community consultation and advanced notification of noisy activities has been shown to reduce complaints (see Health Canada, 2017).</p> | <p>1. Provide the details of the noise complaints resolution and response procedure as per Health Canada (2017).</p> <p>2. Consider conducting community consultations and/or implementing an advanced community notification system to pro-actively reduce the probability noise-related impacts and complaints.</p> | | Accepted |
| IR-45 | - | HC | Change to an environmental component due to hazardous contaminants | Section 6 Air Quality Technical Supporting Document Section 6.3.1 | <p>The carcinogenic risks of diesel exhaust from the Project should be assessed.</p> <p>Context: Section 6.3.1 discusses modelled predictions of exceedances for Particulate Matter (PM). TSD p. 22 states: “concentrations of 24-hour PM2.5 are also elevated around the</p> | <p>1. Evaluate the carcinogenic risk of all potential diesel exhaust from the Project based on the approach proposed by Health Canada (2022). Additional guidance (Additional Lung Cancer Mortality from PM2.5: Recommended Approach and Sample Calculation”) is provided as an appendix to this comment table.[not included in this version of the document]</p> | | Accepted |

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| | | | | | <p>standby generators at the freeze plant, which emit fine particulate matter from combustion of diesel fuel". However, diesel particulate matter is not evaluated for the whole project in the air quality model or the air quality assessment.</p> <p>Rationale: Health Canada has determined that diesel exhaust is carcinogenic in humans which is consistent with the conclusion of the International Agency for Research on Cancer (IARC), and that diesel exhaust is associated with significant population health impacts in Canada.</p> <p>To characterize the carcinogenic risk of diesel exhaust from a project, HC has published a report (2022)¹ which provides a quantitative assessment of the relationship between ambient PM2.5 exposure and lung cancer risk. Specifically, this report quantifies the increase in risk of lung cancer mortality (over the baseline rate in the Canadian population) due to PM2.5 exposure.</p> <p>This quantitative assessment is considered appropriate to characterize risks from diesel PM given the contribution of diesel exhaust to ambient PM2.5 in Canada, and that the carcinogenicity of diesel exhaust has generally been evaluated based on the respirable PM fraction^{1,2,3}.</p> <p>References: [1] HC. 2022. Lung Cancer and Ambient PM2.5 in Canada: A Systematic Review and Meta-analysis. Available at: https://publications.gc.ca/site/eng/9.907038/publication.html [2] HC. 2016. Human Health Risk Assessment for Diesel Exhaust. Available at: http://publications.gc.ca/collections/collection_2016/sc-hc/H129-60-2016-eng.pdf [3] IARC. 2013. IARC monographs on the evaluation of carcinogenic risks to humans. Volume 109. Outdoor air pollution. https://publications.iarc.fr/Book-And-Report-Series/Iarc-Monographs-On-The-IdentificationOf-Carcinogenic-Hazards-To-Humans/Outdoor-Air-Pollution-2015</p> | | | |
| IR-46 | - | HC | Physical stressors (noise and vibration) | Appendix 6-A Table A-1 | <p>Low-frequency noise and associated potential human health effects were not assessed.</p> <p>Context: Some equipment that may emit low-frequency noise (LFN) have been listed in Table A-1: Assessment Scenarios and Sound Level Data (Section 6 Appendix A); however, no information describing potential impacts of this type of sound on nearby human receptors are presented.</p> | <p>1. Clarify whether any project-related activities (construction, operation and/or decommissioning) may produce LFN that could impact off-site human receptors. Evaluate LFN in the noise assessment, if and where applicable. See Appendix C of Health Canada (2017) for a discussion of LFN.</p> | | Accepted |

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| | | | | | Rationale: Low frequency noise can be associated with the introduction of noticeable vibrations and rattles in nearby structures. Research indicates that annoyance related to noise is greater when low-frequency noise is present (ISO 1996-1:2003). As sound environments are usually characterized using A-weighted decibel levels (dBA) that reflect the frequencies most audible to the human ear, the impacts of low- frequency noise may need to be assessed separately. | | | |
| IR-47 | - | ECCC | Air Quality | Appendix 6-A, A.1 | Context and Rationale: Verification of the following calculation is required for assessing predicted emissions of dust from general construction. It appears the result of 0.70 ton/acre/month is incorrect and should instead be 0.314 ton/acre/month. Appendix 6-A, Appendix A, A.1 (p. A4) TSP Emission Factor for General Construction: $EF\ (TSP) = 0.11 \frac{ton}{acre\ month} \times 1.2 \frac{ton}{acre\ month} \div 0.42 \frac{ton}{acre\ month}$ $= 0.70 \frac{ton}{acre\ month}$ | Explain how the emission factor total suspended particulates (EF (TSP)) result was obtained or rectify if it is incorrect and update the draft EIS to reflect the correction. | | Accepted |
| IR-48 | - | HC | Physical stressors (noise and vibration) | Appendix 6-E, Figure 6.2.3, p. 6-57 | Noise-sensitive receptors are not included on noise contour maps. Context: Noise-sensitive receptors are identified in the acoustic model report in Section 6 Appendix 6-E but not presented on any maps in the atmospheric and acoustic sections of the main report (Figure 6.2-3). Rationale: The noise assessment typically includes a map illustrating modelled noise levels from the Project at receptor locations in the study area. Certainty regarding the presence of human receptors in the regional study area is also recommended in order to assess cumulative impacts. | 1. For more clarity, identify noise-sensitive receptors on Figure 6.2-3: Noise Assessment Study Area as well as on contour maps showing the baseline and predicted noise levels. | | Accepted |
| IR-49 | - | HC | Physical stressors (noise and vibration) | Appendix 6-E, 4.0 Table A.1 | The Noise Source Characterization is incomplete. Context: Section 3.0 of the Draft EIS Section 6 Appendix 6- E discusses Source Characterization. There is no detail regarding potential tonal or impulsive noise sources in Section 3.0. Rationale: The draft EIS should include a description of sound source characteristics (e.g., tonal, impulsive, highly impulsive) in order to properly inform the quantitative noise assessment and | 1. Identify any tonal, regularly impulsive, highly impulsive, or high-energy impulsive noises likely to be produced during project activities that could be audible at noise sensitive receptors. Furthermore, describe the timing (e.g., hours of night-time activities), frequency and duration of noise events, and their sound characteristics, including frequency spectrum. See Health Canada (2017) for details. | | Accepted |

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| | | | | | which assumptions/adjustments need to be applied and to properly evaluate impacts of project noise on health of affected receptors. | | | |
| IR-50 | - | HC | Physical stressors (noise and vibration) | Appendix 6-E, 4.0 Table A.1 | <p>The description of noise modelling does not document or justify the use of sound level adjustments.</p> <p>Context: ISO Standard 9613-2 has been used for the sound level modelling; however, it is unclear if all applicable adjustments have been considered as per ISO 1996-1:2016 (Table A.1).</p> <p>Rationale: When modelling techniques are used to estimate present (baseline) or future (construction and operational) sound levels, these techniques and any accompanying assumptions, including the use of sound level adjustments, it is important to provide appropriate documentation and justification.</p> <p>Note that in situations where more than one source characteristic adjustment is applicable (e.g., impulsive or tonal), only the higher of the adjustments is used. However, all time-of-day adjustments and the quiet rural area adjustment are to be added to the highest of the applicable source adjustments.</p> | 1. Clarify whether ISO-1996-1:2016 has been considered in the modelling to account for any applicable sound level adjustments. Adjustments should be considered when calculating Ln (night-time sound level) and Ldn (day-night sound level). In addition, if applicable, adjustments can be applied depending on the noise characteristic (impulsive, highly impulsive, etc.), and because the Project location is considered to be in a quiet rural area. See: ISO 1996-1:2016 and Health Canada (2017) for details. | | Accepted |
| IR-51 | - | CNSC | Geology and Groundwater | Section 7, Figure 7.8-1 Appendix 7-C | <p>Context: Figure 7.8-1 (p. 7-107, main EIS report) shows monitoring well cluster outside of the freeze wall.</p> <p>Rationale: It is not clear what the targeted hydro-stratigraphic units of each monitoring well cluster are. In addition, it is not clear how the establishment of the freeze wall and any leakage from the brine solution will be monitored. If there is any “window” within the freeze wall (i.e., the freeze wall is not continuous), is there any way to identify that?</p> | <p>Please clarify the targeted hydro-stratigraphic units of each monitoring well cluster in Figure 7.8-1 (p. 7-107, main EIS report).</p> <p>Please clarify how the establishment of a continuous freeze wall will be monitored.</p> | | Accepted |
| IR-52 | - | ECCC | Fish and fish habitat | Section 7, Geology and Groundwater Appendix 7 | <p>Context: According to the Proponent, “an acidic or low pH mining solution will be used to leach uranium ores from the ground. Mining solution may be a mixture of sulphuric acid, hydrogen peroxide, ferric sulphate, and freshwater (from shallow groundwater well or surface waterbody) or recycled water.</p> <p>Wellfield will consist of a combination of injection and recovery wells, in the general the arrangement of one recovery well in the center surrounded by four injection wells (5-spot pattern) with about 5 to 10 m between wells. The final wellfield is expected to include approximately 300 wells over an area measuring 90 m wide x 750 m long”.</p> <p>As the components/contaminants mentioned in the description of the hydrogeologic contaminant transport processes above may be transported to Whitesfish Lake through groundwater, the injection</p> | <p>1. Explain why 3D hydrogeology and contaminant transport numerical modelling of the injection and extraction wells was not presented.</p> <p>2. Alternatively, provide simulation results and a sensitivity analysis for the injection and extraction of the acidic solution in the mining area.</p> | | Accepted |

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| | | | | | and recovery wells should be included in the model. Rationale: The hydrogeologic contaminant transport processes described above are an important part of the proposed Project and it is not clear why numerical modelling results and a sensitivity analysis for the above processes was not presented. | | | |
| IR-53 | - | CNSC | Geology and Groundwater | Section 7.3, Table 7.3.-2 Appendix 7-C | <p>Context: The field-based hydraulic conductivity values (referred to as K values hereafter) in Table 7.3-2 (p. 7-32, main EIS report) indicate that the K value ranges of upper and lower sandstone aquifers have a significant overlap with those of the intermediate sandstone aquitard.</p> <p>However, the calibrated K value in Table 2-2 (p. 2.7, Appendix 7-C)) for the intermediate sandstone aquitard is close to the lower end of the field-based K value range, while the calibrated K values for the upper and lower sandstone aquifers are close to the upper end of the field-based K value range.</p> <p>Rationale: It is not clear how representative the calibrated K values are of the field-based K values for each hydro-stratigraphic unit, and if the significant difference between the K values for the upper and lower sandstone aquifers and those for the intermediate sandstone aquitard is supported by the geological properties of the corresponding stratigraphy units.</p> <p>It is stated in the report (p. 7-36, main EIS report) that “Vertical fracture or fault zones that hydraulically connect the Local (upper) and Semi-Regional (lower) groundwater flow regimes are present throughout the Athabasca Basin”. But fractures and fault zones are not explicitly considered in the model. There is possibility that these features could increase the hydraulic connection between the upper and lower sandstone aquifer.</p> | Please provide additional information to support the representativeness of the calibrated K values (for example, use graph to present the measured K values and the calibrated K values). | <p><i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> <p>Please include figure(s) (y axis representing depth below ground, x axis representing K, different length of vertical line segment representing different packer testing intervals, etc.) showing the field measured K values, as well as the calibrated K value for the upper sandstone aquifer, intermediate aquitard, and lower sandstone aquifer. This would help demonstrate the distribution of field measured K values and representativeness of calibrated K values.</p> | Accepted |
| IR-54 | - | CNSC | Geology and Groundwater | Section 7.3.1 | <p>Context: EIS states: “The most important associated topographic features in the region are the northwest to southeast trending drumlins and eskers....” This is not the trend shown on the provided maps, nor described elsewhere in the report, e.g., Section 7.3.2.1</p> <p>Rationale: Inaccurate information in the EIS</p> | Please update the EIS where required to accurately describe the topographical features. | | Accepted |
| IR-55 | - | NRCan | Fish and fish habitat | Section 7.3.3.1; Appendix 7-A, sections 3.4, 3.5, 3.8, 4.2; Appendix 7-C, section 2.8 | <p>Context: According to the Proponent's conceptual hydrogeological model (EIS, sec 7.3.3, Figure 7.3-7, Table 7.3-2; Appendix 7-A, sec. 3.4, Table 3-4), the horizontal hydraulic conductivity of the Intermediate Sandstone (Iss) aquitard is 8.4 E-09 m/s based on field measurements. The Proponent further assumes a 10:1 anisotropy ratio for the unit (Appendix 7-A, sec. 3.5.1) such that its estimated vertical conductivity is 8.4 E- 10 m/s. Based on this information, structural geology and groundwater quality data, the Proponent</p> | In the "Parameter Uncertainty Assessment" for the numerical groundwater flow model (Appendix 7-C, sec. 2.8), NRCan requests that the Proponent develop a calibrated numerical model with an alternate conceptualization of the Intermediate sandstone as a "leaky" aquitard with a horizontal hydraulic conductivity on the order of 1 E-07 m/s and a much lower anisotropy ratio. This should involve modifying the model lateral boundary conditions to allow for groundwater inflow/outflow | | Accepted |

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| | | | | | <p>concludes that the connectivity between the Upper sandstone aquifer and the Intermediate Sandstone aquifer (sic) is limited (EIS sec. 7.3.3.3; Appendix 7-A, sec. 4.4). While acknowledging the paucity of conductivity data and the Proponent's attempt to mitigate this by leveraging collateral information on fracture frequency and clay content (Appendix 7-A, sec. 3.3.1), NRCan considers that the hydraulic conductivity assigned to the Iss aquitard is unrealistically low and inconsistent with the following lines of evidence: a) The conductivity value for the Iss is based on the geometric mean of 18 field measurements, 12 of which are from the same borehole (WR-695) located in the Gryphon zone, beyond the domain of the numerical model (Appendix 7-A, Appendix C, Table C-1). If the conductivity data were weighted equally, with one value per borehole, the geometric mean would be approximately 1.5 E-07 m/s, or two orders of magnitude higher; b) The Proponent notes that vertical fracture or fault zones that hydraulically connect Upper and Lower aquifer systems are present throughout the Athabasca Basin including in the Phoenix area (EIS, sec. 7.3.3.2.2; Appendix 7-A, sec.3.8.1); c) The Proponent notes that groundwater chemistry data (major ions) corroborate the presence of structurally controlled vertical hydraulic connections between the Upper and Lower aquifer systems (EIS, sec. 7.3.3.2.2, sec. 7.3.3.3; Appendix 7-A, 4.3.3); d) Groundwater chemistry data (Appendix 7-A, sec. 4.2, Table 4-1) also indicate the presence of detectable levels of "bomb" tritium (indicating recharge waters < 50 years old) in the Lower Sandstone Aquifer (GWR-025, GWR-008, GWR-033) and in the Iss (GWR-009, GWR-034), outside the area of U mineralization. This is also evidence of vertical hydraulic connection through the Iss. In summary, whereas the Proponent conceptualizes the Iss as a very low-permeability unit with localized vertical hydraulic connection (WS Shear), NRCan interprets the Iss as a "leaky" aquitard with pervasive fracture-controlled and much higher vertical hydraulic conductivity.</p> <p>Rationale: The significance of NRCan's alternative interpretation of the Iss hydrostratigraphic unit is that deep groundwaters, including mining-impacted waters, may represent a greater proportion of baseflow discharge to Whitefish Lake than the 1% currently estimated in the Proponent's groundwater flow model (EIS, sec. 7.4.2.1, p.7-51; Appendix 7-C, sec. 2.6.3).</p> | across the entire thickness of the Athabasca Sandstone Group rather than just the Lower Sandstone aquifer. | | |
| IR-56 | - | CNSC | Geology and Groundwater | Section 7.3.3.2 | <p>Context: It is stated in Section 7.3.3.2 (p. 7-37, main EIS report) that “Exploration boreholes drilled in the Phoenix area, where left unplugged, have the potential to provide preferential flow paths between the Overburden and Upper and Lower Sandstone Aquifers. Exploration holes were reportedly grouted approximately 10 to 20 m above and below the ore zone, resulting in open holes remaining throughout the overlying materials. These portions of</p> | Please clarify why the exploration boreholes have not been decommissioned and the timeline to decommission the boreholes according to appropriate guidelines/procedures. If it is not decommissioned before the ISR operation, what is the potential impact of the unplugged boreholes on the mining solution migration? | | Accepted |

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| | | | | | <p>the open holes may act as open conduits for groundwater flow through the 400 m of Athabasca Group Sandstone.”</p> <p>Rationale: It is not clear why the exploration boreholes have not been decommissioned.</p> | | | |
| IR-57 | - | NRCan | Fish and fish habitat | <p>Section 7.3.3.2</p> <p>Appendix 7-A, sections 3.1.2 and 3.7</p> <p>Appendix 7-C, section 2.5.2</p> | <p>Context: The Proponent's conceptual model of groundwater flow in the Local Study Area (EIS, sec 7.3.3, Figure 7.3-7) involves an unconfined Upper system hosted by overburden and the Upper sandstone aquifer, and a Lower confined system hosted by the Lower Sandstone Aquifer. The Intermediate Sandstone aquitard acts as a confining unit. Vertical heads gradients are directed downwards west of the Phoenix deposit and upwards beneath surface water receptors including Whitefish Lake (EIS, sec. 7.3.3.2).</p> <p>Using head data from nested monitoring wells (Appendix 7-A, sec. 3.1.2, Table 3-1) the Proponent calculates upward gradients in cluster WR-607, between the Lower Sandstone aquifer and the Upper Sandstone aquifer. In cluster LA-5, an upward gradient is calculated between the Upper Sandstone and the overburden unit (Appendix 7-A, Table 3-5). In areas west and south-west of the Phoenix deposit, groundwater is estimated to flow downward under a vertical gradient of approximately 0.015 m/m (Appendix 7-A, p.3-15).</p> <p>Rationale: In NRCan's opinion, the Proponent's interpretation of vertical head gradients in the LSA is not fully accurate. For the "Up-Gradient" monitoring well cluster, the tabulated head data (Appendix 7-A, Table 3-1) and data logger hydrographs (Appendix 7-A, Appendix B) indicate a downward gradient (0.014 m/m) from the overburden unit to the Intermediate Sandstone and an upward gradient (0.056 m/m) from the Lower Sandstone to the Intermediate Sandstone. Head data from the "NW" monitoring well cluster indicate a similar pattern of downward (0.016 m/m) and upward (0.014 m/m) gradients converging in the Intermediate Sandstone. In the "Downgradient" and "SE" monitoring well clusters, head observations and data logger hydrographs indicate downward gradients from the shallow aquifer system but essentially equal heads in the Intermediate and Lower Sandstones. This more complex picture of groundwater flow systems in the LSA does not appear to have been captured in the Proponent's conceptual model. Given the importance of the baseline hydrogeological regime for predicting the transport and fate of COPCs in the post-decommissioning period, the Proponent needs to demonstrate that the numerical groundwater flow model accounts for observed vertical head gradients.</p> | <p>In section 2.5.2 of Appendix 7-C (Calibration Results), the Proponent should demonstrate that the numerical groundwater flow model reproduces quantitatively or at least qualitatively the vertical head gradients calculated from observations in the nested monitoring well clusters (Appendix 7-A, Table 3-1).</p> | | Accepted |

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| IR-58 | - | ECCC | Fish and fish habitat | Section 7.3.2.4, Ore Deposit | <p>Context: The Proponent states that the Phoenix ore bodies are long and narrow (approximately 25 to 50 m wide) and are located within or near a graphitic pelite unit. Hydrothermal alteration associated with the ore zone is a discontinuous envelope of clay alteration and a sulphide-cemented rock zone that extends into the overlying sandstone and the underlying basement (Figure 7.3-3). This black, clay-rich zone is approximately 3 m thick on average and locally hydraulically isolates the ore zone from the overlying sandstones and underlying weathered basement rock.</p> <p>Rationale: As indicated by the Proponent, a 3 m black clay rich zone isolates the ore zone from the overlying sandstones and underlying weathered basement rock. It is, however, unclear whether this discontinuous clay layer will prevent downward migration of uranium-bearing solution into the Paleo-weathered basement rock or horizontal flow along the unconformity surface to escape into the environment. Escape of uranium-bearing solution into the environment will have a negative effect on the receiving environment.</p> | <p>1. Verify that there will be no downward migration of mining solution into the paleo- weathered basement rock or that there is no flow along the unconformity surface.</p> <p>2. If downward migration of the mining solution occurs, explain how it will be mitigated.</p> | | Accepted |
| IR-59 | - | CNSC | Fish and fish habitat | Section 7.4 Assessment of Project-related Effects, Figure 7.4-2 (p. 7-56) | <p>Context: Figure 7.4-2: Simulated Change in Groundwater Discharge and Flow through Whitefish Lake Over the Life of the Project appears to be missing information.</p> <p>Rationale: Legend is included below the image, but the Legend box is blank. The green dotted line is not represented by anything in the legend.</p> | <p>Please update this Figure to ensure it is complete, and that features are properly indicated in the legend.</p> | | Accepted |
| IR-60 | - | NRCan | Fish and fish habitat | Section 7.4.2.1 Appendix 7-C, section 5.2.1, Appendix B | <p>Context: In the discussion of the limitations of the numerical groundwater flow model (Appendix 7-C, sec. 5.2.1), the Proponent invokes the well known modeling principles of "Occam's razor" and "Parsimony" which guided the parametrization of hydraulic conductivity in model layers. The Proponent states that hydrogeologic property values were applied uniformly for, among other units, the Lower Sandstone aquifer beyond the immediate area of desilicified materials. However, in the layer parametrization for the Lower Sandstone aquifer (Appendix 7-C, Appendix B, Figure B-5), NRCan notes a large zone of enhanced conductivity (1 E-05 m/s) extending south from Kratchkowsky Lake, which contrasts with the value (2 E-07 m/s) assigned elsewhere outside the desilicified zone. NRCan also notes the extremely detailed parametrization of hydraulic conductivity in the clay cap overlying the ore zone where borehole control is dense (Appendix 7-C, Appendix B, Figure B-6).</p> <p>Rationale: In NRCan's opinion, these model features appear to violate the principle of "Parsimony" and require greater justification supported by field observations.</p> | <p>NRCan requests that the Proponent provide justification based on field evidence for the multiple hydraulic conductivity zones assigned to the Lower Sandstone aquifer and the clay cap above the ore zone.</p> | | Accepted |

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| IR-61 | - | CNSC | Geology and Groundwater | Section 7.4.2 | <p>Context: There is no discussion of potential induced seismicity from mining processes.</p> <p>Rationale: Induced seismicity may lead to a loss of process as identified for natural seismicity.</p> | Please provide information on the potential mining-induced seismicity. | <p>This IR is accepted. However, it is requested that Denison review the draft EIS for inaccuracy of scientific terms which cast doubt on the credibility of the EIS, such as the use of the term “inducted seismic” instead of “induced seismicity” in section 7.4.2.4.</p> <p>CNSC staff suggests that Denison review the entire draft EIS once again to address similar inaccuracies.</p> <p>See AD-72 in the Advice to Proponent table [reference to come].</p> | Accepted |
| IR-62 | - | ECCC | Fish and fish habitat | Section 7.4.2, Potential Project-related Effects | <p>Context: The Proponent indicates that the mining area includes:</p> <ul style="list-style-type: none">the ‘active mining area’, which is the target ore zone;a zone extending between 11 and 13 m above the active mining area that represents the maximum vertical height over which the injected mining fluids will migrate upwards from the ore zone during active mining; anda zone extending 50 m vertically upwards from the active mining area (that incorporates the active mining area and the 11 to 13 m zone defined in the previous bullet) that was selected to account for potential upset conditions. <p>Rationale: It is not clear to ECCC how the Proponent would be able to limit the mining solution migration within 11 & 13 m above active mining as the maximum vertical height over which the injected mining fluid will migrate. As the mining fluid will be injected under pressure into zones with possible presence of fractures, the pressure may also cause additional fractures and given that the solution is warm/hot will possibly dissolve the other cementing material in the sandstone above, making it difficult to accurately predict where the solution will migrate to.</p> | <ol style="list-style-type: none">1. Explain plans to limit the upward migration of mining solution into the overlying layer to 11 and 13m above the ore zone.2. Explain what impacts will occur if the mining solution migrates beyond the predicted height. | | Accepted |
| IR-63 | - | CNSC | Geology and groundwater | Section 7.4.2.1, Potential Effect #1: Groundwater Quantity – Construction to Decommissioning Appendix 7-C, Section 2.7, Groundwater Conditions During Mine Operations | <p>Context: The numerical groundwater model described was calibrated to observed water level and stream baseflow data. Table 7.4-3 in the EIS indicates that Denison recognizes the potential for freeze wall operation to impact groundwater quantity. To simulate this impact, the model was adapted to reduce recharge (to 50%) within the freeze wall area, reduce hydraulic conductivity associated with the vertical freeze walls, and simulate pumping within the freeze wall area. Recovery from pumping and effects on discharge to groundwater discharge to Whitefish Lake are discussed in the potential effects section.</p> <p>Rationale: Although this assessment considered drawdown of the water table and discharge to Whitefish Lake, the discussion did not address the potential effects of operating the freeze wall on the local and semi-regional groundwater regimes. What would the pathway be for groundwater to pass around the freeze wall? What is the basis for the parameters selected, e.g., 50% recharge and lower hydraulic conductivity for freeze well? These factors need to</p> | Please provide a more fulsome discussion on the impact of freeze wall operations on local and semi-regional groundwater regimes and potential receptors. Please provide the rationale for assumptions made for key model parameters (e.g., selection of 50% recharge, hydraulic conductivity value used to represent freeze wall). In addition, please discuss the potential pathways for groundwater flow around the freeze wall, complete with figures demonstrating these pathways. | | Accepted |

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| | | | | | be considered when evaluating the potential impacts of freeze well operations on groundwater flow conditions and corresponding receptors. | | | |
| IR-64 | - | ECCC CNSC | Fish and fish habitat | Section: 7.4.2.2, Potential Effect #2: Terrain Morphology and Stability – Operation Appendix 7-A, Appendix K (p. 12) | <p>Context: The Proponent stated that the geological assessment predicted maximum vertical displacement in altered sandstone immediately above the mining area (17.5 cm). A very minor change in elevation at ground surface (of less than 7.5 cm) was predicted within a discrete and localized area overlying the ore body. The modelling work is considered to provide a worst-case bounding scenario. If subsidence were to occur over the lifetime of the Project, or in the years following mining, the extent of vertical displacement is not expected to exceed that predicted in the modelling, which is based on an assumed volume extraction.</p> <p>Rationale: ECCC notes that the thickness of the ore zone has an average thickness of 5 m with a range of 2 to 17 m, and is 25-50 m wide and that the overburden rock above the ore zone measures about 400 m. Therefore, it is not clear how the Proponent determined that the surface expression of a subsidence on the surface if it occurs will be limited to 7.5 cm and localized. A subsidence greater than 7.5 cm, implies that the void in the ore zone will be narrower, and will affect the amount of water migrating through the zone.</p> <p>It was the recommendation of the consultant who conducted the work in Appendix K that more accurate material properties should be used for future modelling.</p> | <p>Explain:</p> <ul style="list-style-type: none">Will this be revisited with updated data based on extraction feasibility results?How will the surface expression of a subsidence will be limited to 7.5 cm and localized? <p>Suggestions for mitigation and follow-up measures: ECCC recommends that the Proponent consider implementing remediation measures immediately after mining to prevent subsidence from occurring in the first place.</p> | | Accepted |
| IR-65 | - | CNSC | Geology and Groundwater | Section 7.4.2.2 | <p>Context: It is stated the maximum subsidence is 7.5cm based on modeling with an assumed volume extraction. Has subsidence from dewatering/pumping and from lack of inflow of groundwater due to freeze wall been considered?</p> <p>Rationale: Surface facilities and wells may be impacted if there is unaccounted for subsidence.</p> | Please provide additional details for any dewatering/pumping induced subsidence. | | Accepted |
| IR-66 | - | CNSC | Geology and Groundwater | Section 7, Table 7.5-1, Row 1, Column 6 | <p>Context: Column 6 in Table 7.5-1 indicates the mitigation measures for a valued component. For Row 1, Geology, there is no description of mitigation measures but only that contingency plans will be developed if based on monitoring.</p> <p>Rationale: Subsidence may impact wells and surface infrastructure.</p> | Please provide additional details on monitoring and contingency plans related to the geological environment (e.g., subsidence), including triggers for implementing such plans. | | Accepted |
| IR-67 | - | CNSC | Geology and groundwater | Section 7.6.2.1 (Remediation Objectives) | <p>Context: Metallurgical testing, including batch reaction, coreflood testing and column tests are mentioned frequently throughout Sections 2 and 7 of the EIS. Outside of the composition of restored solutions from coreflood tests #2B and 3C, results from these various tests are not reported in the EIS or any associated</p> | 1. Please provide a summary of the results and the analysis of results of the metallurgical tests within the EIS, or provide the technical supporting document with this information, and ensure the documentation is appropriately referenced in the EIS. This should include sample information for cores (e.g., mineralogy, | | Accepted |

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| | | | | | Appendices. Rationale: The results from metallurgical testing are important to a number of items discussed in the EIS, including (but not limited to): evolution of hydrochemistry during remediation, source of salts in Lower Sandstone Aquifer porewaters, process plans, industrial wastewater treatment, estimating composition and volume of process precipitates, and composition of mining fluids and leachate. In particular, the EIS posits that mining area decommissioning objectives are achievable based on metallurgical testing and provides these objectives in Table 2.3-3. CNSC staff need to understand the specifics of this metallurgical testing, given its importance for the development and justification for mining and remediation activities. Denison must also provide information demonstrating that the proposed restoration actions and remediation targets are As Low As Reasonably Achievable (ALARA). | location, U content, depth), test conditions (e.g., duration, # of iterations, column length, flow rate, temperature, pressure, sample frequency, influent/effluent composition), as well as results and how they are pertinent to the development of ISR activities. 2. Please provide further clarification/justification on how results from two singular coreflood tests (i.e., Coreflood #2B and Coreflood #3C) can justify large-scale remediation activities and targets following solution mining. 3. Please provide material demonstrating that the proposed restoration actions and remediation targets are ALARA. | | |
| IR-68 | - | NRCan | Fish and fish habitat | Section 7.6.2.2.3 Appendix 7-C, sections 3.3, 4.1, 4.4.4 and 4.7 | Context: Sources terms for the COPCs considered in 3D reactive transport modeling are given by the composition of "Restoration Solution #1", which the Proponent believes is representative of groundwater quality in the ore zone after remediation at decommissioning (Appendix 7-C, sec. 3.3, Table 3-5; sec 4.0). The Proponent considers COPC source terms as "initial conditions" for groundwater quality in the ore zone at the start of the model simulation period. During the simulation, no additional mass of COPCs is transferred to groundwater in the ore zone. Rationale: In NRCan's opinion, this representation of COPC sources is not conservative as it fails to account for various long-term slow mass release processes. These processes could include redissolution of secondary phases formed during ISR mining (e.g., radium-bearing gypsum or barite, jarosite, alunite) and migration of unrecovered lixiviant or restored solution from low-permeability regions or stagnant zones that were not fully swept during mining or remediation. NRCan notes that scenario #2 in the Proponent's transport prediction uncertainty analysis (Appendix 7-C, sec. 4.7) does consider an extended source release period for protons (desorption from chlorite). However, in NRCan's opinion, additional modeling scenarios should consider extended-release periods for other COPCs as well. | NRCan requests that the Proponent's reactive transport prediction uncertainty analysis (Appendix 7-C, sec. 4.7) consider extended source release periods for additional COPCs. | | Accepted |
| IR-69 | - | NRCan | Fish and fish habitat | Section 7.6.2.2.3 Appendix 7-C, sections 3.1 and 3.2 | Context: For hydrogeological and geochemical assessments in support of ISR projects, the Proponent identifies two aspects of primary importance (Appendix 7-C, sec. 3.1). These are a) groundwater remediation (Appendix 7-C, sec. 3.1.1); and b) the assimilative capacity of host rocks downgradient from the ore zone (Appendix 7-C, sec. 3.1.2). According to the Proponent, the | NRCan requests that the Proponent provide a detailed description of the expected mineralogical and hydrogeochemical changes occurring within the ore and barrier zones as a result of the injection of acidic lixiviant. | | Accepted |

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| | | | | | <p>objective of groundwater remediation at decommissioning is to achieve water quality in the mined zone that does not pose a risk to receptors at the point of exposure. Assimilative capacity refers to the ability of groundwater-rock reactions to naturally sequester or attenuate COPCs migrating from the ore zone during the post-decommissioning period.</p> <p>Rationale: However, in NRCan's opinion, the Proponent has neglected to mention the most fundamental aspect for hydrogeological and geochemical assessments in support of ISR projects. That aspect is the choice of ISR lixiviant and its effects on the mineralogy and hydrogeochemistry of the ore zone during mining operations. The Proponent provides information on the pre-mining mineralogy (Appendix 7-C, sec. 3.2.1) and hydrogeochemistry (Appendix 7-C, sec. 3.2.2) but no information on their expected changes as a result of ISR mining. This Information is important when considering source terms in reactive transport modeling.</p> | | | |
| IR-70 | - | CNSC ECCC | Fish and fish habitat Geology and groundwater | Section 7.6.2.2.3, Evaluation of Geochemical Reactive Transport Appendix 7-C, Section 4.4.2, Sub-Domain Model Hydrogeologic Parameters | <p>Context: The EIS indicates that “changes to hydrogeological conditions within the mining area were considered during development of the 3D sub-domain model. Dissolution of ore within the active mining area is expected to enhance ... hydraulic conductivity”.</p> <p>In Section 4.7 (Prediction Uncertainty Analysis), predictive uncertainty scenarios are provided. For scenario 7, the hydraulic conductivity (K) of the ore zone was increased even further than initial model assumptions. The value used is not indicated in the text.</p> <p>Rationale: A hydraulic conductivity (K) value of 5x10-6 m/s, which is a factor of five (5) greater than the value assumed for the ore zone, was applied in the base case numerical model to account for this impact. It is unclear from the information provided in Section 7 of the EIS or associated Appendices what the basis of this five-fold increase in K value for the ore zone, and how this was judged to be conservative, or to adequately represent anticipated conditions. This parameter is important as it impacts the rate at which contaminants flow from the ore zone following mining activities. Due to the dissolution of uranium, larger voids will likely be created, and the hydraulic conductivity may increase by more than a factor of 5 compared to pre-project material. Therefore, a variation of at least one or two orders of magnitude for hydraulic conductivity should be used in the sensitivity analysis. Having a representative, conservative value for hydraulic conductivity is essential for understanding groundwater as a pathway of contaminant transport to Whitefish Lake and potential impacts to</p> | Please provide a more fulsome discussion on the anticipated impacts of mining on permeability of the ore zone due to mining activities in the EIS or in an Appendix. The value used for scenario 7 of the prediction uncertainty analysis should be provided. The scientific rationale for the use of a K value only a factor of five greater than the value assumed for the ore zone in the 3D regional model should be provided, alternatively, provide simulation results for a more conservative scenario. Specifically, this discussion should address the potential effects of mechanical permeability enhancement with tools, dissolution of ore, gas plugging, chemical plugging, plugging due to ion exchange, and mechanical plugging. | | Accepted |

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| | | | | | aquatic life. The K value used in the predictive uncertainty analysis should be reported. | | | |
| IR-71 | - | CNSC | Geology and groundwater | Section 7.7.1, Climate Change Considerations | <p>Context: The report states that in a scenario of increased precipitation and decreased/constant evaporation, climate change may result in greater flows in the Wheeler River drainage system and increased recharge to groundwater, which would correspond to increased groundwater discharge to Whitefish Lake. Additionally, it is also stated that climate change was evaluated qualitatively.</p> <p>Rationale: It is not clear why the impacts of increased evapotranspiration associated with higher average temperatures were not considered, even though these are likely outcomes of temperature increases due to climate change in areas such as the Prairies (Climate trends and projections - Canada.ca). It is also not clear why climate change considerations were not assessed quantitatively.</p> | Please provide a discussion on potential effects of increased evapotranspiration, as well as decreased groundwater recharge for the study area. Provide justification for performing qualitative assessment of impacts of climate change rather than a quantitative one. | <p><i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> <p>The effect of climate change on groundwater recharge in Prairies or Canada is generally uncertain due to the large degree of uncertainty in the modelling of future recharge although future changes in temperature and precipitation are expected to alter groundwater recharge (through changes to runoff, evapotranspiration, and snow accumulation). While CNSC staff accepts the response on potential effects of increased evapotranspiration, as well as decreased groundwater recharge for the study area, no justification has been provided on why quantitative analysis was not completed to address the effect of climate change on groundwater recharge.</p> | Accepted |
| IR-72 | - | CNSC | Geology and groundwater | Section 7.8.2, Groundwater Monitoring | <p>Context: Monitoring seems to consider COPCs from surface facilities, and excursion of pumped mine fluid in the Lower Sandstone Aquifer. There does not appear any discussion on how the proposed monitoring program considers potential excursions of brine from freeze wells.</p> <p>Rationale: It is unclear how potential excursions of brine from freeze wells will be monitored. Would this be through the fiber optic cables installed within the freeze well network? Or would it be achieved in the monitoring well clusters? If this is the case, how would an excursion of brine from a freeze well be differentiated from an excursion of mining solution?</p> | Please provide further information regarding how potential excursions of brine from freeze wells will be monitored as part of the proposed groundwater monitoring program. | | Accepted |
| IR-73 | - | CNSC | Geology and groundwater | Section 7.8.2.2, In Situ Recovery Mining Area Appendix 7-A, Appendix C | <p>Context: The EIS recommends that a follow-up study be carried out to supplement available data on hydraulic conductivity in the Desilicified Zone (DSZ).</p> <p>Rationale: Appendix C (Summary of Hydraulic Testing Data and Conductivity Values) of Appendix 7A indicates that only n = 6 hydraulic conductivity values are available for the DSZ, one of which appears unreliable due to a problem with packer sealing. This is relatively few values compared to the Intermediate and Lower Sandstones. Additionally, limited hydraulic head data from boreholes screened in the DSZ is available (GWR-037, GWR-012 and GWR-014; See Figures 16/17 in Appendix 7-A) – most information appears to originate from open core holes. The information presented in its current form is insufficient considering the importance of this zone as a preferential pathway for contaminants following remediation activities, and the heterogeneity of the unit due to intense hydrothermal alteration and fracturing. Further</p> | As per the EIS recommendations, please provide additional information to supplement available data on hydraulic conductivity in the DSZ. Please provide the following information as part of the follow-up study: <ol style="list-style-type: none">1. identification of the vertical conductivity (KV) as there is an upward flow component (isotropy was assumed in DSZ for numerical model, this assumption must be verified)2. quantification of the horizontal and vertical flow gradients in the DSZ; and3. identification and mapping of any structures with the potential to influence groundwater flow in the DSZ, such as fracture/fault zones. | | Accepted |

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| | | | | | information regarding hydrogeological properties and groundwater flow would aid greatly in validating and refining the numerical groundwater model. | | | |
| IR-74 | - | CNSC | Geology and Groundwater | Section 7.8.2.3 | <p>Context: It is stated in Section 7.8.2.3 (p. 7-113, main EIS report) that, at the Post-Decommissioning Stage, “Excursion are signaled by a change in water quality that is outside of that bounded by modelling predictions”, and “The model predictions spatiotemporally bound COPC concentrations in the subsurface that do not pose a risk to the receiving environment. Water quality that is outside of this bounding is defined as representing a material increase over a meaningful period compared to the predicted values either in rate of change or magnitude of change of COPC concentrations.”</p> <p>Rationale: It is not clear in which locations (e.g., is it in the mining area, or downstream of the mining area, or anywhere else?) the water quality is used to compare with the model predictions to determine if excursion occurs.</p> | Please clarify in which locations the water quality data is used to compare with the model predictions to determine if excursion occurs. | | Accepted |
| IR-75 | - | CNSC | Geology and Groundwater | Appendix 7-A, Appendix K | <p>Context: The geomechanical study showed that the stability of the remnant ore zone and surrounding rock mass is highly sensitive to the magnitude of the material properties. To quantify this risk, the Proponent conducted a sensitivity analysis to assess the influence that material properties have on the stability of key stratigraphic layers. The results of the sensitivity analyses suggest that small variations in the cohesion magnitude and angle of internal friction may significantly influence the stability of the altered sandstone, ore zone, and upper and lower clays.</p> <p>Rationale: By considering the potential uncertainties and risks in association with the geomechanical study and the empirically derived rock mass strength parameters and the non-site specific physical parameters of different rock formations used for the modeling, the Proponent’s consultant suggests to define a laboratory testing program to address data gaps in the current geotechnical data and increase confidence in the material properties, and use more accurate material properties to model the phased extraction of uranium-enriched rock and assess the associated risks for cavity collapse and failure in the steel casing. CNSC staff concurs with these suggestions.</p> | Please provide a plan to implement recommendations for further detailed geomechanical studies to reduce the uncertainties and risks in association with the stability and deformation analyses of ore zone rock matrix and its overlying rock mass formations and assess their impacts on the mine operation. | | Accepted |
| IR-76 | - | CNSC | Geology and Groundwater | Appendix 7-A, Appendix K (p. 12) | <p>Context: Based on the consultant’s report, the modeled vertical strain is approaching or exceeding the tensile and compressive yield limits for steel casing.</p> <p>Rationale: Failure of steel casing may result in process loss or alter groundwater flow and quality.</p> | Please provide additional details on how casing integrity will be monitored and potential effects mitigated. | | Accepted |

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| IR-77 | - | CNSC | Geology and Groundwater | Appendix 7-A, Appendix K Results of a Geomechanical Study Investigating the Influence of Uranium Extraction on Mining-Cavity Stability for the Wheeler River Uranium Project (Revision 1) | <p>Context: It is reported in the appendix K report, within Appendix 7-A, that both phase I scoping analysis and phase II detailed strip model were investigated by numerical modelling. The analysis discussed influence on host rock stability as a result of incremental increase in volumetric extraction and graded conservative treatment of material properties.</p> <p>Rationale: As critical components of a numerical geomechanical simulation, initial and boundary conditions are crucially important to the confidence and reliability of the modelling results. However, this information is absent from the current report. In-situ principal stresses largely affects the stability of the excavated host rock, and the vertical strain and surface subsidence. This information is also absent in current form.</p> | Please provide details on the boundary and initial conditions applied on stress loading and strain for the numerical analysis. In particular, the in-situ principal stresses, which are critical to correct understanding of the excavation disturbance to the host rock, should be provided and justified as appropriate. | | Accepted |
| IR-78 | - | CNSC ECCC | Fish and fish habitat Geology and groundwater | Appendix 7-A, Section 3.5.2, Porosity Appendix 7-C, Section 2.3.2.1, Porosity Values | <p>Context: This section of the report outlines the estimated/assumed effective porosity values. The only reference provided is for permeameter testing on rock core samples (Scibek, 2019).</p> <p>Additionally, the report states that “As tracer test results to estimate effective porosity were unavailable at the time of modelling, effective porosity values for the sandstone bedrock and basement units were sourced from literature values”, where literature values are effective porosities from the Cigar Lake study (AECL, 1994), situated approximately 40 km NE of Wheeler River. No on-site Wheeler River field data was used to justify this value. Additionally,, in the Cigar Lake study, the authors reported that, because results from tracer tests and pumping tests were unavailable, “a practical approach was adopted, i.e., to use the porosity values obtained from laboratory measurements made on core samples, and to assume that those numbers were close to the average field kinematic (effective) porosity values”.</p> <p>Rationale: The source of reported effective porosity values is unclear from Section 3.5.2 in Appendix A (e.g. literature review, field work, laboratory work).</p> <p>In Section 2.3.2.1 of Appendix 7-C, there is a lack of clarity regarding the effective porosity data used in the numerical model. It appears that no site-specific data derived from tracer tests or pumping tests is used in the numerical model. Given that effective porosity directly correlates to seepage velocity and by extension transport time and distribution of COPCs in groundwater, it is an important parameter. Given its relative importance for contaminant fate and transport, effective porosity should be based on field measurements, or at the very least accounted for in the sensitivity analysis.</p> | <p>1. Please provide the reference for the data substantiating the assumed effective porosity values reported in Appendix 7-A and used in the numerical model in Appendix 7-C.</p> <p>2. Please provide information on how the site-specific effective porosity values from tracer tests or pumping tests, were considered in the numerical models. Section 2.2.1.4 of the EIS asserts that tracer tests were carried out in 2021 – this information should thus be available for improving/updating models. Alternatively, provide a sensitivity analysis for the effective porosity in the Desilicified Zone, or contaminant transport simulation results with more conservative effective porosity values.</p> | <p><i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> <p>Effective porosity is an important parameter to understanding groundwater flow and contaminant transport. The Proponent states that “As tracer test results to estimate effective porosity were unavailable at the time of modelling, effective porosity values for the sandstone bedrock and basement units were sourced from literature values”, including porosities from the Cigar Lake study (AECL, 1994), situated approximately 40 km NE of Wheeler River. No on-site Wheeler River field data was used to explain this value. Additionally, in the Cigar Lake study, the authors reported that, because results from tracer tests and pumping tests were unavailable, “a practical approach was adopted, i.e., to use the porosity values obtained from laboratory measurements made on core samples, and to assume that those numbers were close to the average field kinematic (effective) porosity values”.</p> <p>In response to the IR, the Proponent explained and supported their methodology for selecting a value for effective porosity. This method included consideration of literature values and a regional analogue at Cigar Lake. ECCC notes that a tracer test was conducted, the results of which were not considered in the selection of the effective porosity parameter.</p> <p>If field test data is available that is potentially relevant to determining effective porosity, it should be included in the EIS when discussing effective porosity. The field test data should also be made available for ECCC to review, to confirm the conclusions reached by the Proponent. ECCC acknowledges that other sources of information can be useful when explaining the most appropriate value for effective porosity such as literature values and regional analogues, as per the Proponent’s IR response. However, field test results should be presented in the EIS and considered as a part of such an explanation. If the Proponent feels that not utilizing field test data is the most accurate approach when selecting an effective porosity value, then this conclusion should be reached with consideration of the field test data as a part of the evaluation.</p> <p>Provide a discussion of how the effective porosity values are selected, including a discussion</p> | Accepted |

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| | | | | | | | of how field test results were considered. This information is necessary to confirm that the selected effective porosity values are valid. This also relates to IR-52. | |
| IR-79 | - | CNSC | Geology and groundwater | Appendix 7-A, Section 4, Groundwater Chemistry | <p>Context: Table 4-1 in Section 4 of Appendix 7-A provides groundwater monitoring results from sampling activities carried out at 26 monitoring wells in 2019, 2020, and 2021. The majority of these wells were only sampled once (n = 8) or twice (n = 17). In some cases (Lower Sandstone Aquifer/Intermediate Sandstone Aquitard), the variability of results between sampling events is quite high. Data for the Paleoweathered Zone is sparse.</p> <p>Rationale: Insufficient information is presented in the EIS and associated Appendices to concretely define baseline groundwater chemistry for the different hydrostratigraphic units. As defined in the CNSC’s Generic Guidelines for the Preparation of an EIS: “Based on the scope of the project, the EIS will present sufficiently detailed baseline information to determine the effects the project could have on the VCs and analyze those effects”. This is particularly important given certain features of the study area (i.e., presence of zones of thermal alteration/desilicification, as well as hydraulically active fractures/faults), and the need to adequately characterize baseline conditions in the Desilicified Zone downgradient from the proposed mining area. As an example, the US Nuclear Regulatory Commission (NRC) typically requires a minimum of four (4) quarterly samples from (i) surficial aquifers, (ii) production aquifers, (iii) overlying aquifers, and (iv) underlying aquifers to characterize preoperational groundwater quality (E. Striz, pers. comm.).</p> | Please provide the statistical basis (number of samples and variability) by which “baseline” is defined and the justification that the current information is sufficient to adequately characterize groundwater quality. In order to ensure sufficient baseline information is collected, further iterations of sample collection for groundwater monitoring wells in all defined hydrostratigraphic units may be required. In addition, groundwater quality downgradient from the proposed mining area should be further characterized to assess spatial influence of alteration and hydraulically active features, | | Accepted |
| IR-80 | - | CNSC | Geology and groundwater | Appendix 7-A, Section 4.3.3, Hydrochemistry by Hydrostratigraphic Unit | <p>Context: This section provides data for groundwater samples collected during the Cigar Lake analogue study and Millennium Project for further regional context. The previous studies are heavily referenced to support interpretations made for the conceptual site model.</p> <p>Rationale: The Piper Plots in Figure 26 are difficult to interpret (many overlapping circles with variegated colors), and Cigar Lake samples plot predominantly as Na/K-Cl/SO4 groundwater facies. Conversely, samples collected as part of the Phoenix Project (current), plot either as Ca-HCO3 or Ca-SO4/Cl groundwater facies. No explanation is provided for the observed hydrogeochemical differences between groundwater from the Phoenix project and the Cigar Lake analogue study/Millennium Project.</p> | Please provide additional clarity to and interpretation of Figure 26 in Appendix 7-A, including a revision to the Figure to allow for easier interpretation. This could include clear identification of end members, as well as arrows indicating proposed evolution of groundwater chemistry. Further discussion should be provided describing observed differences between groundwater chemistry at the Phoenix project compared to Millenium/Cigar Lake. | | Accepted |
| IR-81 | - | CNSC | Geology and groundwater | Appendix 7-A, Section 4.3.3, Hydrochemistry by Hydrostratigraphic Unit | <p>Context: The report states in the description of hydrochemistry of the Lower Sandstone Aquifer that, “On the basis of groundwater chemistry and tritium values in that groundwater, the authors (of the Cigar Lake analogue study in 1994) concluded that the groundwater reflected a younger water component that had</p> | Provide a further discussion on the interpretation of tritium in groundwater, rather than echoing conclusions from the Cigar Lake analogue study. Consideration should be given to the assertion that modern meteoric water circulates at depth in the Lower Sandstone Aquifer. Collection and analysis of stable | | Accepted |

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| | | | | | <p>penetrated to depth along hydraulically active fractures/faults. The same conclusion is made here (in the Wheeler River EIS) for the Phoenix study area – meaning that fracture/fault conditions are such that some areas of the MFa are characterized by younger/recharge groundwaters”.</p> <p>Rationale: Tritium results for most wells in the Lower Sandstone Aquifer (MFa) reported in Table 4-1 of Appendix 7-A exhibit tritium concentrations <15 Bq/L for the 2020 sample, and 0.1 or <0.1 Bq/L for the 2021 sample. Tritium in modern precipitation typically varies from 1 – 3 Bq/L. Conclusions made in the text are not supported by data, especially given that tritium values are not reported in the EIS for local precipitation or surface water. This is important in reinforcing the assumption from the conceptual model that modern meteoric water circulates at depth in the Lower Sandstone Aquifer.</p> | <p>isotope (e.g., $\delta^2\text{H}$, $\delta^{18}\text{O}$) samples is a cost-effective solution which would greatly improve understanding of groundwater hydrology and support the development of a conceptual model.</p> | | |
| IR-82 | - | CNSC | Geology and groundwater | <p>Appendix 7-A, Section 4.3.3, Hydrochemistry by Hydrostratigraphic Unit</p> <p>Appendix 7-C, Section 3.5</p> | <p>Context: A. In-field measurements of Oxidation-Reduction Potential (ORP) for three (3) out of twenty-six (26) groundwater samples are presented in Table 4-1 of Appendix 7-A. Although sparse, these values are also used to characterize redox conditions for representative groundwaters in Table 3-5 of Appendix 7-C.</p> <p>B. In Section 3.5.5 of Appendix 7-C it is stated that groundwaters in the PHREEQC model were allowed to equilibrate with atmospheric concentrations of oxygen, resulting in oxidizing subsurface conditions. In Section 3.7 of Appendix 7-C it states that input files for 3D reactive transport were generated based on outcomes for PHREEQC modelling. However, in reading Section 4 of Appendix 7-C, it is unclear whether this assumption (equilibration with atmospheric oxygen) was carried forward for the 3D model.</p> <p>C. As per p. 3.49 of Appendix 7-C, “A small amount of reactive pyrite was assumed for the first 500 m of transport away from the ore zone in the model, primarily in the desilicified sediments of the Lower Sandstone Aquifer, and deeper portion of the Intermediate Sandstone Aquitard”.</p> <p>Rationale: A. Given the importance of redox conditions for U mobilization and precipitation/dissolution of minerals (e.g., pyrite/metal oxyhydroxides) and the corresponding influence on contaminant transport from both a modelling and monitoring perspective, these should be further characterized. It should also be noted that the measurement of Oxidative-Reductive Potential (ORP) in natural waters can be complex and difficult due to the variability and disequilibrium of natural systems and issues inherent to electrode calibration (e.g., Schuring et al., 2000). Measurements of redox couples (e.g., As(III)/As(V); Fe(II)/Fe(III); S(-</p> | <p>1. Provide further discussions and information (i.e., ORP measurements or analytical data for redox couples) on redox conditions at the Phoenix site. Particular focus should be given to the spatial heterogeneity of redox processes. Tools such as the reference provided [2] below provide an example of simplified framework for characterizing redox conditions in aquifers.</p> <p>2. Clarify assumptions regarding initial redox conditions for the 3D solute transport model.</p> <p>3. Provide the % reactive pyrite by weight assumed for models in the text. Justification for proportions used, such as analytical data, should also be provided.</p> <p>Reference: [2] Jurgens, B.C., McMahon, P.B., Chapelle, F.H., and Eberts, S.M., 2009, An Excel workbook for identifying redox processes in ground water: U.S. Geological Survey Open-File Report 2009–1004 8 p.</p> | <p>Please see AD-65 in the Advice to Proponent table.</p> | Accepted |

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| | | | | | <p>II)/S(VI)) are typically recommended to accurately characterize redox conditions in natural waters (Schuring et al., 2000).</p> <p>B. The assumptions regarding redox conditions for the 3D solute transport model should be clarified.</p> <p>C. The amount of pyrite (e.g., % by weight) assumed for the purposes of modelling should be clarified, given the potential role of pyrite as a reducing agent in limiting the transport of COPCs.</p> <p>Reference: [1] Schuring J.; Schulz, H. D.; Fischer, W.R.; Bottcher, J.; and Duijnisveld, M.H.W. 2000. Redox: Fundamentals, Processes and Applications. Springer: Berlin.</p> | | | |
| IR-83 | - | CNSC | Geology and Groundwater | Appendix 7-A, Section 7.4.2.2 and Appendix K | <p>Context: Leaching of uranium from the ore zone will generate voids within the ore zone, which could fail and collapse. Failure of the voids would cause displacement in overlying rocks, which will lead to the eventual ground subsidence. Based on the developed geological model, a geomechanical study was conducted to assess potential maximum vertical displacement in the overlying rock formations and predict the ground subsidence. While a layer of altered sandstone is modeled above the ore zone, the desilicified zone, a zone that is comprised of completely to partially unconsolidated sands and has very low rock quality, high fracture intensity, and high friability, and low strength in the area overlying and east of the Phoenix deposit, appears not to have been included in the model for geomechanical modeling. The evaluated displacement/deformation in the overlying rock formation and the resulted ground subsidence would not be conservative without including the desilicified zone.</p> <p>Rationale: Stability of the ore zone rock matrix and the potential displacement/deformation in the overlying rock formations when voids in the extracted ore zone collapse are critical for protecting the overlying aquifers, preventing substantial ground subsidence, safeguarding casing integrity, and mitigating plug-off of the remaining ore as well as efficiently mining extraction. The deformed zone in the overlying rock formations will change in hydraulic conductivity that will impact on the assessment of potential effects on groundwater flow and contaminant transport in the zone. Therefore, the rock mass behavior including and above the ore zone should be adequately understood and the potential displacement/deformation should be assessed and quantified with adequately defined geological model.</p> | Please provide details whether and how the desilicified zone is considered in the geomechanical modeling of the detailed strip model. Such details should include figures and the linkage between the geomechanical model including the determination of strength parameters of the desilicified zone and the geological model including information on the core delineation of the desilicified zone. | | Accepted |
| IR-84 | - | CNSC | Geology and Groundwater | Appendix 7-C | <p>Context: It is stated in Section 2.5.2.4 (p. 2.35, Appendix 7-C) that “In addition to calibrating to water level elevations targets, the</p> | 1. Please clarify in Figure 2-10 where the point streamflow measurements were conducted upstream and downstream of | | Accepted |

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| | | | | | <p>model was calibrated to estimates of groundwater discharge to Whitefish Lake. A match between simulated and observed flows helps to support that groundwater recharge rates are reasonable, and to provide validation for water budget assessments. Baseflow calibration targets were developed using point streamflow measurements collected upstream and downstream of Whitefish Lake. Figure 2-10 (p. 2.26, Appendix 7-C) shows the locations of the baseflow calibration targets, and Table 2-7 (p. 2.35, Appendix 7-C) illustrates the model-simulated groundwater discharge rates in relation to the estimated range of baseflow from stream measurements. The simulated baseflow to Whitefish Lake is in good agreement with the estimated representative baseflow”.</p> <p>Rationale: It is not clear in Figure 2-10 (p. 2.26, Appendix 7-C) where the point streamflow measurements were conducted upstream and downstream of Whitefish Lake. Additionally, it is not clear how the groundwater discharge to Whitefish Lake is simulated, since the model domain does not cover the whole Whitefish Lake.</p> | <p>Whitefish Lake. 2. Please clarify how the groundwater discharge to Whitefish Lake is simulated considering that the model domain does not cover the whole Whitefish Lake.</p> | | |
| IR-85 | - | CNSC | Geology and Groundwater | Appendix 7-C | <p>Context: Section 2.7.3 (Appendix 7-C) mentions Wells A, B and C, and Figure 2-17 (p. 2.43, Appendix 7-C) illustrates the predicted drawdown ranges at Well B and Well C.</p> <p>Rationale: It is not clear where Well A, Well B and Well C are located.</p> | <p>Please provide the locations of Well A, Well B and Well C illustrated in a Figure.</p> | | Accepted |
| IR-86 | - | CNSC | Geology and Groundwater | Appendix 7-C | <p>Context: It is stated in Section 2.7.3 (p. 2.41, Appendix 7-C) that “Both the pumping demand and the recharge changes were incorporated into a transient simulation performed using the calibrated groundwater flow model. The model simulation was started at the beginning of mine construction, with initial conditions taken from the calibrated model. The simulation period was extended for 40 years to include the entire period of construction, operation, and decommissioning, and extending through 17 years post decommissioning”.</p> <p>Rationale: It is not clear what is the difference between the calibrated model and transient model in terms of parameters (such as the K values for the mining zone), boundary conditions, etc.</p> | <p>Please clarify the parameters, boundary conditions and any other aspects as used in the transient model that are different from the calibrated model.</p> | | Accepted |
| IR-87 | - | CNSC | Geology and Groundwater | Appendix 7-C | <p>Context: In Section 2.8 (p. 2.45, Appendix 7-C) Parameter uncertainty assessment, only parameters for certain zones (part of each specific hydro-stratigraphic unit as shown in Figure 2-19, p. 2.46, Appendix 7-C) related to the pathway from the ore zone toward Whitefish Lake were allowed to vary in order to find</p> | <p>It is recommended that the parameter zones in the Parameter uncertainty assessment include hydro-stratigraphic units in the whole model domain to investigate the possible combination of parameter values that could make the groundwater in the mined-out zone more active hydraulically.</p> | | Accepted |

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| | | | | | <p>combinations of parameter values that met statistical calibration criteria. If each hydro-stratigraphic units within the whole model domain were treated as parameter zones that can have varied hydraulic conductivity values, a different combination of parameter values could be obtained that meet statistical calibration criteria too.</p> <p>Rationale: The parameter values for parameter zones between the mining area and Whitefish Lake is important in determining the hydraulic connection between the mining area and Whitefish Lake. Parameter values in other parameter zones could also be important. For example, if the K values for the intermediate sandstone aquitard are significantly larger than in the current calibration results, the interaction between the upper sandstone aquifer and the lower sandstone aquifer could be more active, and the mined-out zone could be more active hydraulically and groundwater in the minded-out zone could have a shorter residence time than in the current calibrated model.</p> <p>Additionally, it is noted that Figure 2.19 (p. 2.46, Appendix 7-C) illustrates the parameter zone for the intermediate sandstone aquitard. However, Figure 2.20 (p. 2.49, Appendix 7-C) did not include the intermediate sandstone aquitard in the results.</p> | | | |

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| IR-88 | - | CNSC | Geology and Groundwater | Appendix 7-C | <p>Context: The conceptual hydrogeological model includes upper sandstone aquifer, intermediate sandstone aquitard, and lower sandstone aquifer. The desilicified zone above the ore zone have enhanced hydraulic conductivity. The boundary condition for the lower sandstone aquifer on the west (upstream) side was assigned to have specified head, which provide source of water for the lower sandstone aquifer.</p> <p>As a result of the conceptual model setup, the upper sandstone aquifer is hydraulically active and the groundwater residence time within the upper sandstone aquifer is relative short. In contrast, the lower sandstone aquifer (and the ore zone) is hydraulically inactive, and the groundwater residence time in the lower sandstone aquifer is relatively long (as shown in the particle tracking results in Figure 7.6-2 (p. 7-71, main EIS report), and the simulated plume for chloride in Figure 7.6-7(p. 7-86, main EIS report)).</p> <p>It is stated in Section 2.6.4 (Appendix 7-C) that “As noted above in section 2.6.3, it is estimated that 99% of the groundwater discharge to Whitefish Lake is derived from groundwater that has only flowed through shallow deposits (i.e., Overburden and Upper Sandstone Aquifers). Contribution of deep groundwater flow through the Desilicified Zone within the Intermediate Sandstone Aquitard is estimated to be < 1% of the groundwater discharging to Whitefish Lake”. This simulation result is reflective of the conceptual model.</p> <p>Section 7.3.3.3 (p. 7-42) states that “The Lower Sandstone Aquifer is characterized spatially by two types of groundwater. The first groundwater type is most like that observed in the Local Flow System. This reflects hydraulically active fractures and fault systems that allow fresh recharge water to penetrate and mix with deeper waters in the aquifer. The second type of groundwater is within the zone of thermal alteration around the ore zone”.</p> <p>The hydraulic connectivity of the ore zone with the upper sandstone aquifer has important implication on the groundwater restoration. The ore zone is not hydraulically active locally because it is enclosed by a clay zone before the mining operation. But if it is located within a hydraulically active area, or on a groundwater flow pathway that is hydraulically active, the mined-out zone (with much larger porosity and hydraulic conductivity) could become active hydraulically after mining operation is finished.</p> <p>Figure 7.6-7 (p. 7-86, main EIS report) shows that the chloride plume is most persistent within the mined-out mining area. This seems to indicate the mined-out zone is hydraulically inactive after the mining operation is finished.</p> | <p>It is recommended to conduct the following work to demonstrate if the mined-out zone is hydraulically active:</p> <ol style="list-style-type: none">1. Determine the groundwater residence time in the lower sandstone aquifer and compare it with the simulated residence time in the numerical model.2. Conduct additional particle tracking to demonstrate where groundwater originating from the mined-out zone flow towards (forward tracking) and where groundwater flowing towards the mined-out zone originates from. This would help determine why groundwater in the mined-out zone is not hydraulically active.3. Conduct sensitivity analysis to investigate the effect of higher K values for the intermediate sandstone aquitard and the K and porosity values of the mined-out zone on the plume migration. | | Accepted |

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| | | | | | <p>It is stated in Section 7.3.3.2 (p. 7-37, main EIS report) that “Exploration boreholes drilled in the Phoenix area, where left unplugged, have the potential to provide preferential flow paths between the Overburden and Upper and Lower Sandstone Aquifers. Exploration holes were reportedly grouted approximately 10 to 20 m above and below the ore zone, resulting in open holes remaining throughout the overlying materials. These portions of the open holes may act as open conduits for groundwater flow through the 400 m of Athabasca Group Sandstone.” So, there is possibility that the unplugged borehole could increase the hydraulic connection between the upper and lower sandstone aquifer.</p> <p>Rationale: It is important to understand if the larger area containing ore zone is hydraulically active. Additional confidence would be gained if there is any other evidence that support that the area containing the ore zone is not hydraulically active, and groundwater residence time in the lower sandstone aquifer surrounding the ore zone is comparable with the simulated results.</p> <p>Table 2-4 (p. 2.16, Appendix 7-C) shows the effective porosity (0.01-0.05) of the ore body. Figure B7 (p. B.8, Appendix 7-C) shows that the calibrated K values for the mined-out zone is 1x10-6 m/s. Section 3.5.2 (p. 3.24, Appendix 7-C) states that “The same average linear velocity was assumed for the mining area (source zone), following from the discussion in Section 4.4.2, where the hydraulic conductivity value in this zone following mining was set to 5x10-6 m/s, and a porosity of 0.2 is assumed for the ore zone (Table 4-2)”. It is not clear what the justification is for the selection of the porosity and K values for the mined-out area, and whether they are conservative. It is also not clear, what the potential impact on the groundwater flow and COPCs transport would be If the mined-out zones collapse.</p> | | | |
| IR-89 | - | ECCC | Fish and fish habitat | Appendix 7-C, Numerical Modelling: Post-Decommissioning Evaluation, | Context: The Proponent states that a hydraulic conductivity value of 5x10-6 m/s was uniformly assigned to the model layers representing the Desilicified Zone. They additionally state that this value is consistent with packer and pumping tests screened in this unit that have interpreted hydraulic conductivity values ranging | 1. Provide an in-depth rationale for choosing a value of 5x10-6 m/s as the base case for the hydraulic conductivity, in both the PH REdox EQUilibrium (PHREEQC) and Finite-Element Ground Water Flow (FEFLOW) models. | <u>The Proponent has not adequately responded to the IR and has indicated in their response that they do not agree with ECCC’s previous advice relating to the sufficiency of the conservative sensitivity analysis. The Desilicified Zone is a critical layer in the hydrogeological model because it represents a key potential pathway of contaminants to Whitefish Lake.</u> | <u>Not Accepted</u> |

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| | | | | Section 2.3.1.4, Desilicified Zone | <p>from 1x10-6 to 3x10-5 m/s (Appendix C), with a geomean of 6.0x10-6 m/s.</p> <p>Considering that the Desilicified Zone is of particular interest because it is the main pathway for the COPC to reach Whitefish lake, and that hydraulic conductivities are not entirely understood, ECCC recommends that a larger range of hydraulic conductivities be simulated to understand potential effects on fish and fish habitat.</p> <p>Rationale: The Desilicified Zone is a critical layer in the hydrogeological model as it represents a key potential pathway of contaminants to Whitefish Lake. The base case hydraulic conductivity value (5x10-6 m/s) is even lower than the geometric mean, not to mention the highest value found. When simulating geochemical processes and contaminant transport within this important pathway a more conservative approach should be employed. Modifying this parameter will affect travel times and distribution of COPC in the subsurface.</p> | <p>2. Provide a rationale for keeping the sensitivity analysis within one order of magnitude considering the lack of physical data on the Desilicified Zone. Alternatively, provide contaminant transport simulation results with more conservative hydraulic conductivity (e.g., more than 3x10-5 m/s) values in the Desilicified Zone.</p> <p>See also related: IR-96.</p> | <p><u>However, ECCC advises that the Proponent has not adequately considered conservative scenarios in its sensitivity analysis.</u></p> <p><u>In their response, the Proponent states that “The scenarios tested hydraulic conductivity values for the desilicified zone as high as 3.7x10-5 m/s (realization 7 – predictive uncertainty case 5), which is two times higher than any measured value within this hydrogeologic unit,...” This is inconsistent with the values presented in the Revised Draft Environmental Impact Statement Section 7 – Geology and Groundwater, where the maximum field values are presented as 3.0x10-5 m/s. The approach presented does not demonstrate a conservative scenario for evaluating the extent of potential travel times to Whitefish Lake.</u></p> <p><u>The Proponent should test a K value in the desilicified zone with a value at least an order of magnitude higher than the highest field K values in order to provide a conservative scenario for potential travel times to Whitefish Lake.</u></p> <p><u>The Revised Draft Environmental Impact Statement, Section 7, has a revised geometric mean for hydraulic conductivities in the desilicified zone where the value was changed from 6.0 x10⁻⁶ m/s to 4.8x10⁻⁶ m/s with no explanation regarding how this new value was obtained. The Proponent should clarify why this change was made, and provide any supporting evidence.</u></p> <p><u>Note to Denison: This IR is still under discussion.</u></p> | |
| IR-89 | IR-89-R1 | ECCC | Fish and fish habitat | Appendix 7-C, Numerical Modelling: Post-Decommissioning Evaluation, Section 2.3.1.4, Desilicified Zone IR-89 Response from Denison | <p>Context: The Proponent states that the range of hydraulic conductivities considered in sensitivity analysis was limited to values that fit within a calibration constrained uncertainty analysis of the model.</p> <p>Considering that the Desilicified Zone is of particular interest because it is the main pathway for the COPC to reach Whitefish lake, and that hydraulic conductivities are not entirely understood, ECCC recommends that a larger range of hydraulic conductivities be simulated to understand potential effects on the aquatic environment.</p> <p>The Proponent clarified the details of the calibration-constrained uncertainty analysis that was used for parameter bounding within the model, with hydraulic conductivity sensitivity bounds determined based on model calibration values that were supported by the available physical data.</p> <p>Rationale: ECCC agrees that calibration constrained uncertainty analysis using hydraulic head field data is useful to determine probable upper limits of K values. However, there is always some degree of uncertainty in groundwater data and models. Sources of such uncertainty may include errors, lack of complete and representative field data to determine key parameters, or any number of heterogeneities associated with groundwater systems over large scales. Such uncertainties will always exist and can be accounted for by conducting a sensitivity analysis that accounts for the lack of physical data in the Desilicified Zone by running</p> | Expand the sensitivity analysis of hydraulic conductivity outside of calibration constrained parameters to account for the lack of physical data in the Desilicified Zone. | <p><u>See IR-89 (above). Note to Denison: This IR is still under discussion.</u></p> | <u>Not Accepted</u> |

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| | | | | | modelling scenarios using parameters that are outside of the calibration constrained values. | | | |
| IR-90 | - | ECCC | Fish and fish habitat | Appendix 7-C, Section 2.4 and 2.6 | <p>Context: Hydraulic conductivities and hydraulic gradients play an important role in groundwater flow, geochemical modeling, and contaminant transport for the PHREEQC and FEFLOW models. Although there is an important vertical component to the contaminant transport, there is no distinction made between lateral and vertical hydraulic conductivities of hydraulic gradients.</p> <p>Rationale: According to the conceptual model, there is an important vertical aspect to the groundwater flow thus incorporating any vertical hydraulic gradient or hydraulic conductivity information into the calibration would increase confidence in the results.</p> <p>Providing a distinct value for vertical hydraulic conductivity will improve the accuracy of the model in regards to the transport of contaminants to Whitefish Lake through the Desilicified zone, which is important to understand potential impacts to aquatic life.</p> | <ol style="list-style-type: none">1. Explain if the vertical and lateral hydraulic gradients and hydraulic conductivities are assumed to be equivalent.2. Provide a rationale for not distinguishing between vertical and lateral hydraulic gradients.3. Alternatively, provide both lateral and vertical hydraulic gradient estimates and the implications on contaminant transport. | | Accepted |
| IR-91 | - | NRCan | Fish and fish habitat | Appendix 7-C, section 2.5.2 | <p>Context: The numerical model calibration quality plot (Appendix 7-C, sec. 2.5.2.1, Figure 2-13) contains a small error. The vertical (simulated heads) and horizontal (observed heads) axes do not have the same scales (499 to 521 masl versus 499 to 522 masl). Therefore, the line of ideal fit is offset.</p> <p>Rationale: As a result, NRCan notes that observed heads in the 510-512 masl range are underpredicted by the model. NRCan also notes that the calibration statistics (Appendix 7-C, sec.2.5.2.3) are highly leveraged by two data points from open boreholes south of Kratchkowsky Lake where simulated values are largely controlled by the nearby constant-head boundary in the Lower Sandstone aquifer (520 masl).</p> | The Proponent should correct the scales on the axes of Figure 2-13 in Appendix 7-C. The Proponent should also comment on the effect on calibration of the clustering of most observation wells in the ore zone. | | Accepted |
| IR-92 | - | CNSC | Geology and groundwater | Appendix 7-C, Section 3.2.1, Mineralogical Composition | <p>Context: Table 3-2 summarizes the clay content of the Athabasca Group sandstones and the Paleoweathered Zone. Although minimum, maximum and median values are provided, the number of samples and variability of the dataset are not. Rationale for incorporating illite into reactive transport modelling and excluding kaolinite/dichlorite is provided in the text.</p> <p>From p. 3.29 in Appendix 7-C: “The illite content was based on the normative clay composition determined from site-specific corehole elemental analysis (median illite by mass is 7.68%; Table 3-2) and using portable infra-red mineral analysis indicating median illite content by mass is 13.1% (data not shown)”</p> | <ol style="list-style-type: none">1. Please provide in Table 3- the number of samples and variability of the datasets used to estimate the clay content of hydrostratigraphic units for the model. Include results from infrared mineral analysis in the text if the information is used to support assumptions for modelling.2. Please provide further information/discussion within the EIS relating to the assumptions of clay content in hydrostratigraphic units for modelling. Provide further justification and rationale as to why total clay content in the Athabasca Group sandstones and Desilicified Zone is assumed to be illite, and how this assumption is conservative. This discussion could include a comparison of the properties (cation exchange capacity, surface area) of illite vs. | | Accepted |

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| | | | | | <p>From p. 3.30 in Appendix 7-C: “Using the minor amount of illite compared to the more dominant chlorite is conservative in that not all sorptive capacity of the clays is accounted for in the simulated paleoweathered zone”. This conservative assumption appears contrary to assumptions for the desilicified zone (DSZ) and Athabasca Group sandstones “Illite was used to represent the total clay content, which varies from 1.74% to 5.85% by mass in the hydrostratigraphic units within the Athabasca Group sandstones and Desilicified Zone”.</p> <p>Rationale: Information is missing in the EIS regarding the clay composition of hydrostratigraphic units. Results from infrared mineral analysis are not reported.</p> <p>The assumption for the solute transport model is that all clays in the downgradient DSZ are illite. However, clay content in the Read Formation (Lower Sandstone Aquifer) downgradient of the ore zone is low in illite (0.42%) compared to kaolinite (0.52%) and dichlorite (1.18%). A value of 3.9% illite clay by weight is used for the DSZ, but Table 3-2 indicates median content is 2.42% illite. It is not clear why illite was used to represent total clay content for the DSZ, as opposed to the conservative assumptions used for the Paleoweathered Zone, nor has any basis or justification been given.</p> | kaolinite vs. dichlorite for the anticipated range of subsurface conditions (pH, redox, U concentrations, etc.). | | |
| IR-93 | - | CNSC | Geology and Groundwater | Appendix 7-C, Table 3-10: Properties of Adsorbing Mineral Phases | <p>Context: In Appendix 7-C, section 3.5.6.2.2 Ion Exchange and Surface Complexation, the consideration of ion exchange and surface complexation and the corresponding parameters and chemical reaction are discussed.</p> <p>Rationale: The site density of sorbent Goethite was reported in Table 3-10 to be 1.6E3 mol/kg. Taking into account the specific surface area of 60 m2/g, this equals to 1600/6E4 mol/m2, or 0.0266 mol/m2, 1.6e4 sites/nm2.</p> <p>This value largely overestimates the site density of goethite, which is reported to be in the range of 2~6 sites/nm2. The reference used in the EIS report indicates the similar range of variation for this specific parameter.</p> <p>There are plenty of similar studies on SCM of iron oxides in literature. It is suggested to consult with more than one single study to enhance the reliability of model parameters.</p> <p>The overestimation of sorption site density will directly result in underestimation of the affected COPCs’ concentrations in pore fluid. This will result in underestimation of COPC transport plume in the affected underground space, and potentially the dissolved concentrations in the hydrogeological sink.</p> | Please provide additional evidence to justify the model parameter of site density for goethite, applied to the numerical model. If necessary, the reactive transport modelling should be re-run to update the contents presented in the EIS report. | | Accepted |

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| IR-94 | - | CNSC | Geology and Groundwater | Appendix 7-C, Numerical modelling: post-decommissioning evaluation, Section 3.5.5, Subsurface Conditions Incorporated | <p>Context: It is reported in this section the assumed subsurface conditions that were applied in the geochemical site conceptual models. Critical phenomenon of pH tail was mentioned. Inclusion and exclusion of corresponding geochemical reactions were discussed briefly.</p> <p>Rationale: It was reported that the residual reduced minerals of uraninite and pyrite were not included in the modelling of the remediated mining area. The argument was based on consideration of the upstream groundwater, passing through the mined zone, will not be oxidizing and groundwater conditions are expected to be similar to pre-mine conditions. However, this ignores the pH tail effect that releases proton H+ sorbed to solid surface during ISR flooding. By ignoring this process, there is a potential risk of underestimating the source terms for some key COPCs. Exclusion of uraninite and pyrite in remediated mining area modelling is contradictory to pH-tail effect. The justification is not sufficient in the current form.</p> | Please provide additional evidence to justify the approach for excluding uraninite and pyrite from the analysis of remediated mining area. This may require the results from additional modelling. | | Accepted |
| IR-95 | - | CNSC | Geology and Groundwater | Appendix 7-C, Table 3-11 | <p>Context: The Table 3-11 reported the Solid-Phase Concentrations and Partitioning Constants for COPCs. Data were both measured and simulated.</p> <p>Rationale: It is unclear how the partition coefficients of various COPCs upon desilicified and paleoweathered rocks were obtained. It was not reported at what pH were these Kd analyzed. Sorption of chemicals on solid phase is known to be pH dependent. It is unclear whether pH influence was considered in the measurement and analysis of apparent partition coefficients.</p> <p>In addition, uptake of metals on clay is highly nonlinear, and always has a maximum capacity. Even with a very strong affinity towards specific metal ions, the sorption will be saturated at elevated concentrations. Therefore, assuming a linear correlation needs to be cautious of the concentration range of target COPC species, and the applicable sorption capacity of the clay mineral.</p> <p>In the current model, only the linear form of sorption is considered, although with discussion of Kd value selection. Additional rationale is needed to justify if the applied methodology is sufficient for assessment.</p> | Please justify the choice of applying a linear form partition coefficient for the modelling and assessment, and whether it provides a conservative approach to the assessment results. Clarity around the experimental conditions during the measurement of partitioning coefficient of various COPCs on the target rocks may help support this assumption. | | Accepted |
| IR-96 | - | CNSC | Geology and groundwater | Appendix 7-C, Section 4.4.4, Sub-Domain Model | <p>Context: From the text, “Transport parameters were specified for diffusion (1x10-9 m2/s), longitudinal dispersivity (10 m along the plume trajectory), and transverse dispersivity (5 m)”. The source of this information is not provided in Appendix 7-C. It is unclear if the</p> | 1. Please provide the source of the numerical value used for diffusion and longitudinal and transverse dispersivity, and provide justification if default values by the model code were used. | <i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i> | Accepted |

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| | | | | Transport Boundary Conditions | <p>values used are defaults in the modelling software, from literature, from small-scale laboratory tests, or are site-specific values determined through tracer tests.</p> <p>Rationale: The use of a calibrated flow model does not imply that the solute transport model is calibrated. The transport parameters (such as effective porosity, dispersivity and reactive transport parameters) can only be calibrated by matching simulated and observed spatial and/or temporal distributions of a solute. Sensitivity analysis indicates that decreasing longitudinal and transverse dispersivities by a factor of two resulted in exceedances of groundwater criteria for both selenium (Se) and cobalt (Co). Given the clear influence of these values on contaminant transport, it is important that transfer parameter values are justified in the solute transport model. In addition, the influence of large-scale heterogeneity on dispersion and solute transport predictions should be discussed, to identify any uncertainty in the model predictions, and provide confidence that the applied model is adequately representing groundwater flow and solute transport.</p> <p>Further guidance on solute transport modelling can be found in BC MOE (2012) [1].</p> <p>Reference: [1] British Columbia Ministry of the Environment (BC MOE). 2012. Guidelines for Groundwater Modelling to Assess Impacts of Proposed Natural Resource Development Activities. Report no. 194001, 385 p.</p> | <p>2. Please provide a discussion on the influence of large-scale heterogeneity on dispersion and solute transport predictions in the modelling report.</p> <p>See also related: IR-89.</p> | <p>CNSC staff appreciate the comprehensive information provided relating to longitudinal dispersivity and variation based on scale. However, it should be noted that guidance from Gelhar et al. (1992) and the BC MOE (2012) indicate that horizontal transverse dispersivity values should be approximately 1 order of magnitude lower than longitudinal dispersivity values, and vertical transverse dispersivity values should be approximately 2 orders of magnitude lower than longitudinal dispersivity. For the model presented in the EIS, transverse dispersivity is represented by a singular value of 5 meters, with the supporting rationale that the Gelhar et al. (1992) identified 5 meters as a representative value. It is important to note that the Gelhar et al. (1992) paper considered 5 meters to be representative for horizontal transverse dispersivity and identified that vertical transverse dispersivity is smaller than horizontal transverse dispersivity. Additionally, it is important to note that Petrotek (2021) used a transverse dispersivity of 1 m in their numerical models of the ore zone aquifer. CNSC staff thus request that Denison provide further information relating to why horizontal and vertical transverse dispersivity are represented using a singular value, and how this value is considered appropriate to represent both dimensions.</p> <p>Reference: Petrotek 2021. Groundwater Model Report Phase 1, Phoenix Deposit Wheeler River Project. Prepared for Denison Mines. December 2021.</p> | |
| IR-97 | - | ECCC | Fish and fish habitat | Appendix 7-C, Figures 4-6, 4-7a, 4-7b, 4-8a, 4-8b, 4-9a, 4-9b | <p>Context: Appendix 7, Figures 4-6, 4-7a, 4-7b, 4-8a, 4-8b, 4-9a, 4-9b present contaminant transport simulations of chloride, selenium, cadmium, and uranium. All simulations use initial condition concentrations at t=0 (or end of mining operations. In the 3D FEFLOW contaminant transport model it is not clear why initial condition concentrations were chosen rather than a constant concentration boundary.</p> <p>It is also unclear if mining activities will cause mobilization of the contaminants beyond the end of operations.</p> <p>Rationale: The choice of boundary conditions may impact the predicted transport of contaminants that reach Whitefish Lake through groundwater, which may have impacts to aquatic life.</p> | <p>1. Explain and clarify if mining operations will mobilize contaminants beyond operations?</p> <p>2. Clarify if the source of contamination, (e.g., uranium, selenium) will cease after operations?</p> <p>3. For the 3D model please provide the rationale for using initial concentrations rather than constant concentration boundary conditions for contaminant concentrations.</p> | <p><i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> <p>It should be noted that the fate and transport simulations of the COCs are dependent on groundwater flow. Therefore, the Proponent’s conclusions on the transport of COCs, may need to be revisited depending on how IR-89 is resolved.</p> | Accepted |
| IR-98 | - | CNSC | Change to an environmental component due | Section 8, Aquatic Environment | <p>Context: It states in EIS in Section 8.3.7.1 (p. 8-151) that "Cameco’s Key Lake Operation will overlap spatially and temporally with the Project".</p> | <p>Please provide supporting information to demonstrate whether discharges from the proposed operation will not eventually flow into a reference lake used by another existing operation.</p> | | Accepted |

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| | | | to hazardous contaminants | | Rationale: It is not clear whether there is the possibility that planned Denison discharges would eventually flow into and influence a background reference lake used by Key Lake operation. | | | |
| IR-99 | - | CNSC | Aquatic environment | Section 8, Water Quality, Table 8.2-13 | Context: Table 8.2-13 shows the maximum concentration of hazardous and radiological COPC's in surface water throughout the local study area. However, the concentration for all constituents is stated as mg/L. Rationale: It is unusual for radiological COPC's to be displayed in mg/L, radiological constituents are typically displayed in Bq/L | Please use Bq/L when displaying concentration of radiological COPC's. If this was a typographical error in the table, please indicate as such and revise the table to indicate values are indeed in Bq/L. Please also review other tables displaying concentrations of radiological constituents to ensure this error is not repeated in other tables. | | Accepted |
| IR-100 | - | HC | Indigenous Peoples' health / Socio- economic conditions | Section 8, (p. 8-195) Section 8.5.3, Table 8.5-2, (p. 8-226) | <p>Mercury is excluded as a COPC in the assessment. Inadequate consideration of mercury and methylmercury in fish and other country foods, and use of incorrect Hg-related health guideline values can underestimate the risks to human health among country food consumers.</p> <p>Context: Section 8 states “Mercury has not been identified as a COPC for the Project as it is currently not present in the receiving environment (i.e., background condition) at detectable concentrations and will not be produced as part of the mine process; therefore, it will not be discharged to the aquatic environment.</p> <p>However, it is understood that potential nutrient enrichment-related effects are possible and can be linked to increases in mercury in the environment” (p. 8-195).</p> <p>Table 8.5-2 shows that there is mercury present in the tissues of Northern Pike and White Sucker sampled in the waterbodies within the local study area and in Russell Lake. These fish are regularly consumed by nearby communities according to the ERFN 2017 dietary survey.</p> <p>In Section 8.5.3, fish tissue concentrations are compared to Health Canada’s human health risk- based maximum permissible mercury concentration (0.5 µg/g wet weight), which is applicable to most species of commercially sold fish rather than country foods.</p> <p>Rationale: It is recommended that mercury be listed as a COPC considering it is in fact present in fish tissue under existing conditions, the significant consumption of fish by the local Indigenous communities, and its toxicological significance to human health.</p> | <p>1. Include mercury (including methylmercury) as a COPC in the assessment given the baseline presence of mercury in sampled fish, the potential increase of methylmercury in receiving waters due to nutrient enrichment resulting from the Project, the significant fish consumption by the local population and that country foods, particularly fish, are an important source of dietary exposure to mercury.</p> <p>2. Assess health risks from fish consumption by calculating hazard quotients for baseline and predicted methylmercury levels in country foods using Health Canada’s pTDI for methylmercury (Health Canada, 2007).</p> <p>3. Clarify whether mercury data represented throughout the EIS represents total mercury, inorganic mercury or methylmercury.</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends including methylmercury in the list of COPCs to be monitored in fish throughout all project phases.</p> <p>See also related Advice to the Proponent: AD-31.</p> | <p>This IR remains not accepted. It is unclear what threshold concentration(s) of mercury in fish would trigger further assessment of potential health risks.</p> <p>The response to IR-100 includes a commitment to monitor mercury concentrations in fish, and to assess potential health risks if concentrations are greater than that used to derive the Government of Saskatchewan (GoS) guidelines for fish consumption (last updated in 2015). However, using this concentration as a threshold would not be protective of human health if the local population consumes greater quantities than the published consumption guideline.</p> <p>Please provide the following information:</p> <ol style="list-style-type: none">Discuss how the fish consumption rates from average and high traditional foods consumer groups (Section 10-A, Table 4-4: Annual Food Intakes for Components of the Human Receptor’s Diet) relate to the GoS fish consumption limits for general and sensitive populations.Justify the use of GoS guidelines for fish consumption for mercury monitoring in fish and as a trigger for possible management actions. | Not Accepted |

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| | | | | | <p>Further, the Health Canada provisional tolerable daily intake (pTDI) value of 0.2 µg/kg/bw/day (Health Canada, 2007) is a more appropriate reference level when evaluating consumption of mercury in fish by Indigenous people, as it allows for the consideration of food consumption patterns in the risk assessment that differ from the general population and is protective of the most sensitive sub-group (i.e., developing foetus).</p> <p>It is important to note that methylmercury, rather than inorganic mercury, is generally the predominant mercury species present in fish and is also the most toxicologically significant form. The assumption of 100% of mercury in fish and other country food items being present as methylmercury ensures that the potential health risks are not underestimated. It is unclear, however, if the mercury data presented throughout the EIS represent total mercury, inorganic mercury or methylmercury.</p> | | | |
| IR-101 | - | ECCC CNSC | Fish and fish habitat | Section 8.1.1.3, Section 8.2.1.3 Aquatic Environment | <p>Context: In Section 8.1.1.3 Spatial and Temporal Boundaries the Project Area, Local Study Area (LSA) and Regional Study Area (RSA) are established as they pertain to surface water quantity. The same is done in Section 8.2.1.3 for surface water quality. In Section 8.1.1.3 Figure 8.1-4, the locations of the Project Area, LSA, RSA and surface water features and monitoring stations are provided.</p> <p>However, the locations of wetlands located near the Project area and within the LSA and RSA have not been provided. The location of wetlands within or near the Project footprint, as well as the other wetlands existing within the LSA can be confirmed from Part II _S9 Terrestrial Environment, Section 9.2.3.3 Figure 9.2.-8, including the wetland classifications. There appears to be at least one shallow open water wetland and several bogs located within the Project Area. There is no consideration of wetlands or potential effects to wetland hydrology, surface water or sediment quality throughout the aquatic environment assessments. There is no baseline information regarding wetlands and their status as fish habitat and ecological function, or assessment of potential effects to flow rates, water levels, water quality, sediment quality, or biota.</p> <p>Rationale: There is currently not enough information provided for ECCC to provide advice on the potential risks of the proposed Project to wetland hydrology, surface water and sediment quality within the LSA. This pathway of effects is important to assess in terms of potential effects to wetland habitat availability and quality due to changes in flow rates, water levels, water quality, sediment transport, sediment quality and potential effects to terrestrial and aquatic receptors. It is necessary to evaluate if changes in groundwater and surface water runoff flows and routing will affect water levels and habitat availability within wetlands. Potential</p> | <ol style="list-style-type: none">1. Provide baseline information regarding wetland characterization within the Project Area and LSA, including: locations, wetland type, size, water surface elevation, depth, water flow pathways, and the presence of wildlife receptors including presence of fish/fish habitat within the Aquatic Environment section of the draft EIS. If this information is available in annexes or baseline studies, summarize it within the main body of the Aquatic Environment section of the draft EIS with references to respective documents for review.2. Provide baseline information on wetland surface water and sediment quality characterization for wetlands within the Project footprint.3. Provide an assessment of potential effects to wetlands within the LSA and potential effects to ecological receptors during all phases of the proposed Project.4. Provide further information on mitigation measures and monitoring that would be applied for the protection of wetlands. | <p>Responses to items one and four have been accepted, but items two and three require additional information.</p> <p>For item two, the Proponent has not included justification regarding why they have relied on measurements upstream and downstream of the wetlands over direct measurements in the wetland areas within their response. Please provide the missing justification for item two, as well as describe how baseline information will be used to further assess the effectiveness of mitigation measures. Water and sediment quality in wetlands differ than those in stream and lakes systems because of their distinct biota and hydrology. In wetlands, there is a greater cycling of nutrients, more nutrients and metals can be sequestered in sediment, and metal toxicity modifying water quality factors such as pH and dissolved organic carbon are not the same as in streams and lakes. Baseline data on water and sediment quality in wetlands are necessary to evaluate potential effects on fish and fish habitat of proposed discharge to Whitefish Lake upstream of the wetlands. The information would also be used to assess possible effectiveness of proposed mitigation measures.</p> <p>For item three, the Proponent has not provided the predicted sediment quality impacts within item three, which is part of the wetlands assessment that was requested.</p> <p>Please also update Section 8.3 to include additional information on predicted sediment quality impacts to wetlands and to provide an assessment of potential effects to wetlands from sediment quality changes within the LSA.</p> <p>This Information is required in order to identify and define potential effect pathways linked to project-related changes to wetland sediment quality and assess effects on wetland functions, fish and fish habitat, and other valued components. Potential effect pathways in wetlands can be different than those in lakes and streams and warrant a separate assessment.</p> | Not Accepted |

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| | | | | | effects from COPCs and radionuclides to surface water and sediment, or potential effects to ecological receptors within wetlands have not been evaluated. | | | |
| IR-102 | - | ECCC CNSC | Fish and fish habitat | Section 8.1.3.1 Appendix 8-C, including Appendix II, Table 1 (p. 2) | <p>Context: Only one measured-results dataset for baseline stream flow exists that is relevant to the Project data from the Water Survey of Canada (WSC) station for Wheeler River (06DA005), and the Proponent used constructed records. The Proponent states that data from 06DA005 was used to extend local hydrometric station records and calculate baseline water quantity metrics. However, this was done through a complex combination of daily data correlation or monthly unit area runoff relationship, with or without offset, where some stations were based off constructed records instead of the real long-term dataset at 06DA005 (see Section 8.1.3.1 and Appendix II of Appendix 8-C, Table 1, p.2 (PDF p. 569)). Appendix 8-C references previous reports in its own appendices, but no equations are shown and there is no description of the accuracy of the fit, or explanation for not referring back to the one dataset (WSC station). Subsequent statistics calculated from these constructed records (e.g., 7Q10 needed for SK water licenses) would be affected by this uncertainty.</p> <p>Rationale: Fish habitat can be altered by changes to depositional and erosional patterns in streams. Confidence in the Proponent’s estimate of baseline water quantity, and by extension Project effects to fish habitat, cannot be established without a complete description of the method applied, as well as a discussion of its accuracy.</p> | <p>1. Provide more information on the extension of Project hydrometric station data using WSC station 06DA005.</p> <p>2. Discuss the accuracy of any correlations/relationships and justify any deviations from simple unit area runoff relationships in the estimation of baseline water quantity values for the Project hydrometric stations. Constructing records from records that are themselves constructed is not recommended.</p> <p>3. If baseline water quantity metrics need to be revised, discuss (if any) resulting changes to the effects assessment.</p> | | Accepted |
| IR-103 | - | ECCC CNSC | Fish and fish habitat | Section 8.1.3.4 Climate Change Influenced Extreme Events | <p>Context: The Proponent notes that Intensity duration frequency (IDF) curves are used to estimate the size of water management structures around a site and that the IDF curves are often specific to climate monitoring stations.</p> <p>The Proponent used the IDF_CC Tool 5.0 developed by the Institute for Catastrophic Loss Reduction (2021) which generates Intensity Duration Frequency (IDF) curves at ungauged locations in order to estimate future IDF curve values under influences of climate change. This tool generates sub-daily values at ungauged locations by interpolation and distance weighing from gauged locations.</p> <p>Rationale: IDF trends exhibit random behavior at some locations and correlated behavior at other locations. The choice of gauged locations will infer the statistics for the ungauged locations, including the IDF trends. Without identification of the gauged locations, it is not possible to assess if the modelled data is realistic or not. If the modelled data is not accurate the design of water management structures on the site may not be sufficient resulting</p> | Provide the gauged stations used to generate the sub daily duration values found in Table 8.1-6: Baseline of Intensity Duration Frequency data. | <p>See AD-73 in the Advice to Proponent table [reference to come].</p> <p><u>Note to Denison:</u> This IR is conditionally accepted. Denison’s commitment to providing the requested information related to the IDF (1 in 100 year 24-hour rainfall) and demonstrate climate change resilience of the project (conduct climate risk and resilience assessment) during licensing should be captured in the Commitments Register.</p> <p>Once Denison has added a commitment related to updating the IDF (1 in 100 year 24-hour rainfall) and demonstrate climate change resilience of the project (conduct climate risk and resilience assessment) in the Commitments Register, this can be accepted.</p> <p><u>Proposed rationale text for posting:</u> <i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> <p>In the Context and Rationale of AD-15 in the Annex 1 – Denison Response, ECCC recommends that the Proponent consult CSA PLUS 4013:19 (2019) <i>Technical guide: Development, interpretation and use of rainfall intensity- duration-frequency (IDF) information: Guideline for Canadian water resources practitioners</i> regarding the</p> | Accepted |

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| | | | | | in the potential for impacts to the Project from flooding or extreme weather events. | | <p>consideration of future changes in short-duration precipitation extremes. In IR-103, ECCC indicated that in order to assess the accuracy of the Intensity duration frequency (IDF) curves, ECCC required that the Proponent provide the gauged stations generating the values for the modelled data. The Proponent provided the closest gauged stations, however, the future short duration precipitation values were based on statistical relationships fitted between local scale observed extreme precipitation and modelled simulations extremes.</p> <p>Additionally, REGDOC-2.9.1 (Appendix 1A) stipulates that “<i>The applicant shall also take into account any potential effects of climate change on the project, including an assessment of whether the project might be sensitive to changes in climate conditions during its lifecycle</i>” and Section 5.1.5 of “ECCC’s Strategic Assessment of Climate Change” states “<i>All proponents will be required... to provide information in the Impact Statement on how the project is resilient to and at risk from both the current and future impacts of a changing climate.</i>” CNSC staff review of Section 15.3.2, 15.4.2 and 15.5.3 of the draft EIS show that the vulnerabilities of the project (infrastructures and project activities) and the associated risk (likelihood and consequence) due to potential increase in climate change hazards (in Section 15.3.2 and 15.4.2) due to climate change throughout the life cycle of the project is not presented in detail. It is also not clear from Section 15.4.2 that the mitigation measures in Table 15.4-1 have considered the additional risk due to the impact of climate change. On page 15-19 of the draft EIS states that: “Denison will apply adaptive management that includes monitoring climate factors so that they can proactively mitigate or prevent adverse climate effects on the Project.” Denison did not provide details on how climate factors will be considered within their adaptive management plans.</p> <p>Rationale: Estimates of future short duration precipitation that are based on statistical relationships fitted between local scale observed extreme precipitation and modelled simulations extremes, such as the approach used by the Proponent, are unlikely to provide reliable projections. This is because the amount of information regarding changes in local-scale observed extreme precipitation contained in short records is not sufficient to constrain a regression (model the statistical relationship) between local and larger scale simulations (Li et al., 2019; ECCC 2022). An alternative approach is to base future projections on a comprehensive assessment that integrates climate science understanding and model projections over a large region. The recent Canadian Standards Association (CSA 2019) guidance on IDF for Canadian Water Resources practitioners provides such an assessment. In terms of adaptive management, the Proponent should clearly outline what climate factors will be monitored to mitigate or prevent adverse climate-related effects. This should include information on when and how the climate factors would be monitored and under what circumstances particular adaptive management approaches would be applied. In addition, considering anticipated project life of 37 years, the climate-infrastructure interactions should be assessed to identify climate vulnerabilities of project infrastructures and operations/activities for all phases of the project. This allows climate risk evaluations and propose adaptation measures accordingly. It is difficult to determine how potential changes in future climate will affect project infrastructures and operations/activities and the associated risk (likelihood and consequences) based on the information provided in Section 15.5.3 (p.15-19) of Draft EIS.</p> <p>In order to assess the Proponent’s adaptive management strategies for future extreme precipitation events, ECCC requests that the Proponent consult the CSA (2019) guidance when using future IDF projections in the Project design and provide revised estimates of the</p> | |

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| | | | | | | | <p>potential future changes in short-duration precipitation extremes over the Project’s duration.</p> <p>1. Provide revised estimates of the potential future changes in short-duration precipitation extremes over the Project’s duration as relevant to the Project design.</p> <p>2. Demonstrate how the CSA (2019) guidance will be incorporated in the Project design when developing and considering future IDF projections and estimates of the potential future changes in short-duration precipitation extremes.</p> <p>3. Demonstrate project resilience to climate change (considering all potential climate sensitive natural hazards including hazards in Section 15.3.2 and 15.4.2) by conducting climate change risk and resilience assessment that includes risk treatment/adaptation measures. CNSC staff recommends proponent to utilize “<i>ECCC (2022). Draft technical guide related to the Strategic Assessment of Climate Change: Assessing climate change resilience</i>” as a guide. Other recommended best practice guides include “<i>Infrastructure Canada (2023). Climate Lens General Guidance – Version 2.1. Infrastructure Canada - Investing in Canada Infrastructure Program Climate Lens - General Guidance</i>” and “<i>MAC (2021). Guide on Climate Change Adaption for the Mining Sector. Mining Association of Canada (MAC)</i>”.</p> <p>References CSA Group. (2019). Technical guide: Development, interpretation and use of rainfall intensity-duration-frequency (IDF) information: Guideline for Canadian water resources practitioners. <i>CSA PLUS 4013 :19</i>. https://www.csagroup.org/store/product/2703080/, <i>ECCC (2022). Draft Technical guide related to the Strategic Assessment of Climate Change: Assessing climate change resilience</i>. https://www.strategicasessmentclimatechange.ca/28896/widgets/117114/documents/77106 Li, C., Zwiers, F., Zhang, X., & Li, G. (2019). How much information is required to well constrain local estimates of future precipitation extremes? <i>Earth’s Future</i>, 11-24.</p> | |
| IR-104 | - | ECCC | Fish and fish habitat | <p>Section 8.1.3.4.2 Probable Maximum Precipitation (PMP) Events</p> <p>Appendix 8C</p> | <p>Context and Rationale: The Proponent notes: “The probable maximum precipitation (PMP) event is a design standard value for an extreme rainfall event. The PMP event does not have an estimated return period but is instead based on the theoretical maximum amount of water that a storm could produce based on the maximum persisting dew point.”</p> <p>The Proponent provides a PMP value of 489.3 mm, which is based on data and methodologies available in 1999, taken from the Atmospheric Environment Branch Report (1999), Report Number AHSD-R99-01. The Proponent references Appendix 8C for details. Appendix 8C contains no supplementary information other than what is already provided in Section 8.1.3.4.2.</p> <p>The assumptions and methodologies presented in the report are the results of time series analyses available in 1999. As time series evolve so do the derived statistics. In order to assess potential flood risks and impacts to the Project from flooding, data that is current</p> | <p>1. Provide a revised PMP value (using up to date data) or justify the use of a PMP that is based on data and methodologies from 1999 as opposed to a more recent time series analysis.</p> <p>2. Describe the alternative methods for determining PMP values that were considered. Include descriptions of both “statistical” outcomes and “rational” outcomes as applicable.</p> <p>Technical Discussion Required: Yes</p> | <p>Response to IR-104 is accepted by CNSC staff based solely on the Denison’s response (E-DOC#-7220826, p.47/112) that states “<i>Despite Denison’s reiteration that the PMP is adequate for the EA level design basis, Denison is committed to revisiting the estimates per CNSC’s recommendations, as applicable, for the licensing phase of the Project.</i>”</p> <p><i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> <p>There are an additional 24 years of meteorological datasets since the 1999 study thus all historical rainfall extremes including those since 1999 study should be considered to estimate up to date PMP at the Project site The proponent’s justification on whether the 1999 or 1994 PMP estimates are current and conservative should be substantiated based on meteorological data analysis. An estimation of updated PMP is achievable by the proponent as meteorological data is freely available and accessible from ECCC and the proponent should provide a revised PMP.</p> | Accepted |

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| | | | | | and representative of the changing climate is needed. The Proponent should explain why they've used data from 1999 rather than using up to date data, describe what alternative methods for determining PMP they have considered, and describe how they will support their use of 489.3 mm as a PMP, or describe how they will generate a refreshed PMP. The main factor that influences the statistical data output is the length of the time series hence the reason to keep the statistical data. The PMP values can be substantially (>10%) different if two decades of data is used in the statistical analysis. | | <p>The Proponent should also clarify how recent the data used to calculate the PMP or the time series is and explain the use of an older data set that will not produce as accurate of a PMP value as a more recent data set would produce, even when estimates are conservative.</p> <p>Specifically, a. Explain the rationale for the use of the data set which was used to derive the PMP. B. Clarify if the PMP and/or the time series was calculated using more recent data.</p> <p>This will allow for an accurate evaluation of the validity of results derived from the data sets selected by the Proponent.</p> | |
| IR-105 | - | Directorate of Fisheries and Oceans (DFO) | Fish and fish habitat | Section 8.1.4.1, Potential interactions between project and valued component/key indicators Surface Water Quantity Section 8.1.4.2.2, Surface Water Taking 8.3.4.1, Potential interactions between project and valued component/key indicators | Context: Table 8.1-8 and Table 8.3-6 in the EIS indicates a potential for freeze wall operation to influence groundwater interactions and surface water quantity and as a result, impact fish and fish habitat. Section 8.1.4.2.2 references Section 7 Geology and Groundwater for details on potential impacts. In addition, IR-63 notes the groundwater model does not describe the pathway in which groundwater would pass around the freeze wall during operation and any resulting potential effects on groundwater discharge to Whitefish Lake. Rationale: As per IR-63, the groundwater model analysis is insufficient to make conclusions on the potential effects of the freeze wall on groundwater discharge into Whitefish Lake. DFO requires this information to fully understand if altered groundwater regimes will result in changes to Whitefish Lake water levels and any potential impacts to fish and fish habitat as a result of changing water levels. | <p>1. Provide a more fulsome analysis of the potential impact of freeze wall operations on local and semi-regional groundwater regimes, and subsequently to fish and fish habitat within Whitefish Lake. The analysis should provide a rationale of how the scope of the groundwater model is relevant to and able to detect changes at the scale of fish and fish habitat.</p> <p>2. If impacts to fish and fish habitat in Whitefish Lake are predicted to occur due to changes in the groundwater regime, describe any mitigation measures that could be used to avoid these impacts.</p> <p>3. If impacts are predicted that cannot be avoided, characterize residual effects on fish and fish habitat.</p> | | Accepted |
| IR-106 | - | CNSC | Change to an environmental component due to hazardous contaminants | Section 8.1.4.2.3, Surface Water Discharge | Context: It is stated in this section under construction that all site contact water will be held in the Clean Waste Rock Pond. Rationale: It is unclear from this section what will happen to the contact water held in the Clean Waste Rock Pond, and whether it will be removed from site or released at a later time. What is the contingency plan if more contact water is produced during construction than the Clean Waste Rock Pond has capacity for. | Please indicate what will happen to the contact water stored in the Clean Waste Rock Pond during construction activities, will it be released after the wastewater treatment plant is installed? Further, please describe the contingency plan if contact water produced exceeds estimates and will exceed the volume of the clean waste rock pond? | | Accepted |
| IR-107 | - | CNSC ECCC | Aquatic environment | Section 8.2.3.3, Existing Surface Water Quality | Context: Under the methodology and metrics section (8.2.3.1) it is stated baseline water quality was sampled in 2016, 2018, and 2019. Looking at the data in Appendix A of Appendix 8D it seems that some waterbodies have little data available for baseline characterization. For example, Whitefish Lake only has 3 and 5 samples taken between its two sample stations, with sampling frequency seeming intermittent. Rationale: The amount of data available for baseline water quality | Please clarify which data quality objectives were used for the baseline characterization data. Please provide justification whether the number of datapoints collected with inconsistent frequency in baseline surface water characterization is sufficient to meet data quality objectives and to adequately characterize the baseline, and whether Denison is confident that the data collected is enough for a robust water quality baseline characterization. | <p>Before this IR is accepted, the Proponent is requested to provide the statistical correlation analysis to confirm that data is correlated.</p> <p>Additionally, the four expectations set out in the rationale for status have not been adequately responded to. The Proponent should incorporate the following information into the EIS and ERA:</p> <p>1. Provide raw baseline data (perhaps in an appendix).</p> | Not Accepted |

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| | | | | | <p>characterization does not seem sufficient to adequately characterize the baseline and the variation it would experience. An effective baseline characterization is vital to ensure water quality is indeed not being affected by the Project. In addition, it is not clear if data quality objectives were applied to determine baseline information was adequate.</p> <p>To meet CEAA 2012 requirements, and CNSC expectations outlined in REGDOC 2.9.1, Environmental Principles Assessments and Protection Measures, the applicant is required to complete a characterization of the baseline environment.</p> <p>As described in REGDOC 2.9.1 Appendix B.2, Characterization of the Baseline Environment for Environmental Assessment Under CEAA 2012, the “baseline information should be sufficient to support the use of an aquatic dispersion model to conduct the site-specific ERA and to support an assessment of the effects of the environment on the facility or activity”</p> <p>In addition, the “applicant or licensee should include an assessment of any limitations or gaps in the quality and extent of baseline data and methods, as well as the method(s) by which they have been addressed.”</p> | Suggestions for mitigation and follow-up measures: CNSC recommends that additional water samples are collected and analyzed at a consistent frequency to ensure a robust baseline | <ol style="list-style-type: none">2. Provide summary statistics for baseline datasets, which at a minimum should include: mean, standard deviation, 95th percentiles, minimum, maximum, and number of samples. Present summary statistics by season (i.e., freshet, summer, fall and under-ice), and include comparisons to relevant water quality guidelines.3. Identify potential gaps in baseline datasets, and indicate how data gaps will be addressed. Describe the planned baseline monitoring to be conducted including, but not limited to, addressing any data gaps.4. Demonstrate that the combined existing baseline data and planned baseline monitoring will yield dataset(s) that provide robust water quality baseline characterization of seasonal conditions (i.e., freshet, summer, fall, under-ice during winter), including a range of flow conditions. <p>The Proponent should also incorporate the additional baseline data collected into the analysis and conclusions of the finalized EIS and ERA.</p> <p>Concerning the other aspects of the IR, these responses are accepted based on Denison’s commitment to conduct periodic sampling prior to construction to strengthen existing environmental data. CNSC staff will review this information to ensure EA predictions remain valid and recommend collecting samples in the fall to spring timeframe, as samples from these seasons is sparse in the current dataset.</p> | |
| IR-108 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.3.3 Aquatic Environment | <p>Context: Tables 8.2-2 and 8.2-3 provide summaries of the baseline surface water quality in the LSA. No justifications for the selection of water quality guidelines have been provided. COPCs that require calculations based on other parameters such as hardness, pH, or temperature to derive guidelines (i.e., ammonia, cobalt, zinc, etc.) should be indicated within the table, with a note specifying the parameter values used in the calculations, so that thresholds may be confirmed. No baseline data for un-ionized ammonia has been provided, which is a Schedule 4 substance requiring monitoring under the MDMER. For cobalt, manganese, and vanadium, Federal Environmental Quality Guidelines (FEQGs) and/or CCME Canadian Water Quality Guidelines (CWQGs) for the Protection of Aquatic Life have not been included. A guideline of 26 mg/L has been provided for molybdenum as a Saskatchewan Environmental Quality Guidelines (SEQG), however the actual SEQG is 31 mg/L and the CCME CWQG is 0.073 mg/L.</p> <p>Rationale: In order to assess potential changes to surface water quality from Project related activities, ECCC requires that data on all parameters that require MDMER effluent and receiving environment monitoring be provided for assessment, including accurate water quality guidelines where available.</p> | <ol style="list-style-type: none">1. Update Tables 8.2-2 and 8.2-3 to include all COPCs that require effluent characterization and receiving environment monitoring under the MDMER.2. Update Tables 8.2-2 and 8.2-3 to include missing or corrected water quality guidance thresholds, and information on values used to derive thresholds for COPCs that are dependent on general parameters. | <p>The IR has only been partially resolved. In item one, temperature is still missing from updated tables in attachment IR-108, 8.2-2 and 8.2-3. The Proponent should add this to the tables.</p> <p>In item two, Tables 8.2-2 and 8.2-3 still contain numerous incorrect guidelines. Additionally, the information on values used to derive thresholds for COPCs that are dependent on general parameters contain inconsistencies which should be corrected or explained.</p> <p>The table does not specify if metal concentrations are total or dissolved. The long-term benchmark column includes both guidelines for dissolved metals (e.g. aluminum, manganese) and total metals (e.g. iron, selenium). The table should be updated to clarify if metal concentrations are total or dissolved and include the appropriate benchmarks.</p> <p>For metal parameters, for which guidelines are dependent on environmental modifying parameters, site specific environmental parameters should be used to select the most appropriate guideline. Specific inconsistencies noted are:</p> <ul style="list-style-type: none">• Aluminum – guideline may change depending on site specific pH.• Ammonia (as N) – should be calculated at site specific pH and water temperature reached during the summer.• Ammonia (un-ionized) – The CCME long-term guideline is 0.019 mg/L, so the reference is incorrect.• Boron – The CCME has both short- and long-term guidelines for total boron (29 & 1.5 mg/L) which should be included in the tables. | Not Accepted |

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| | | | | | | | <ul style="list-style-type: none">Chromium – The type of chromium should be specified. The benchmark specified is the CCME guideline for hexavalent chromium, it is not clear if this was also used for the measured concentrations.Cobalt – The FEQG added as a benchmark includes a specific hardness range and does not apply to the soft waters found on site and should be removed. The guideline is for water with hardness between 52-396 mg/L and table footnote #2 states: “<i>Site-specific hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6).</i>”Copper - the CCME guideline applied for copper is out-dated (1987) and does not reflect the current state of science. The FEQG for copper (2021) reflects the current science utilizing the biotic ligand model and is a more appropriate screening criterion.Dissolved phosphorous & phosphorous – Table footnote #17 states the guidelines for a meso-eutrophic waterbody were used. Use of this guideline should be justified because all sample locations except one had non-detectable phosphorous and dissolved phosphorous concentrations with a detection limit on the upper end of the oligotrophic cutoff, indicating oligotrophic status. Though dissolved phosphorous concentrations were detected at site LB-2, phosphorous concentrations at this site were not detectable, which suggests issues with the measurements. These measurements are therefore not reliable enough to base a trophic status for the region.Manganese – Table footnote #3 states pH of 7.5 and hardness of 15 mg/L were used to calculate the benchmark for dissolved manganese. Justification is required for using a hardness above the site-specific hardness used in footnote #2 (5.26 mg/L) and site-specific pH should be used.Nickel – The long-term benchmark has been changed from the CCME guideline of 0.025 mg/L total nickel to the WHO drinking water guideline of 0.070 mg/L. It is noted that a drinking water quality guideline may not be protective of aquatic life and the more stringent CCME guideline for the protection of aquatic life is the more appropriate benchmark for the receiving environment so the original benchmark should be retained.Strontium – The guideline added for strontium (205 mg/L) is incorrect. The FEQG for dissolved strontium is 2.5 mg/L | |
| IR-108 | IR-108-R1 | ECCC | Change to an environmental component due to | Section 8.2.3.3 Aquatic Environment IR-108 Response from Denison | <p>Context: Incorrect benchmark environmental quality guidelines and guidelines that cannot be verified remain within the updated Tables 8.2-2 and 8.2-3 provided in the Proponent’s response. The Proponent provided an Aluminum Saskatchewan Environmental Quality Guidelines (SEQG) value of 0.005 mg/L in both tables. This is incorrect and appears to be the guideline for irrigation, not the guideline for protection of aquatic biota. The Proponent provided a Molybdenum SEQG of 26 mg/L in both tables. This value is incorrect. The correct SEQG for Molybdenum is 31 mg/L and the Canadian Water Quality Guideline (CWQG) is 0.073 mg/L. The Proponent provided a Nitrate SEQG of 13.29 mg/L in both tables. This value is incorrect. The correct SEQG for Nitrate is 3 mg/L and the CWQG is 13 mg/L.</p> <p>Rationale: In order to verify the benchmark environmental quality guidelines that are calculated based on environmental modifying</p> | <p>1. Update Tables 8.2-2 and 8.2-3 to include footnotes with the concentrations of environmental modifying parameters such as pH, hardness and DOC used to derive guidelines for Aluminum, Cadmium, Copper, Lead, Manganese, Nickel and Zinc.</p> <p>2. Update Tables 8.2-2 and 8.2-3 to include the correct benchmark guideline value for Aluminum, Molybdenum and Nitrate. Include the concentrations of environmental modifying parameters needed for deriving guidelines. If the most stringent guideline value is not selected for use, provide a rationale for use of the chosen guideline.</p> <p>3. Update Tables 8.2-2 and 8.2-3 to include the calculated guideline value for manganese and the environmental modifying parameter concentrations used to calculate the</p> | Item one has been partially addressed, but additional corrections to the footnotes of Tables 8.2-2 and 8.2-3 are needed for copper, manganese, nickel and zinc. Additionally, table footnote #9 does not specify the DOC, pH or hardness values used to calculate the dissolved zinc benchmark. The Proponent should provide the corrections to Tables 8.2-2 and 8.2-3, as well as specify the DOC, pH and hardness values used to calculate the dissolved zinc benchmark. Follow up to items two and three can be found under IR-108. | Not Accepted |

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| | | | | | factors such as pH, hardness and dissolved organic carbon (DOC), the specific concentrations of these environmental modifying parameters used in the calculations must be provided. Additionally, incorrect benchmarks for Aluminum, Molybdenum, and Nitrate remain within the updated tables provided by the Proponent. No benchmark was provided for Manganese. It is not clear if Total Chromium or Hexavalent Chromium was measured as the table does not specify, and the benchmark provided was for Hexavalent Chromium. This information is required to understand potential changes to surface water quality from Project related activities and facilitate threshold confirmation. Use of the incorrect threshold could allow for effluent to be discharged at the wrong concentration. | guideline. A benchmark environmental quality guideline has not been provided for Manganese, however a chronic CWQG guideline exists that can be derived based on environmental modifying parameter concentrations. Update Tables 8.2-2 and 8.2-3 to specify if Total Chromium or Hexavalent Chromium was measured. See also related IR-115-R1. | | |
| IR-109 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.1.1 Aquatic Environment | <p>Context: In this section it is stated “Treated water from the IWWTP will be pumped to the three Effluent Monitoring and Release Ponds (each 3,300 m3). These ponds will be designed to hold effluent for 72 hours for testing before discharge to the environment” (p. 8-75). It is unclear what procedure will be followed if effluent in monitoring ponds does not meet discharge requirements following testing.</p> <p>Additionally, it is also stated that “Treated water in the Effluent Monitoring and Release Ponds will be monitored prior to release to a surface waterbody or injected into groundwater via deep well injection.” However, the MDMER pursuant to the Fisheries Act requires all mine effluent and seep. From the mine site that contain deleterious substances be discharged through a final discharge point.</p> <p>Rationale: In order to fully understand effluent management, more information is required regarding the procedure for managing effluent in monitoring ponds that does not meet discharge requirements. It is unclear how effluent that does not meet discharge requirements will be managed if it needs re-treatment and re-testing prior to discharge.</p> <p>ECCC reminds the Proponent that Project effluent from all final discharge points must meet federal legislation requirements.</p> | Provide further information regarding management of effluent in monitoring ponds that does not meet the requirements for discharge under the MDMER. | | Accepted |
| IR-110 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.1.1 Aquatic Environment Appendix 8-E, Section 2.1 | <p>Context: It is stated that the diffuser at the final effluent discharge point will be located in approximately 3m of water. However, in Figure 8.2-5 displaying the location of the proposed diffuser and lake bathymetry, the diffuser location seems to be located in 2-2.5m of water. A similar image in Figure 1 Section 2.0 of Appendix 8-E also indicates that the diffuser seems to be located in 2-2.5m of water. Additionally, while thermal effects are unlikely, this cannot</p> | Provide confirmation of the diffuser depth and location. ECCC requests the opportunity to review the finalized diffuser design once it is available. | <p><u>This IR is conditionally accepted. As Denison is unable to provide the finalized diffuser design, a commitment should be captured in the Commitments Register that the final diffuser configuration will not change the environmental assessment conclusions of risk to aquatic receptors and that water quality will remain below guidelines.</u></p> <p><u>Once Denison has added a commitment that the final diffuser design will not change the environmental assessment conclusions of risk to aquatic receptors and that water quality will remain below guidelines to the Commitments Register, this can be accepted.</u></p> | Accepted |

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| | | | | | <p>be confirmed until a more detailed diffuser design is provided for review.</p> <p>Updated Rationale: The Proponent should confirm the location and depth of the proposed diffuser in order to confirm that modelling predictions for effluent discharged into the receiving environment are accurate.</p> <p>A review of the final discharge design is necessary to confirm the location and depth of the proposed diffuser and modelling predictions for effluent discharged into the receiving environment.</p> | | <p><u>Note, if there are deviations from predicted effluent and near-field surface water concentrations of COPCs and risk to aquatic receptors due to the finalized diffuser design, this would be addressed through Denison identifying and implementing mitigation measures (e.g., treatment) to ensure that the environmental assessment conclusions of risk to aquatic receptors will not change and that water quality will remain below guidelines.</u></p> <p><u>Proposed rationale text for posting: Denison has captured a commitment in the Commitments Register that the final diffuser configuration will not change the environmental assessment conclusions of risk to aquatic receptors and that water quality will remain below guidelines, so this IR has been accepted.</u></p> <p><u>Any outstanding issues will be further assessed as part of licensing technical reviews, prior to the granting of a license.</u></p> <p><u>Note to Denison: This IR is still under discussion, but the expected path forward is conditional acceptance, with a commitment from Denison that it be captured in the Commitments Register that the final diffuser configuration will not change the environmental assessment conclusions of risk to aquatic receptors and that water quality will remain below guidelines.</u></p> <p><u>With this commitment, it would be expected that any outstanding issues (ie. if there are deviations from predicted effluent and near-field surface water concentrations of COPCs and risk to aquatic receptors due to the finalized diffuser design) will be further assessed as part of licensing technical reviews, prior to the granting of a license.</u></p> | |
| IR-111 | - | CNSC | Fish and fish habitat | Section 8.2.4.2.2, Controlled Discharge | <p>Context: This section of the EIS indicated that the scenario was assessed using a conservative assumption of a continuous freshwater withdrawal rate of 40.5 m3/hr, and a continuous effluent discharge rate of 81.0 m3/hr.</p> <p>Rationale: The withdrawal rate assessed is half of the effluent rate, it is unclear from the text where the other half of the volume of effluent is coming from, if not drawn from the lake.</p> | Please clarify where the other half of the total volume of effluent discharged is from in the water balance between water intake and effluent. | | Accepted |
| IR-112 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.2.2, Aquatic Environment Appendix 8-E, Section 1.2.1 Appendix 10-A (ERA), Section 3.1 | <p>Context: This section of the EIS states that, “for the purpose of assessing the scenario of greatest potential effects, the Project was assessed as having a continuous freshwater withdrawal rate of 40.5 m³/hr and a continuous effluent discharge rate of 81.0 m³/hr.” (p. 8-21)</p> <p>However, several sentences later it is stated that, “The approach to assessing Project-related effects on the Surface Water Quality VC was conservative for the following reasons: The assessment was based on a continuous (year-round) discharge rate at an expected average effluent discharge of 0.0101 m3/s (or 36.5 m3/hr) throughout Construction, Operation, and Decommissioning...”</p> <p>This is a continuous theme throughout Section 8, Aquatic Environment, where the discharge rate for the surface water quality assessment changes between 36.5 m3/hr and 81.0 m3/hr.</p> | <p>1. Confirm that the surface water quantity, quality, and aquatic biota risk assessments and modelling, were conducted using the discharge rate for 36.5 m3/hr within the draft EIS.</p> <p>2. Revise any statements or conclusions in the draft EIS to improve clarity about the usage of the maximum upper bound discharge rate of 81 m3/hr. Remove statements regarding use of the discharge rate of 81 m3/hr during modelling and risk assessments to the receiving environment as needed.</p> | | Accepted |

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| | | | | | <p>However, in Appendix 10-A (ERA) the 36.5 m3/hr discharge rate is the only value used for the near and far-field modelling.</p> <p>It should be made clear in the main body of the draft EIS that the average effluent discharge rate of 36.5 m3/hr has been used as the input for the near- and far-field modelling for effluent, surface water and sediment quality predictions. The maximum upper bound discharge rate is 81 m3/hr; however, modelling for effluent, surface water and sediment quality was not completed for this discharge rate.</p> <p>Rationale: It remains unclear throughout the draft EIS that all predictions of COPC concentrations in effluent, and receiving environment surface water and sediment are based upon the effluent discharge rate of 36.5 m3/hr, and not the maximum upper bound discharge rate of 81 m3/hr. All conclusions about risk to the environment and aquatic and terrestrial biota must make this clear. If the Proponent wishes to make conclusions based on the maximum upper bound discharge rate of 81 m3/hr, modelling needs to be conducted using this rate of discharge.</p> | | | |
| IR-113 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.2.3 and Section 8.4.7.6, Aquatic Environment | <p>Context: No quantitative assessment of climate change has been conducted. Representative concentration pathways (RPC) projections for climate change have not been integrated with near- and far-field modelling to assess impacts to surface water quality or sediment quality in the future.</p> <p>Rationale: Changes in air and water temperatures, precipitation, snow melt, ice formation, etc., due to climate change can all influence COPC concentrations in surface water and sediment. It is not possible to assess the potential impacts from climate change on predicted surface water and sediment COPC concentrations with the current information.</p> | <p>Provide a quantitative analysis of the potential impacts of predicted COPCs from mine effluent to surface water and sediment quality with climate change scenarios for the Project lifespan incorporated into modelling. Include modelling predictions regarding the influence of changes to air and water temperatures, precipitation, snow melt, ice formation, etc., on COPC concentrations in surface water and sediment.</p> | <p>The Proponent has not adequately responded to the IR. The Proponent suggests that the requested quantitative analysis is not necessary and contends that potential climate change effects on water quality should instead be addressed through mitigation measures, monitoring and adaptive management.</p> <p>The Proponent’s approach does not sufficiently characterize the range of potential effluent and water quality predictions. Climate change analysis is lacking, and a sensitivity analysis was not conducted in order to further understand uncertainty and drivers of the model results. Further, some aspects of water quality modeling are not sufficiently conservative, including use of the geometric mean (instead of the 95th percentile) as the baseline concentration for constituents, and pooling data from all lakes, which would mask any differences between the lakes.</p> <p>It is therefore not known whether water quality exceedances may be predicted under climate change scenarios. Without estimating the potential influence of climate change on water quality, it is unclear whether the proposed water quality mitigation measures are adequate.</p> <p>The Proponent should conduct a sensitivity analysis on water quality predictions for low and high precipitation scenarios, including the potential influences of climate change to assist in fulfilling the IR from the previous round.</p> <p>This information is required to assess the potential for significant adverse effects to the environment. If additional baseline information is required, it should be sourced or otherwise collected.</p> | Not Accepted |

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| IR-113 | IR-113-R1 | ECCC | Fish and fish habitat | Section 8.2.4.2.3 and Section 8.4.7.6, Aquatic Environment IR-113 Response from Denison | <p>Context: The Proponent states the following, “The PMP is very conservative (e.g., assumes effectively a full year of precipitation in one event) under both existing and future conditions (climate change)”. This statement suggests that the PMP value utilized considers future climate changes such as possible changes in the frequency or intensity of extreme precipitation events.</p> <p>Rationale: As noted by the Proponent, increases in extreme rainfall are anticipated with a warmer climate. For precipitation extremes across Canada, the relative change in event frequency is expected to be larger for more extreme and rarer events. Given that the extreme precipitation is expected to intensify in the future (Kunkel et al. 2013), the Proponent should consider how these potential changes will influence design values such as PMP.</p> | <p>Clarify if climate change has been considered in the PMP value provided. If it has not been considered, discuss how potential increases in PMP have been and/or need to be considered in the Project design.</p> <p><u>Reference</u> Kunkel, K., Karl, T. R., Easterling, D. R., Redmond, K., Young, J., Yin, X., & Hennon, P. (2020). Probable maximum precipitation and climate change. <i>Geophysical Research Letters</i>, 1402-1408.</p> | <p><i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> <p>The Proponent has not clarified if climate change has been considered in the PMP value provided or discussed how potential increases in PMP have been or need to be considered in the Project design.</p> <p>Thermodynamic effects on atmospheric moisture will lead to intensification of local extreme precipitation in the future. Probable maximum precipitation (PMP) is defined as the greatest accumulation of precipitation for a given duration meteorologically possible for an area (Kunkel et al., 2013). PMP values may increase with climate change.</p> <p>In the response to IR-113 R1, the Proponent states that “the design basis PMP is robust and inclusive of projected total annual precipitation under a high carbon scenario”. It is unclear from this statement how the analysis provided indicates that the PMP is inclusive of climate change.</p> <p>The Proponent should clarify how the analysis that they provided shows that the design PMP considers climate change, and indicate if or how the potential for increased PMP has informed site water management for the mine life and into post-closure and considered in the development of mitigation measures.</p> <p>Reference: Kunkel, K. E., Karl, T. R., Easterling, D. R., et al. 2013. Probable maximum precipitation and climate change. <i>Geophysical Research Letters</i> 40(7), 1402–1408. Available at: 10.1002/grl.50334</p> | Accepted |
| IR-114 | - | ECCC CNSC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.2.3 and Section 8.2.4.2.4 | <p>Context: Tables 8.2-9, 8.2-10 and 8.2-13 demonstrate predicted maximum effluent concentrations of COPCs and maximum predicted receiving environment concentrations in the near- and far-field. General parameters such as temperature, pH, conductivity, etc. that would require Project thresholds and monitoring under the MDMER have not been provided in this table. Lead, nickel, TSS and un-ionized ammonia were not provided, despite all being Schedule 4 substances with maximum monthly concentrations under the MDMER. Aluminum, iron, nitrate, thallium, and manganese have not been provided despite being required parameters under Schedule 5 Section 4 of the MDMER for effluent characterization.</p> <p>For zinc, it is unclear how guidelines have been calculated when CCME thresholds can only be derived with hardness values <250 mg/L. Additionally, water quality thresholds appear to have been calculated using estimated effluent concentrations rather than receiving environment baseline concentrations.</p> | <p>1. Update all tables to include all COPCs with required monitoring under the MDMER including acute and chronic thresholds.</p> <p>2. Ensure all selected water quality thresholds are derived using baseline receiving environment concentrations and use water quality guidelines that are protective of aquatic biota.</p> <p>3. Provide baseline data on the concentrations of methylmercury in surface water, sediment and fish tissues (i.e., large-bodied sports fish and small-bodied forage fish) in the LSA and RSA receiving environment to establish a baseline prior to potential Project impacts.</p> <p>4. Provide an assessment of risk from methylmercury to ecological receptors due to changes in sulphate concentrations in effluent, and potential deposition of mercury from Project related atmospheric emissions in the receiving environment.</p> | <p><u>In response to the FIRT’s previous review, Denison provided responses to the following outstanding requests from ECCC:</u></p> <p><u>1. Update all tables to include missing data for mercury, aluminum, total suspended solids, iron, thallium, manganese, nitrate and phosphorus.</u></p> <p><u>2. Update tables to include predictions of total hardness concentrations (in mg/L CaCO3) in effluent and the receiving environment.</u></p> <p><u>3. Update tables to include acute water quality thresholds to ensure COPCs do not have the potential to be acutely lethal at the end-of-pipe.</u></p> <p><u>4. Ensure that all selected water quality thresholds are derived using baseline receiving environment concentrations and use water quality guidelines that are protective of aquatic biota.</u></p> <p><u>The Proponent has resolved item two and four of the above, but items one and three require additional follow up.</u></p> <p><u>The Proponent has responded fully to items two and four of the request.</u></p> <p>Regarding item one, further corrections to Table 8.2-13 are necessary:</p> <ul style="list-style-type: none">There are several inconsistencies in the footnotes:<ul style="list-style-type: none">numbers 2 & 3 are missing in the footnotes at the bottom;there is no reference to footnote 2 in the table; and | Not Accepted |

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| | | | | | <p>Mercury has been identified as a COPC of interest to Indigenous groups for the proposed Project. Table 8.2-8 indicates that background concentrations of mercury in LA-5 are low, and predicted effluent concentrations are also low. However, no information has been provided on background methylmercury concentrations or expected atmospheric deposition of mercury from Project related emissions. Predicted effluent concentrations of 3915 mg/L of sulphate are quite high, and sulphate is known to increase mercury methylation rates in aquatic environments.</p> <p>Rationale: A review of all modelling results for all COPCs under the MDMER will assist ECCC in understanding the potential risks to the receiving environment. ECCC recommends the use of the most stringent guidelines for the protection of aquatic biota. All water quality thresholds should be derived from receiving environment parameters to determine any baseline receiving environment and effluent COPC exceedances of water quality thresholds.</p> <p>Increased sulphate availability can lead to increased methylation rates of mercury and methylmercury in sediment and surface water. Methylmercury is a toxin that can bioaccumulate within the food chain and present risks to aquatic biota and wildlife consuming aquatic biota. Potential changes to methylmercury concentrations in water quality, sediment and fish tissues should be assessed due to the proposed sulphate loadings in effluent.</p> <p>Additionally, in accordance with the MDMERs, Denison will be required to demonstrate that their effluent quality meets the limits in the MDMER. Denison is expected to provide the predicted effluent quality for lead, nickel, and un-ionized ammonia to demonstrate compliance with the MDMERs.</p> | | <ul style="list-style-type: none">○ The asterisk “*”, which is sometimes used to qualify the source of screening concentration, is not defined.• Screening criteria are missing for aluminum and iron, and should be sourced from CCME or SEQG rather than the MDMER as listed in the table.• Uranium-234 and uranium-238 are missing from the table, even though they have been identified as contaminants of potential concern.• Proposed screening criteria for cobalt, copper, manganese, nickel, phosphorous and un-ionized ammonia are inadequate, see comment in IR-108 & IR-108-R1.• Alkalinity and nitrate have been added to the table as requested, however predicted maximum concentrations are only presented for Whitefish Lake Middle and South. The proponent should describe why there are no estimates for these parameters in other lakes, and how they intend to fill these gaps.• Un-ionized ammonia appears in two separate lines in the table with concentrations differing by 3-4 orders of magnitude and different screening values. A single line entry with accurate values should be retained. The Proponent should provide an explanation for the error in order to give the reviewer confidence that the correct values are retained.• The column with screening values does not always use the most conservative value from Table 8.2-8. See comment IR-115 for request to provide justifications. <p>Table 8.2-14 should be updated with corrections to screening criteria necessary for this IR as well as for IR-108 and IR-115. Additional follow up for Table 8.2-10 can be found under IR-108 and IR-108-R1.</p> <p>In the Proponent’s response to item three of the IR, Table 8.2-10 is missing the source for the short-term screening criteria value for arsenic. The Proponent should update Table 8.2-10 to include the source for the short-term screening criteria value for arsenic.</p> | |
| IR-115 | - | ECCC | Fish and fish habitat | Section 8.2.4.2.3 Aquatic Environment Appendix 10-A (ERA), Section 3.1.1.1 | <p>Context: Table 8.2-8 demonstrates baseline concentrations of COPCs in LA-5 South Whitefish Lake, their respective water quality guidelines from applicable sources, and proposed Project thresholds. General parameters such as temperature, pH, conductivity, etc. that would require Project thresholds and monitoring under the MDMER have not been provided in this table. Lead, nickel, Total Suspended Solids (TSS) and un-ionized ammonia were not provided, despite all being Schedule 4 substances with maximum monthly concentrations under the MDMER. Aluminum, iron, nitrate, thallium, and manganese have not been provided despite being required parameters under Schedule 5 Section 4 of the MDMER for effluent characterization. Water quality thresholds appear to have been calculated using estimated effluent concentrations rather than receiving environment baseline concentrations. The water quality objective selected for molybdenum is the 31 mg/L SEQG rather than the CCME guideline of 0.073 mg/L.</p> | <p>1. Update Table 8.2-8 to include all COPCs with required monitoring under the MDMER.</p> <p>2. Ensure all selected water quality thresholds are derived using baseline receiving environment concentrations and are at levels protective of aquatic life.</p> <p>3. Provide additional information to justify the use of the selected water quality guideline for molybdenum.</p> | Please see the response to IR-115-R1 (below). | Not Accepted |

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| | | | | | Rationale: ECCC recommends the use of guidelines that will ensure the protection of aquatic biota. All water quality thresholds should be derived from receiving environment parameters to determine any baseline receiving environment and effluent COPC exceedances of water quality thresholds. | | | |
| IR-115 | IR-115-R1 | ECCC | Fish and fish habitat | Section 8.2.4.2.3 Aquatic Environment Appendix 10-A (ERA), Section 3.1.1.1 IR-115 Response from Denison | <p>Context: In the Proponent’s response to item two, it is mentioned that the derived water quality thresholds used in Table 8.2-8 and in the assessment (Section 8.2.4.2.3, Aquatic Environment; Appendix 10-A (ERA), Section 3.1.1.1) are based on hardness concentrations found in effluent. The Proponent mentions that hardness derived from IWWTP discharge will consider IWWTP discharge on the receiving environment and provide “a reasonable estimate of expected hardness in effluent”. However, this does not consider induced hardness (i.e., hardness concentration increases in the receiving environment over the lifecycle of the Project) from effluent contributions as a Project effect; the receiving environment baseline concentrations of hardness have been altered due to inputs from Project effluent. Providing only one estimate of expected effluent hardness in the receiving environment is not an appropriate means of conducting the effects assessment.</p> <p>Additionally, the following COPCs have not been included in the updated table provided in the Proponent’s response: un-ionized ammonia, aluminum, iron, manganese, thallium and total dissolved solids (TDS). It is noted that these COPCs are also subject to monitoring requirements under the <i>Metal and Diamond Mining Effluent Regulations</i> (MDMER).</p> <p>Rationale: Background concentrations of un- ionized ammonia, aluminum, iron, thallium, manganese and TDS are required to determine potential effects to the environment. The Proponent will also require this information to satisfy their obligations under the MDMER.</p> <p>The purpose of the surface water quality assessment is to determine if changes to the receiving environment over the project lifecycle will have significant adverse effects on biota. Changes from baseline in hardness concentrations in the receiving environment due to the deposition of effluent is a Project related effect and therefore providing a single baseline water quality threshold which is applicable only to one set of conditions is not an appropriate method to evaluate impacts across a shifting hardness baseline.</p> | <p>1. Update Table 8.2-8 to include the following COPCs: un-ionized ammonia, aluminum, iron, manganese, thallium and total dissolved solids (TDS).</p> <p>2. Update Table 8.2-8 to include background concentrations of total hardness (in mg/L CaCO3) in the receiving environment.</p> <p>3. Provide rationale that all selected water quality thresholds are derived using baseline receiving environment concentrations and are at levels protective of aquatic life.</p> <p>See also related IR-108-R1</p> | <p>The Proponent has not fully responded to the previous round’s IR. For items one and two, some of the information provided on contaminants of potential concern (COPCs) and the background concentrations of hardness in the receiving environment is not sufficiently conservative. Item three requested rationale that all selected water quality thresholds (i.e., screening criteria) are at levels protective of aquatic life, which was not provided.</p> <p>The updated Table 8.2-8 provides two short-term and two long-term screening criteria for each parameter. The screening criteria reflect calculated screening criteria for both background hardness and project-induced hardness, however, it is unclear which criteria the Proponent intends to apply in their assessment since four separate criteria are provided (see IR-114).</p> <p>The information presented in Table 8.2-8 indicates there are no background water quality exceedances of guidelines. However, it is noted that several screening criteria do not reflect the most conservative guidelines, which is not consistent with the approach described in Appendix 10-A (Environmental Risk Assessment). For some examples, the short-term screening criteria value of 500 mg/L for nitrate is much higher than the BC MOE nitrate guideline of 32.8 mg/L., the long-term criteria for un-ionized ammonia of 6.87 mg/L is much higher than the CCME guideline of 0.019 mg/L and the MDMER limit, and the long-term phosphorus screening criteria represent a trigger range that is two to three trophic levels above background, which is much higher than the CCME guidance framework recommends. The Proponent should review and update Table 8.2-8 to provide conservative screening criteria for all parameters, and include a consideration of the CCME, FEQG, SEQG, and BC MOE when selecting the screening criteria. Screening criteria selection should be informed by the most conservative guidelines. Cases where the Proponent does not propose to apply the most conservative screening criteria should be accompanied with a discussion and rationale for the selection. The Proponent should also specifically state which criteria will be used in screening, how these criteria will be or are applied, how the EA conclusions are informed by the criteria, and whether any EA conclusions are altered by changes to screening criteria.</p> | Not Accepted |

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| | | | | | Water hardness is an environmental modifying factor, various concentrations of hardness influence the toxicity of other COPCs in the aquatic environment. Using water quality thresholds that have been derived from high effluent hardness concentrations will not be protective of aquatic biota, particularly in the early stages of the project lifecycle when receiving environment water quality will be similar to baseline water quality. | | | |
| IR-116 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.2.4.2.5, Section 8.4.4.2.5 and Section 8.5.4.2.3 | <p>Context: Tables 8.2-14, 8.4-9 and 8.5-5 demonstrate predicted mass flux (in mg/s) of COPCs in groundwater during the future centuries scenario. The table does not provide any information on actual surface water concentrations of COPCs or accumulation in concentrations over time. It is not possible to determine what the COPC concentrations in surface water and sediment will be during the future centuries scenario with the current information.</p> <p>Additionally, only a subset of parameters have been provided in this table based on parameters that were elevated in effluent after treatment. Groundwater may have a variety of different COPCs with elevated concentrations as it will migrate directly from the ore body area and not receive treatment.</p> <p>Rationale: It is not possible for ECCC to assess the predicted concentrations of COPCs in surface water and sediment, and therefore risk to aquatic biota during the future centuries scenario with the provided information.</p> | <p>1. Provide the predicted water and sediment quality concentrations of COPCs in the receiving environment for the future centuries scenario.</p> <p>2. Include data for a greater suite of COPCs that were assessed as having potential to be at elevated concentrations in groundwater.</p> | | Accepted |
| IR-117 | - | CNSC | Human health with respect to hazardous contaminants | Section 8.2.4, Table 8.2-9 | <p>Context: CNSC staff note that some of the effluent quality predictions in the EIS are quite high for a uranium mine and mill facility compared to the existing facilities.</p> <p>For example, the upper bound effluent quality of molybdenum is 2.5 mg/L. In 2021, the highest monthly mean concentration at the existing uranium mine and mill facilities is 0.213 mg/L.</p> <p>Also, the upper bound effluent quality of copper is 0.022 mg/L. In 2021, the highest monthly mean concentration at the existing uranium mine and mill facilities is 0.002 mg/L.</p> <p>Rationale: Surface water quality models should be based on the anticipated effluent quality. From discussions with Denison, it appears that the effluent quality predictions may change based on the results of more bench scale tests that are still being conducted and continued optimization of the design of the water treatment plant.</p> | <p>Please provide the anticipated effluent quality of the constituents of potential concern during normal operations.</p> <p>Once Denison has refined the effluent quality predictions, Denison is expected to update the inputs into the surface water quality model.</p> | | Accepted |
| IR-118 | - | ECCC | Change to an environmental component due | Section 8.2.6.1, Section 8.4.6.1 and Section 8.5.6.1, | <p>Context: It is unclear if Tables 8.2-16, 8.4-12, 8.5-7 and 8.5-8 take into consideration potential effects from groundwater seepages of COPCS to surface water and sediment quality in the future</p> | Provide further information regarding how groundwater seep. Of COPCs may have future impacts to surface water quality, | | Accepted |

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| | | | to hazardous contaminants | Aquatic Environment | centuries scenario. No information regarding the future centuries scenario has been provided in the rationale summary for ratings. Rationale: Groundwater seepage of COPCs may have future impacts to surface water quality, sediment quality and aquatic receptors; however, the extent of residual effects is unclear without further information. | sediment quality, and aquatic receptors, and any residual effects that may persist. | | |
| IR-119 | - | CNSC | Fish and fish habitat | Section 8.3.1.2, Table 8.3-1, Sediment quality | Context: Sediment quality isn’t considered a key indicator for fish and fish habitat, but the accumulation of contaminants in sediment porewater without habitat alteration is similar to the key indicator 'change in surface water quality from baseline conditions' that is considered. Rationale: It is not clear whether sediment was just considered for physical disturbance, and why chemical changes are missing from key indicator list for fish and fish habitat. | Please provide the rationale for exclusion of sediment quality from the key indicator list for fish and fish habitat. | | Accepted |
| IR-120 | - | CNSC | Aquatic species | Section 8.3.3 and 8.5, Aquatic Environment | Context: Although downstream impacts are not predicted by Denison it is important from an ecosystem perspective to establish baseline locations to monitor for potential cumulative effects to the aquatic environment due to the Key Lake and Wheeler River Operations to ensure the aquatic environment is being protected from cumulative impacts. Denison should consider adding a far-field exposure location and collecting baseline aquatic ecosystem baseline data in Russell Lake including: <ul style="list-style-type: none">• Water quality/chemistry• Sediment chemistry/quality• Benthic invertebrate chemistry /community• Large-bodied fish tissue/chemistry Rationale: Russell Lake is identified as part of the RSA for the aquatic environment, but it appears that no detailed aquatic baseline data was completed in far-field location in Russell Lake. In addition, several Indigenous Nations and communities and local resource users have indicated that Russell Lake is an important body of water both culturally for traditional use and was once used as commercial fishery. | If Denison has not collected baseline aquatic studies in the far-field downstream receiving environment of Russell Lake, please provide a rationale for why. If a far-field Russell Lake location was sampled as part of baseline data collection, more information about the process and results with regards to sampling at Russell Lake should be included in the EIS. This information would be valuable to help determine potential cumulative effects downstream in the Russell Lake drainage system (due to the Key Lake Operation) which has been identified as a key concern and area of interest by several Indigenous Nations and communities. | Response is accepted, but also see AD-51 in the Advice to Proponent table. | Accepted |
| IR-121 | - | CNSC | Fish and fish habitat | Section 8.3.3.1, Methodology and Metrics | Context: In the description of methodology for fish communities and spawning surveys, there’s no mention that could be found for an any evaluation of fish condition, other than sexual condition. Rationale: Exposure to other pre-existing stressors could result in abnormal conditions or deformation(s) in existing population, but the extent of existing conditions should be evaluated to ascertain | Please provide reference to where fish condition is considered or provide a justification for its exclusion. | Response is accepted, but also see AD-52 in the Advice to Proponent table. | Accepted |

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| | | | | | whether the rate is increasing as a result of proposed activities once in operation. | | | |
| IR-122 | - | CNSC | Fish and fish habitat | Section 8.3.8, Monitoring and Follow-up | <p>Context: Section 8.3.8 of the EIS states: “Changes in fish communities/populations will be assessed through comparison of Construction, Operation, and Decommissioning results to pre-development.”</p> <p>Rationale: Tracking changes in fish communities / populations in reference lakes over time should be conducted, as reference lakes can be used to differentiate natural temporal variation with potential project impacts.</p> | Please include reference lakes, and if it is provided, please reference where in the EIS these are discussed. If there are no reference lakes, these should be included in the monitoring program. | Response is accepted, but also see AD-53 in the Advice to Proponent table. | Accepted |
| IR-123 | - | ECCC | Change to an environmental component due to radiological contaminants | Section 8.4.3.2.3, Aquatic Environment Appendix 8-D, Table 3-5 | <p>Context: Table 8.4-3 provides a summary of the baseline concentrations of COPCs in sediments in the LSA. Sediment quality thresholds and justification for the selection of those thresholds have not been provided. Table 3-5 in Appendix 8-D does provide benchmarks but the selection of benchmarks is not discussed, and the most stringent guidelines are not used for some COPCs. Additionally, there is no data provided for sediment concentrations of mercury, which is a COPC that requires surface water quality monitoring and effluent characterization under the MDMER.</p> <p>Rationale: Further information should be provided regarding any exceedances of sediment quality thresholds in baseline concentrations of COPCs, which should be recommended for further assessment of risk due to effluent discharges.</p> | <p>1. Provide sediment quality thresholds and justification for the selection of those thresholds for comparison against measured baseline COPC concentrations in the LSA.</p> <p>2. Provide data on baseline concentrations of mercury in sediment.</p> <p>3. Identify any COPCs with baseline concentrations that exceed sediment quality thresholds in the LSA.</p> | | Accepted |
| IR-124 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.4.4.2.3, Aquatic Environment | <p>Context: Table 8.4-7 provides maximum concentrations of surface water COPCs in sediment. The following COPCs, which are required to evaluate the risk from effluent to sediment quality, were not evaluated:</p> <ol style="list-style-type: none">1. COPCs that have monitoring requirements in receiving environment surface water and effluent under the MDMER,2. COPCs that exceed water quality guidelines in effluent, and,3. COPCs that have baseline concentrations that exceed sediment quality thresholds in the receiving environment. <p>Rationale: Due to the lack of information on COPCs with baseline concentrations that exceed sediment quality guidelines, and COPCs that require monitoring under the MDMER, a determination on risk to sediment quality and aquatic biota cannot be made.</p> | <p>1. Provide the information on baseline exceedances of COPCs in sediment.</p> <p>2. Provide an assessment of risk for any COPCs that have baseline exceedances of sediment quality thresholds in the receiving environment.</p> <p>3. Provide an assessment of risk from any COPCs that require monitoring in the receiving environment and effluent under the MDMER. Please include any COPCs in effluent that will exceed water quality guidelines.</p> | <p>The Proponent has not fully responded to the previous round’s IR.</p> <p>The modeling of surface water and sediment COPC’s described in Appendix 10-A show results for the receiving waterbodies, but it is not clear how the results for the COPC concentrations for water quality and sediment quality calculated for each of the water bodies, shown in Figure 6-1 and 6-2 respectively, are being interpreted. The Proponent has not explained if these modeled values are based on the worst-case scenarios that account for environmental variables such as seasonal changes in hydrology and chemistry or if they have only accounted for changes in operational effluent discharge scenarios to consider the upper bound discharge rates. Additionally, it is unclear whether depositional areas for sediment were identified based on hydrological data. Additional information is also needed regarding baseline exceedances of sediment COPC thresholds and the associated risk assessment of mine operations on the receiving water body.</p> <p>The Proponent should consider maximum COPC scenarios for the receiving water bodies in baseline assessments and the risk assessment, including seasonal variability and sediment depositional areas to determine whether the baseline assessment and risk assessment fully considered the effects of the operations of the proposed mine. The Proponent should provide supplemental information to aid in determining if the environmental model has considered environmental variability such as seasonal changes in water levels, flows and sedimentation.</p> | Not Accepted |

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| | | | | | | | <p>The Proponent should also demonstrate that the model has considered a reasonable expected worst case scenario, such as a 100 year return.</p> <p>This IR is addressing quality of inputs (ex. baseline data, conservatism of scenarios modelled, environmental variability, etc.) in to modelling. This information is required to assess the conservatism of modelling the bounding conditions and potential for significant adverse effects to the environment.</p> | |
| IR-124 | IR-124-R1 | ECCC | Change to an environmental component due to hazardous contaminants | Section 8.4.4.2.3, Aquatic Environment IR-124 Response from Denison | <p>Context: In the Proponent’s response it is stated, “Schedule 5 parameters will be monitored as per the MDMER once under this regulation (i.e., meeting regulated criteria of discharge to the environment [50 m3/day). Please refer to Table 8.2-13 of attachment IR-114. In these cases, COPCs including Schedule 4 parameters were below screening criteria.”</p> <p>If concentrations of Schedule 5 parameters in effluent exceed water quality thresholds, these parameters are necessary for ECCC to examine in the risk assessment to determine the potential for effluent to be acutely lethal and for adverse effects to aquatic biota. These parameters will also be required to be characterized under Section 4, 5 and 7 of the MDMER. As per CSA N288.6-22 Section 7.2.5.2.1, “Screening of environmental concentrations of chemical and radiochemical substances released to the environment should be performed to identify COPCs for further evaluation in the risk assessment. Both measured concentrations and concentrations calculated from release rates may be used in the screening analysis. The screening concentrations should be compared to screening criteria, and chemicals that exceed screening criteria should be identified as COPCs.”</p> <p>As per CSA N288.6-22 Section 7.2.5.4.2, “If COPCs exceed the screening level for one medium, they should be carried forward into the EcoRA for all media that are likely to contribute to exposure. For example, for a given COPC, if a water screening benchmark is exceeded, the same COPC should be carried forward for sediment if its concentration was above the detection limit.”</p> <p>Additionally, updated Table 8.2-13 of attachment IR-114 has been found to be insufficient due to maximum concentrations in surface water for mercury, aluminum, total suspended solids, iron, thallium, manganese, nitrate and phosphorus being absent and the use of incorrect water quality thresholds.</p> <p>Rationale: Due to the lack of information on COPCs with concentrations that exceed water quality thresholds in effluent, a determination on risk to sediment quality and aquatic biota cannot be made.</p> | Provide an assessment of risk from any MDMER Schedule 5 parameters that are required to be characterized in effluent and in surface water quality in the receiving environment and that have effluent concentrations that will exceed water quality guidelines derived from environmental baseline conditions. | <p>The Proponent has not fully responded to the previous round’s IR. The modeling of surface water and sediment COPC’s described in Appendix 10-A, Figure 6-1 and 6-2 respectively shows results for the receiving waterbodies. However, it is unclear if these modeled values are based on the worst-case scenarios that account for environmental variables such as seasonal changes in hydrology and chemistry, or if they have only accounted for changes in operational effluent discharge scenarios to consider the upper bound discharge rates. The Proponent’s responses regarding baseline exceedances of COPC thresholds in the receiving waterbodies require additional information regarding environmental variability, including but not limited to seasonal changes in water levels, flows and sedimentation, in order to determine whether the model has considered environmental variability. The Proponent should also demonstrate that the model has fully considered a reasonably expected worst case scenario, such as a 100-year return period for the above variables.</p> <p>The Proponent should include a consideration of the maximum COPC scenario for the receiving water bodies in baseline assessments and the risk assessment, including seasonal variability and sediment depositional areas, to consider the effects of the operations of the proposed mine.</p> <p>This IR is addressing quality of inputs (ex. baseline data, conservatism of scenarios modelled, environmental variability, etc.) in to modelling. This information is required to assess the conservatism of modelling the bounding conditions and potential for significant adverse effects to the environment.</p> | Not Accepted |

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| IR-125 | - | CNSC | Fish and fish habitat | Section 8.5, Aquatic Environment and Fish health | <p>Context: Indigenous Knowledge studies and information collected in relation to the Project clearly identified the importance of water quality and fish health to local Indigenous peoples and is discussed throughout the Draft EIS. For example:</p> <ul style="list-style-type: none">“Russell is one lake where I commercially fish. How will this effluent impact the water quality, fish health? Will I be able to sell fish from here? If there is going to water” pollution, I just want to know” (19-LK-ERFNTrip-134.255) ““How are you going to protect the water quality? We are concerned about mercury in fish, other animals, etc. Is there mercury or arsenic in the uranium solution?” (p. 8-53) <p>Rationale: Several Indigenous Nations and communities and local resources users have indicated Russell Lake is an important body of water both culturally for traditional use and was used as commercial fishery in the past and from an aquatic ecosystem perspective.</p> | <p>One of the many mitigation measures mentioned throughout the aquatic environment section states:</p> <p>“Denison will work with the associated communities to develop and implement the Project-specific monitoring programs and a framework to share the results for the purpose of assessing the performance of the water management system.” (p.10-32)</p> <p>Has Denison considered the collection of additional baseline fish tissue species that are of importance to Indigenous Nations and communities and local cabin owners from Russell Lake? Assuming the species would be walleye (commercially and recreationally) and lake white whitefish that is traditionally an important species consumed.</p> <p>Please provide more information on the engagement to date on the development of the Surface Water Management Program and Monitoring program that Denison is developing and engagement to date with interested Indigenous Nations and communities in the region on fish and fish health.</p> | Response is accepted, but also see AD-51 in the Advice to Proponent table. | Accepted |
| IR-126 | - | ECCC | Aquatic species | Section 8.5.3 Appendix 10-A (ERA), Section 5.3.1.1.8 | <p>Context: The Proponent has used the US Environmental Protection Agency (US EPA) guidelines for the assessment of selenium fish tissue concentrations in Section 8.5.3 of the draft EIS and in the Environmental Risk Assessment (ERA) in Appendix 10-A (ERA) of Section 10.</p> <p>Rationale: ECCC’s Federal Environmental Quality Guidelines of 6.7 ug/g dry weight fish whole body tissue for selenium should be used, as it is more protective than the US EPA guidelines.</p> | <p>Update the selenium fish tissue assessment in the draft EIS and the Wheeler River ERA (Appendix 10-A (ERA) in Section 10) as needed using ECCC’s FEQG.</p> | <p>The Proponent did not compare their predictions for fish tissue selenium to the FEQGs in the ERA as requested. Furthermore, in their response the Proponent does not use available species-specific moisture content and conversion factors available for northern pike and lake whitefish when converting muscle selenium concentrations to whole-body selenium concentrations. This means that the Proponent’s prediction likely underestimates the selenium tissue concentrations in the fish. Consequently, the hazard quotients reported are lower than expected.</p> <p>Additionally, the method used by the Proponent to predict selenium concentrations in northern pike and lake whitefish does not appear to include dietary uptake and bioaccumulation of selenium, only direct contact with pore water and overlying water is considered (Table 5-5 in Appendix 10A; Section 2.2.2 of Appendix A to Appendix 10-A). Selenium uptake through the aquatic food web has been shown to result in bioaccumulation of selenium in aquatic-dependent wildlife and resulting in reproductive impairments and malformations (ECCC 2022). Dietary sources of selenium would typically be expected to be the main contribution to tissue concentrations of selenium compared to selenium uptake from water. In most situations, the conversion of inorganic selenium to organic selenium through uptake from water into periphyton/algae is the rate limiting step of selenium bioaccumulation into higher level organisms including benthic invertebrates and fish. This step is affected by many environmental parameters (e.g. temperature, substrate, lentic/lotic environment). Considering that the effluent discharge contains 42 ug/L selenium, consideration of dietary selenium is warranted.</p> <p>The Proponent should update the final EIS with the following information:</p> | Not Accepted |

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| | | | | | | | <ol style="list-style-type: none">Update the ERA with the assessment of selenium concentrations in fish tissue to include a comparison of selenium fish tissue concentrations to ECCC FEQG guidelines for either fish whole body tissue (6.7 ug/g dry weight) or fish egg/ovary tissue (14.7 ug/g dry weight) <u>using</u> species-specific moisture content and muscle : whole body and/or egg-ovary : muscle conversion factors (see Tables B-1b, Table B-3, Table B-4, and Table B-5 in US EPA (2021)).Update the ERA for the assessment of selenium concentrations in fish tissue using a method that considers dietary uptake and bioaccumulation in order to determine predicted fish tissue concentrations of selenium in northern pike and lake whitefish. This is recommended to be done over all Project phases for both the Expected Case and sensitivity scenarios. <p>Provide predicted fish tissue selenium concentrations that include the range of variability of data used to develop the tissue selenium predictions. Only one output value without a confidence interval is provided for each location and species (see Table B.5 in Appendix B of Appendix 10-A).</p> | |
| IR-127 | - | CNSC | Aquatic environment | Appendix 8-E, Section 1.2.1, Hydrological Inputs | <p>Context: Within this section it states that the 7Q10 low flow rate used in the mixing assessment “was provided verbally to Ecometrix by NewFields Canada during a project meeting on 26 April 2022”</p> <p>Rationale: The statement that this value was provided verbally is not an infallible method of communicating data, as the value could have been misheard, misremembered, or recorded improperly.</p> | Please verify that the 7Q10 value used in the assessment is the correct value determined by NewFields. | | Accepted |
| IR-128 | - | CNSC | Current use of lands and resources for traditional purposes | Section 9 Various pages in section 11.1, Land and Indigenous Resource Use Section 12 Section 14 | <p>Context: The increased road traffic (14-18 trucks per day during construction/operations) may have indirect impact on ungulates, furbearers and wood land caribou presence/absence for traditional and subsistence hunting have been raised to CNSC staff when meeting with Indigenous Nations and communities and are presented in the EIS.</p> <p>Rationale: The increased traffic and therefore dispersal of game (moose, woodland caribou) due to increased traffic has been raised as a concern with respect to increased mortality on wildlife and decreased ability to practice traditional rights.</p> | <p>How have the potential residual impacts with respect to increased traffic and noise (due to current and future operations) been communicated to Indigenous Nations and communities who use the road #914 for cultural and traditional activities (such as moose harvesting, berry picking and small game and birds)?</p> <p>Please provide any additional information on the engagement that has taken place to date with Indigenous Nations and communities with respect to concerns and potential impacts on current use of lands and resources due to increased road traffic, and any mitigation measures proposed by Indigenous Nations and communities to minimize the potential impacts.</p> | Response is accepted, but also see AD-54 in the Advice to Proponent table. | Accepted |
| IR-129 | - | CNSC | Current use of lands and resources for traditional purposes | Section 9 Section 10 Section 11, including Section 11.1.4.3.1 (p. 11-46) Section 12 Section 16 | <p>Context: ERFN indicated they are concerned about declining moose populations from an influx of hunters; more people may be accessing the area year after year, and worried populations may be affected by the Project (21-EN-ERFN-473.13).</p> <p>Further, the EIS highlights that: “Vehicle collisions are the most likely source of direct mortality for moose. Effective mitigation measures (e.g., breaks in snowbanks; speed limits; and exclusion</p> | <p>Please provide additional information on the discussions Denison has had with Indigenous Nations and communities on how to mitigate any residual project impacts on their traditional harvesting activities of large game such as moose.</p> <p>More information is required to determine if Denison has engaged directly with ERFN/KML and other Indigenous Nations who utilize the area to harvest moose to determine current baseline harvest numbers that provide subsistence, continued</p> | Response is accepted, but also see AD-62 in the Advice to Proponent table. | Accepted |

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| | | | | | <p>fencing around contaminated waste pads and ponds) will be implemented to reduce moose mortality.” (p. 11-46)</p> <p>Rationale: The Technical Guidance for Assessing the Current Use of Lands and Resources for Traditional Purposes under CEAA 2012 notes: “The views of affected Aboriginal groups on mitigation be considered and included in the EIS. This could assist in ensuring that the environmental effects on the current use of land and resources for traditional purposes are at an acceptable level for the community.”</p> <p>Sources for indirect moose mortality (e.g., increased hunter access, changes to health due to sensory disturbances, changes to predator-prey dynamics) may result in mortality outside the Wildlife LSA. The residual effect of change in moose mortality is likely to occur. Although mitigation measures are expected to reduce, but not fully eliminate, the residual effect on moose.</p> <p>The potential residual impact on the moose and other large game populations in the broader regional study area may potentially impact Indigenous treaty rights, culture, and community well-being if the harvesting of moose and large game declines due to increased traffic, noise, and vehicle mortality or increased outside hunting pressure.</p> | <p>cultural identity and community well-being, as well as discussions on how the Project could potentially impact moose populations and the harvesting of moose for traditional practices.</p> | | |
| IR-130 | - | H. Mulye | Physical stressors (noise and vibration) on wildlife | Section 9, Terrestrial Environment | <p>Context: Sensory disturbances such as noise have been identified as stressors for selected wildlife (Ungulates, Furbearers, and Woodland Caribou), birds and amphibians in the Project area. However, there is no consideration of impacts from vibrations on these species. Also, impacts of noise and vibration on reptiles have not been assessed in the Project area.</p> <p>Rationale: While noise has been qualitatively assessed for selected wildlife, birds, and amphibians, there is no consideration of project-related vibrations as a sensory disturbance/physical stressor. Sensitive terrestrial species (specifically, herpetofauna, amphibians, invertebrates, and caribou) can be impacted by vibrations emanating from the operation of heavy machinery, blasting activities, and other anthropogenic activities at the Project site.</p> <p>Also, impacts of physical stressors (noise and vibration) on reptiles were not assessed. These species should be included in this assessment due to their sensitivity to noise and vibrations.</p> | <p>Please provide a discussion of impacts of physical stressors (specifically vibrations) on wildlife, birds, and amphibians in the Project area. Specific mitigation measures and/or monitoring for impacts from project-related vibrations should be considered, as appropriate.</p> <p>Also, include reptiles in the assessment of project-related noise and vibrations as sensory disturbance/physical stressor, or a justification for their exclusion.</p> | | Accepted |
| IR-131 | - | ECCC | Migratory birds, Wildlife and Wildlife Habitat | Section 9, Terrestrial Environment | <p>Context and Rationale: As per the requirement outlined in Section 79 of the Species at Risk Act (SARA): <i>The person must identify the adverse effects of the project on the listed wildlife species and its critical habitat and, if the project is carried out, must ensure that</i></p> | <p>Identify all species at risk listed on Schedule 1 of the Species at Risk Act and their critical habitat that are likely to be affected by the Project and describe how they may be adversely affected by the Project. Describe what measures will be taken to avoid or</p> | | Accepted |

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| | | | | | <i>measures are taken to avoid or lessen those effects and to monitor them. The measures must be taken in a way that is consistent with any applicable recovery strategy and action plans. This is accomplished by ensuring that the Proponent has identified, avoided, lessened and will monitor effects to species at risk.</i> As per the CNSC’s Generic Guidelines for the Preparation of an EIS pursuant to the Canadian Environmental Assessment Act, 2012: <i>“The EIS will then describe mitigation measures that are specific to each environmental effect identified. Measures will be written as specific commitments that clearly describe how the Proponent intends to implement them and the environmental outcome the mitigation is designed to address. The EIS will describe mitigation measures in relation to species and/or critical habitat listed under the Species at Risk Act (SARA). These mitigation measures will be consistent with any SARA permit, applicable recovery strategy and/or action plan”.</i> The draft EIS neither lists the adverse effects to all listed schedule 1 SARA species, nor outlines the measures that will be taken to avoid or lessen these effects. The Proponent references that additional species-specific mitigations will be detailed in environmental management plans but has not provided those plans for review. | lessen the effects of each Project activity and stage, and how these effects will be monitored to ensure they are avoided or minimized. | | |
| IR-132 | - | ECCC | Wildlife and Wildlife habitat | Section 9, Terrestrial Environment | Context and Rationale: ECCC has identified that three species at risk arthropods (yellow banded bumble bee, transverse lady beetle, and nine-spotted lady beetle) have ranges overlapping the Project area and these were not mentioned in the draft EIS. | 1. Conduct an effects assessment for arthropod species at risk. 2. Explain what mitigation measures will be used to minimize potential effects. | | Accepted |
| IR-133 | - | ECCC | | Section 9, Terrestrial Environment | Context and Rationale: There is potential for some species at risk (e.g., myotis species, barn or bank swallows, common nighthawk) to be attracted to and use mine infrastructure (buildings, roads etc.) once constructed for nesting, roosting, or foraging. Details on mitigation measures and adaptive management with respect to attraction to Project components should be identified to assess residual and cumulative impacts to species at risk. | For all Project phases, describe the mitigation measures and adaptive management to prevent and minimize effects on species at risk that may utilize mine infrastructure. | | Accepted |
| IR-134 | - | ECCC | Wildlife and Wildlife habitat | Section 9, Terrestrial Environment | Context and Rationale: The draft EIS states in multiple places that vegetation clearing may occur year-round. In order to correspond with the timing of emergence from hibernation, tree clearing should not be conducted during the bat roosting period. If maternity roost trees are removed after pregnant females have established a roost area, there is a higher likelihood of abortion than there would be otherwise. Species-specific mitigations are required to protect bat SAR. | Provide important roosting dates for bat species at risk in the Project area. | The Proponent provided a complete response regarding the roosting dates for bat species at risk, however follow-up IRs are required. See follow-up IR-134-R1. | Accepted |

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| IR-134 | IR-134-R1 | ECCC | Wildlife and Wildlife habitat | Section 9, Terrestrial Environment | <p>Context: The Proponent has committed to conduct pre-construction and pre-clearing surveys for multiple species, however the timing and methods for the surveys were not provided. Knowing the survey methodology for pre-construction and pre-clearing for little brown myotis and northern myotis is important for assessing cumulative impacts, effectiveness of adaptive management strategies as well as determining how bat species were considered in the EIS.</p> <p>Rationale: ECCC can determine whether the methodology the Proponent will use to collect data is appropriate and if the methodology would contribute to a more complete understanding cumulative effects and adaptive management strategies.</p> <p>A clear outline of how timing has been considered and incorporated into the methodologies is required to understand how sensitive periods for bats, such as roosting, have been considered in the EIS. An understanding of the methodologies and how these sensitive periods are being considered is required to evaluate the effectiveness of mitigation strategies and adaptive management strategies which are being developed by the Proponent.</p> | The information provided by the Proponent regarding the roosting dates and potential habitat for bats is complete, however, the information related to the pre-construction and pre-clearing surveys is missing details on important habitat features for bat species at risk. As two Species at Risk Act (SARA) schedule 1 listed bat species, little brown myotis (Myotis lucifugus) and northern myotis (Myotis septentrionalis) have been identified in the Project area, effects need to be identified, avoided, lessened and monitored. | <p>The Proponent indicated that wildlife sweeps would be completed within a period of seven days prior to project activities. Wildlife sweeps will be conducted rather than conducting species-specific surveys focused on species at risk. Sweeps will be based on timing of the Project and related activities focused on identifying features such as hibernacula that may require mitigation.</p> <p>The Proponent also indicated that the methods associated with these sweeps will be tailored to species at risk (including bats) that may potentially be using the habitat.</p> <p>Species specific surveys are required to reliably identify rare species, such as species at risk, which may not be captured by more general wildlife sweeps. It remains unclear how the Proponent will complete wildlife sweeps, identify appropriate mitigation measures and implement those, or how these measures will be assessed for effectiveness.</p> <p>Information is outstanding on how surveys will be tailored to species at risk. ECCC recommendsIt is requested that the Proponent to provide information on the methods that will be used for tailored surveys to species at risk, including bats or for the Proponent to provide a discussion on why these methods cannot be developed as part of this review.</p> <p>For further clarity, Denison is expected to describe how the pre-construction and pre-clearing survey methods are targeted/tailored for each SAR, where surveys will be performed to address SAR habitat, and the approximate timing prior to disturbance along with appropriate scientific rationale. At a minimum, one paragraph must be provided for each SAR specifically addressing the items above.</p> <p>Also see: IR-142-159-167-R1</p> | Not Accepted |
| IR-135 | - | ECCC | Migratory birds, Wildlife and Wildlife Habitat | Section 9, Terrestrial Environment | <p>Context and Rationale: The mitigation measures for birds and wildlife presented in the draft EIS are very general. Additional detail is required for a complete assessment of residual and cumulative Project effects to birds and wildlife.</p> <p>The Proponent has committed to providing a number of plans including, a Decommissioning Plan, a Spill Response Plan, a Waste Management Plan, a Surface Water Monitoring Plan, a Remediation and Closure Plan, a Radiation Protection Plan, a Soil and Vegetation Monitoring Plan, a Wildlife Monitoring Plan, and a Woodland Caribou Management Plan. In order to assess potential affects to migratory birds and wildlife from Project related activities, ECCC requires details on species-specific mitigation measures, and monitoring plans.</p> | <p>The following information should be included in the various plans and should be provided for review during the environmental assessment:</p> <ol style="list-style-type: none">1. For all Project phases, describe the species-specific mitigation measures and responses to prevent and minimize effects on migratory birds or species at risk (SAR) birds and mammals that may utilize mine infrastructure.2. Explain how light pollution will be managed and what specific mitigation measures will be used to minimize effects to migratory birds and SAR birds and mammals.3. Provide details on what methods will be used for erosion control and how they will prevent sediment from entering waters frequented by migratory birds or SAR. Explain what actions will be taken if the erosion control measures are not successful. | | Accepted |

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| | | | | | | 4. Provide details on noise and other sensory disturbance monitoring and mitigations if noise levels surpass thresholds. 5. Describe time windows and species- specific mitigations related to maintenance activities such as vegetation management, road or building repair and stream crossing replacements. | | |
| IR-136 | - | CNSC | Soil Salvage Monitoring | Section 9.1.8.2 | <p>Context: The Proponent plans to salvage and stockpile soil and organic matter/peat in order to use it in reclamation activities during decommissioning. Periodic monitoring of the stockpiles is proposed to be conducted to verify that soil and organic matter/peat are delineated, stripped, handled, and stockpiled as recommended, and to evaluate the stability of salvaged soil, e.g., in relation to potential erosion and/or degradation. It is unclear whether monitoring includes soil quality in terms of concentrations of COPCs.</p> <p>Rationale: It is expected that project-related activities (road and airport traffic, drilling) can result in open-source (i.e., fugitive) dust and process-source dust (incl. radionuclides), which can accumulate and result in changes in soil quality of the stockpiled soil and organic matter/peat as described in Sections 9.1.4.2.2 and 9.1.4.2.3).</p> | Please clarify if COPC concentrations monitoring is planned to be performed for stockpiled soil and organic matter/peat. | | Accepted |
| IR-137 | - | ECCC | Migratory birds, Wildlife and Wildlife Habitat, Vegetation and Wetlands | <p>Section 9.2.1.3, Spatial and Temporal Boundaries for Vegetation and Ecosystems, Listed Plant Species and Wetlands</p> <p>Section 9.3.1.3.1, Spatial Boundaries for Ungulates, Furbearers and Woodland Caribou</p> <p>9.4.1.3.1, Spatial Boundaries for Raptors, Migratory Breeding Birds, and Bird Species at Risk</p> | <p>Context and Rationale: The CNSC’s Generic Guidelines for the Preparation of an EIS Pursuant to the Canadian Environmental Assessment Act, 2012 states that: “The EIS will describe the spatial boundaries, including local and regional study areas, for each VC to be used to assess the potential adverse environmental effects of the Project and provide a rationale for each boundary.</p> <p>Spatial boundaries will be defined taking into account the appropriate scale and spatial extent of potential environmental effects, community knowledge and Indigenous knowledge, current or traditional land and resource use by Indigenous groups, ecological, technical, social and cultural considerations.”</p> <p>The information provided in the EIS does not enable a biologically relevant assessment of the Project’s effects.</p> <p>The Proponent did not provide rationale for the selection of study areas for individual vegetation, wildlife or migratory bird valued components (VC). Different VCs may have different spatial boundaries for the LSA and/or RSA. For wildlife and bird VCs, the LSA is defined as a 1.7-km buffer from the Project area, and the RSA is defined as a 6.6-km buffer around the LSA. There is no information on how the spatial boundaries were derived.</p> | <p>Provide a biologically relevant rationale for the delineated study boundaries (LSA and RSA) for all different valued components. Include the following information:</p> <ul style="list-style-type: none">• Descriptions of how the RSA and LSA boundaries were derived for all VCs. <p>Specific to boreal caribou:</p> <p><u>Project Footprint:</u></p> <ul style="list-style-type: none">• Include a 500-m buffer of area of maximum physical disturbance to represent functional habitat loss for boreal caribou <p><u>LSA:</u></p> <ul style="list-style-type: none">• Include a description of how the LSA takes into account boreal caribou avoidance of disturbed areas, predator access to undisturbed areas, reduction in connectivity and sensory disturbance to individuals. <p><u>RSA:</u></p> <ul style="list-style-type: none">• Include a description of how the RSA used in the draft EIS is an accurate representation of the SK1 boreal caribou range; or | | Accepted |

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| | | | | | <p>Specific to Woodland Caribou, boreal population (hereafter referred to as boreal caribou):</p> <p><u>Project Footprint</u>: In a scientific assessment of critical habitat (Environment Canada, 2011) [1] ECCC demonstrated that the application of a 500-m buffer to mapped anthropogenic features best represents the combined effects of increased predation and avoidance on caribou population trends at the national scale. Adding a 500-m buffer to the Project footprint is required to represent functional habitat loss.</p> <p>The draft EIS does not appear to use a buffer for their Project area. The draft EIS (Section 9.3.1.3.1) states: “Project Area: the area within which the Project and all components/activities are located (i.e., the area of maximum physical disturbance). The Project Area covers 169.6 ha and is not VC-specific, but consistent throughout the EA.” (p. 9-168)</p> <p><u>LSA</u>: The defined LSA for boreal caribou has to consider avoidance of disturbed areas, predator access to undisturbed areas, reduction in connectivity and sensory disturbance. This required information is not detailed in the draft EIS.</p> <p>Adverse effects of Projects including predator and prey access to undisturbed areas, reduction in connectivity, and sensory disturbance to individual boreal caribou can vary and extend several kilometers depending on Project activities and ecological context. At minimum, the LSA should capture the above-mentioned effects.</p> <p>For boreal caribou, the Project footprint should be defined as the immediate area to be cleared, plus a 500-m buffer to represent functional habitat loss. Following this guidance, the LSA should be defined as a buffer of the Project footprint with the 500-m buffer.</p> <p><u>RSA</u>: The Amended Recovery Strategy for Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada states: <i>Mitigation of adverse effects from individual projects/activities will require a coordinated approach and management of cumulative effects within and among ranges. A cumulative effects assessment is essential to position the proposed project/activity in the context of all current and future development activities. The cumulative effects assessment will:</i></p> <ul style="list-style-type: none">• <i>Assess the impact of all disturbances (anthropogenic and natural) at the range-scale;</i>• <i>Monitor habitat conditions, including the amount of current disturbed and undisturbed habitat, and amount of habitat being restored;</i> | <ul style="list-style-type: none">• Re-do the assessment with the RSA at the scale of the range <p>See also related IRs: IR-154 and IR-156.</p> | | |

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| | | | | | <ul style="list-style-type: none">Account for planned disturbances; andAssess the distribution of disturbance in large ranges for risk of range retraction in parts of the range. <p>The proposed Project’s cumulative effects for boreal caribou are possible at the scale of the SK1 boreal caribou range. The RSA used for boreal caribou for this Project is only 40,173.6 ha, compared to the SK1 range, which is 18,034,870 ha. As such, it is too small to capture cumulative effects to this species and does not follow the Scientific Assessment to Support the Identification of Critical Habitat for Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada (Environment Canada, 2011) or the Amended Recovery Strategy for Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada.</p> <p>Reference: [1] Scientific Assessment to Support the Identification of Critical Habitat for Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada (Environment Canada, 2011).</p> | | | |
| IR-138 | - | CNSC | COPC in Lichen | Section 9.2.4.2.2 Appendix 10-A (ERA) | <p>Context: A quantitative assessment using modelling dispersion and uptake of COPCs in the environment was completed for the Project as part of the ERA, to support conclusions drawn in the EIS. In Appendix 10-A (ERA), COPCs in plant tissue was estimated for lichen. Table 5-5 of the ERA (p. 5.24) named “Complete Exposure Pathways for All Selected Ecological Receptors to be Assessed using the IMPACT Model” lists the exposure pathway for lichen as direct contact on soil.</p> <p>Rationale: Airborne COPC can deposition on lichen and subsequently enter the food chain; therefore, the “contact with air” pathway should be considered. In fact, lichen species are frequently used to monitor the deposition and accumulation of airborne contaminants (e.g., dust, metals). It is also noted that based on sampling results of the 2017 baseline studies, lichen frequently contain higher concentrations of COPC than blueberry (compare Table 9.2-6 and Table 9.2-7 in the EIS), especially at sampling sites with elevated concentrations (e.g., RSV9 and RSV10).</p> | <p>Please include the exposure pathway of direct deposition (dry and wet) of airborne contaminants on lichen in the quantitative ERA, or justify why this exposure pathway was not considered.</p> <p>See also related: IR-189.</p> | | Accepted |
| IR-139 | - | ECCC | Change to an environmental component due to hazardous contaminants | Section 9.2.5.2.7, Waste and Hazardous Materials Management | <p>Context: In this section, the Proponent outlines various measures to mitigate air emissions, including implementation of the air quality programs within the Environmental Management System, regular maintenance and inspection of equipment, and elimination of unnecessary idling of equipment. However, the intention to use industry-standard emission control systems has not been substantiated.</p> | <p>Confirm if vehicles and equipment will be equipped with Tier 4 engines where feasible.</p> | <p>Response is accepted, but also see AD-55 in the Advice to Proponent table.</p> | Accepted |

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| | | | | | Rationale: For the protection of air quality, it is important to specify the emission standards that equipment will have (e.g., Tier 3 or Tier 4 engines). Vehicles and equipment with Tier 4 engines have much lower emissions of contaminants than those with Tier 3 engines. If non-Tier 4 engines are used, ECCC recommends that best management practices are followed, including proper maintenance of the engine and anti-idling measures. | | | |
| IR-140 | - | CNSC | Change in the Areal Extent of Wetlands | Section 9.2.6.4 | Context: Predicted residual effects on the areal extent of wetlands include the direct effect of loss of wetlands and several indirect effects of alteration of wetlands. As stated in the EIS, wetlands can exhibit low resilience and high susceptibility to disturbance. At the same time, wetlands tend to support a high species diversity, and are considered to have a moderate to high potential to support listed plant species. Lastly, wetlands are rare on the landscape compared to terrestrial ecosites (see Table 9.2-5). Rationale: Several wetland ecosites (BS19/24, BS25, BS27) occur only in small areas (< 30 ha) in the RSA but are predicted to experience disturbance of 6-64%, most notably the ecosite BS19/24 where 0.8 of 1.2 ha are predicted to be disturbed. It is noted that wetlands are scattered throughout the landscape as shown in Figure 9.2-8. More information is requested regarding the ecological impact of this disturbance. | 1. Please provide a discussion on the ecological impact of disturbance to rare wetland ecosites. 2. Please provide information on whether adequate other habitat is available for species impacted in these disturbed sites in close proximity, taking into account the home ranges of susceptible species. 3. Please provide additional information on whether wetland connectivity is maintained through the landscape within the LSA/RSA. See also related: IR-141. Suggestions for mitigation and follow-up measures: CNSC recommends that Denison conduct monitoring of species present in wetlands before and after disturbance, with a focus on listed plant species. | | Accepted |
| IR-141 | - | ECCC | Wetlands | Section 9.2.6.4.1 | Context and Rationale: The Proponent states that: “Direct loss of wetlands has been mitigated by reducing the size of the Project Area to the extent practicable during Project design. However, up to 0.5 ha (less than 0.1%) of all wetlands within the Terrestrial RSA are anticipated to be removed from the Project Area during Construction (Table 9.2-16).” Information is not provided on whether wetlands in the terrestrial RSA are considered ecologically, economically or socially important to the region. Information on the regional importance of the wetlands that will be lost is needed in order to assess effects, including a wetland compensation plan if the wetlands are considered regionally important. | 1. Provide information that accounts for whether wetlands are considered ecologically, economically and socially important to the region. 2. If the above is affirmative provide a wetland compensation plan to offset the loss. Consistent with the Operational Framework For Use of Conservation Allowance [1] a minimum ratio of 2:1 should be the starting point when determining the amount to be offset. [1] Available at : https://publications.gc.ca/site/eng/9.696852/publication.html See also related: IR-138. | | Accepted |
| IR-142 | - | ECCC CNSC | Wildlife and Wildlife habitat | Section 9.3.3.2.1 Scientific Literature Review – Wolverine Section 9.3.5 Mitigation Measures | Context: The Proponent did not conduct any field work to identify potential wolverine dens in the Project area and therefore did not present any mitigations for the potential impacts to wolverine dens. In Section 9.3.3.2.1, the Proponent states: “Denning females are | 1. Please provide additional information on whether the lost and/or altered wolverine habitat overlaps with wolverine home ranges. | The information provided by the Proponent is complete, however, a follow up IR regarding survey methods for all pre-construction and pre-clearing surveys is required. See follow-up IR-142-159-167. | Accepted |

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| | | | | Section 9.3.6 Residual Effects Evaluation | <p>sensitive to disturbance during denning season in February to April and may abandon their dens and, in some cases, their litter, which may decrease their reproductive success. “</p> <p>In Section 9.3.6, the Proponent states: “In the Project Area, 145.0 ha or 100% of available wolverine habitat is assumed to be removed and will not be available to wolverine for the duration of the Project (Table 9.3-13). Similarly, 145.0 ha (3.4%) of available wolverine habitat within the Wildlife LSA is anticipated to be removed, all from the Project Area, during site clearing in Construction. In the Terrestrial RSA, up to 0.5% (145.0 ha; from the Project Area) of available wolverine habitat is anticipated to be removed during site clearing in Construction.”</p> <p>The residual effect assessment estimates that 8.2% of available wolverine habitat within the Terrestrial RSA may be altered or lost (Table 9.3-20).</p> <p>Rationale: As Wolverine is a Species at Risk Act Schedule 1 listed species, effects need to be identified, avoided, lessened and monitored. Mitigations, such as setback distances, should be used to protect important habitat features, such as dens.</p> <p>Wolverine occupy large home ranges and, therefore, need vast tracts of undisturbed land to maintain viable populations. The species avoids most human footprint types and linear features.</p> | <p>2. Describe any important wolverine habitat feature (i.e., dens) that may be lost as a result of the Project.</p> <p>3. Assess the need for pre- construction/pre-clearing surveys to identify any wolverine denning sites.</p> <p>4. Please provide additional information on whether the remaining, available, undisturbed wolverine habitat size is suitable to maintain populations.</p> | | |
| IR-142 IR-159 IR-167 | IR-142-159-167-R1 | ECCC | Wildlife and Wildlife Habitat | <p>Reference to EIS: Section 9.3.3.3, Baseline Studies Section 9.3.5 Mitigation Measures</p> <p>IR 142, 159, and 167 Responses from Denison</p> | <p>Context: The Proponent has committed to conduct pre-construction and pre-clearing surveys for multiple species, however the timing and methods for the surveys were not provided.</p> <p>Rationale: Knowing the survey methodology for pre-construction and pre-clearing surveys across multiple species is important because the Proponent is intending to collect data so that ECCC can determine whether the methodology used to collect the data is appropriate and if the methodology would contribute to understanding cumulative effects and adaptive management. Understanding how timing has been considered and incorporated into the methodologies is required to understand how sensitive periods, such as nesting, breeding, foraging and migration, have been considered in the EIS. An understanding of the methodologies and how these sensitive periods are being considered is required to evaluate the effectiveness of mitigation strategies and adaptive management being developed by the Proponent for each species mentioned in IR-142, IR-159 and IR-167.</p> | Provide survey methodology and timing for all preconstruction and pre-clearing surveys, including avian and species at risk surveys (caribou, wolverine). | <p>The Proponent notes that:</p> <ul style="list-style-type: none">• Site clearing and other works that involve disturbance of vegetation and/or soil will be completed in winter.• Pre-disturbance wildlife sweeps would be conducted by qualified biologists at least seven days prior to any scheduled vegetation/land disturbance.• Mitigation measures to avoid or minimize adverse effects on identified features are not species specific.• The methods associated with these pre-construction and pre-clearing sweeps will be tailored to species at risk that may potentially be using habitats at certain times of the year.• Methods will include searching for potential roost trees for bat species, as per protocols included in the Wildlife Habitat Features Field Guide (BC Ministry of Environment and Climate Change Strategy, Ecosystems Branch 2019). If sensitive features are found, then they will be documented, and data collected would inform the development and implementation of appropriate mitigation measures. <p>It is unclear what is meant by “surveys are not species-specific” but sweeps will be “tailored to the species at risk”. It is also unclear how mitigation measures will be developed and implemented in a seven-day period.</p> | Not Accepted |

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| | | | | | | | <p>In order for ECCC and CNSC to provide advice on potential effects to SAR based on the habitat potential mapping, the development of species-specific mitigation measures needs to be produced for review during this assessment process. The Proponent also needs to provide details on follow up and monitoring programs that are in place to confirm that the mitigation measures implemented are effective.</p> <p>In addition, ongoing monitoring is required for SAR. Denison is expected to describe the planned monitoring and follow-up programs for SAR. Denison must justify how the proposed methods are adequate to provide a baseline for each SAR, to verify that mitigation measures are effective, and to allow for statistically robust comparison to assess potential impacts on SAR over the lifecycle of the project.</p> | |
| IR-143 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.3.3, Baseline Studies | <p>Context and Rationale: The baseline caribou data is insufficient to understand potential Project impacts to this species. Presence/absence detection was provided by camera traps, incidental observations, winter track and pellet survey.</p> <p>Additional information and analyses on caribou use of the landscape during all life stages of the Project area is required to assess impacts and to determine significance of impact from the Project to caribou.</p> | <p>Provide details on the baseline caribou data including:</p> <ul style="list-style-type: none">• Revision of map 9.3-8 to include all observations, categorized by type, season and year (see also IR-145); and• Description of seasonal use of the LSA, RSA and caribou range.• Description of Project areas used by caribou.• Description of future studies planned to assess habitat use by caribou. Include specific details on how many additional years of aerial surveys will be completed to assess the caribou baseline conditions. <p>Utilizing additional data noted above and specified in IR-145, explain how caribou use of the area could be affected by the Project throughout all seasons and life stages (e.g., calving, post-calving, rutting, wintering).</p> <p>See also related: IR-152.</p> | | Accepted |
| IR-144 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.3.3, Baseline Studies – map 9.3-8 | <p>Context and Rationale: The mapping of caribou observations during baseline studies provided in Figure 9.3-8, “Caribou Sign Observations in the Wildlife Study Areas,” is insufficient to enable conclusions to be drawn. ECCC is not able to review the spatial aspect of caribou observations without a map of all available observations. Additional information is available, as stated in Section 9.3.3.3.3:</p> <p><i>“A total of 200 observations were made between 2017 and 2019 and recorded as either caribou sign (i.e., tracks, pellets, and evidence of feeding activity based on ground feeding craters and arboreal feeding evidence) or photographs (collected through the wildlife camera study) to document caribou presence in the LSA and RSA. Most observations occurred in the Terrestrial RSA, with observations concentrated in the north and southeast portions.</i></p> <p><i>Three observations occurred in the southeast portion of the Wildlife LSA, and no caribou sign was observed in the Project Area. Figure</i></p> | <p>Update map 9.3-8 to show all caribou observations during baseline studies, broken down by type of observation (camera, incidental, pellet, track) and season/year when the observation was made. Include additional data from the Province of Saskatchewan (see also IR-145) to help characterize caribou use on a spatial map.</p> | | Accepted |

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| | | | | | <i>9.3-8 provides an overview of some caribou sign observed during the baseline studies.”</i> | | | |
| IR-145 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.3.3, Woodland Caribou | <p>Context and Rationale: The Proponent has not provided sufficient information on how caribou use the landscape, including identification of areas for different life stages of caribou (calving, post-calving, rutting and wintering).</p> <p>The University of Saskatchewan published a report entitled Population and habitat ecology of boreal caribou and their predators in the Saskatchewan Boreal Shield. This report contains information on habitat types that are used during different life stages. Additionally, Appendix H of the Amended Recovery Strategy for the Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada 20202 [1] details habitat characteristics required by boreal caribou to carry out life processes necessary for survival and recovery.</p> <p>The scientific literature review (Section 9.3.3.3.1) on Woodland Caribou states: “While calving areas have not been documented within the SK1 range, it is recognized that caribou may use open fen and treed bog habitat types for calving during the spring/summer period. In Saskatchewan, caribou habitat used during the calving season in the SK2 range demonstrated a strong selection for treed muskegs, but avoidance of jack pine, mixed hardwood stands, and roads (Dyke 2008).”</p> <p>ECCC is not able to verify the Proponent’s effects assessment without sufficient information on important habitat or biophysical attributes for caribou within the study areas.</p> <p>[1] https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/recovery-strategies/woodland-caribou-boreal-2020.html#toc0</p> | <p>1. Provide, based off existing literature or available data and the Amended Recovery Strategy for Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada:</p> <ul style="list-style-type: none">information on known important habitat features or biophysical attributes in Project areas for different caribou life stages (calving, post-calving, rutting, wintering),a map(s) of the type and spatial extent of important caribou habitat features or biophysical attributes of the study areas as defined in Appendix H of the Recovery Strategy,<ul style="list-style-type: none">mapping should be at the RSA/LSA level as well as larger-scale mapping at the scale of the Project footprint. <p>2. Assess the potential direct and indirect effects based on additional information on caribou from bullet A above.</p> <p>See also related IRs: IR-143 and IR-152.</p> <p>Suggestions for mitigation and follow-up measures: ECCC recommends that the Proponent contact the Province of Saskatchewan to enquire about obtaining caribou telemetry data in the Project area. The data can be analyzed to determine important habitat features in the Project area.</p> | | Accepted |
| IR-143 IR-144 | IR-143-144-R1 | ECCC | Wildlife and Wildlife Habitat | Section 9.3.3.3, Baseline Studies IR-143 and 144 Responses from Denison | <p>Context: In the IR-143 response, the Proponent states: “As described in the EIS, caribou may use open fen and treed bog habitat types for calving during the spring/summer period. Information from Indigenous Knowledge (IK) was included in the EIS, including potential calving areas in the Terrestrial RSA.” The Proponent provided a revised Map 9.3-8 to display these features.</p> <p>Rationale: While the revised Map 9.3-8 shows seasonal use, it is challenging to see the overlapping spatial and temporal features. The map is not adequate for fully understanding the seasonality of the data. The scale provided does not allow for a proper assessment of seasonal use, including differentiation of habitat use such as calving, movement or wintering habitats.</p> | Provide individual maps by season and survey type or with larger scale insets that show areas with overlapping spatial and temporal features. | | Accepted |

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| | | | | | Some habitats, based on use, may be more used for more critical functions than others and this information cannot be adequately assessed based on the information provided. | | | |
| IR-143 IR-145 | IR-143-145-R1 | ECCC | Wildlife and Wildlife Habitat | Section 9.3.3.3, Baseline Studies IR-143 and 145 Responses from Denison | <p>Context: Information presented on boreal caribou in the study areas in the Proponent’s response is insufficient to:</p> <ul style="list-style-type: none">• characterize and determine the risk of Project impacts,• and• calculate the appropriate level of offsetting required. <p>Information on important habitat features and how caribou are using the landscape is required to complete an assessment of the Project impacts.</p> <p>Although the Proponent provided a map showing telemetry points (provided by the Province of Saskatchewan), the map lacked sufficient detail to assess habitat use and important biophysical features of the Project area.</p> <p>The IR-145 response states: “Available habitat was determined as the ecosites in which caribou / caribou sign were detected most frequently during the baseline studies, and the EIS used a precautionary approach by assuming caribou use of these areas during all seasons and life stages.” As a part of the analysis, calving areas are particularly important to delineate if information is available as a key part of all life stages.</p> <p>In the draft EIS, the habitat types that are considered non-habitat for caribou are open bogs (BS20), leatherleaf shrubby fens (BS22), graminoid fens (BS24), open fens (BS25), rush sandy shorelines (BS26), sedge sandy shorelines (BS27) and waterbodies.</p> <p>Rationale: Woodland caribou are known to use treed bog and open fen (Section 9.3.3.3.1 of the draft EIS), however open fens and bogs are excluded from the identified available Woodland Caribou habitat, based on not detecting presence or not detecting presence as frequently.</p> <p>Mapping of important caribou habitat features is required to assess important potential impacts to caribou. In the absence of telemetry data, mapping of habitat quality, based on a combination of known ecosites and known important biophysical features will provide a reasonable alternative where known important caribou habitat features cannot be mapped.</p> | <p>1. Provide maps at the Project Development Area (PDA)/Local Study Area (LSA)/Regional Study Area (RSA) scale showing caribou habitat quality.</p> <p>2. Provide maps at the PDA/LSA/RSA scale showing areas with the appropriate biophysical attributes for calving and other life stages, such as important wintering habitats and movement corridors.</p> <p>Indicate the source of telemetry data (i.e., University of Saskatchewan and/or the Province of Saskatchewan).</p> | | Accepted |

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| IR-146 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.3.3.1, Woodland Caribou, Scientific Literature Review - Predation | <p>Context and Rationale: The information on impacts of predation and apparent competition for caribou in relation to the proposed Project are insufficient.</p> <p>In the section on caribou predators (9.3.3.3.1), the Proponent provided details on densities of wolves and their overlap with caribou and speaks of apparent competition. The Proponent did not examine other predators, such as black bear.</p> <p>The analysis on impacts of predation and apparent competition is insufficient since known predators have been omitted without explanation from the assessment of effects. ECCC is not able to verify the Proponent’s effects assessment since important species have not been considered in the assessment.</p> | Provide further information and analyses on all potential predators of caribou, including impacts from apparent competition. | | Accepted |
| IR-147 | - | ECCC | SAR – Boreal Caribou | Section 9.3.4.2.1, Alteration and/or Loss of Habitat | <p>Context and Rationale: The process of in-situ recovery mining will likely create changes to the surface topography and potential ground subsidence as well as changes to groundwater elevations. These changes can affect the plant communities and ecosite types.</p> <p>In Section 9.3.4.2.1 the Proponent states that: “Following decommissioning and reclamation, wildlife habitat is expected to recover to baseline conditions.”</p> <p>A more thorough explanation regarding post-decommissioning landscape is required to assess Project impacts.</p> | <p>1. Provide further rationale and/or analysis regarding the return of wildlife habitat to baseline conditions post- decommissioning. Incorporate other environmental impacts including:</p> <ul style="list-style-type: none">• Ground subsidence and impacts on wildlife habitat• Changes to aquifers and impacts on wildlife habitat <p>2. Describe reclamation activities/measures, including temporal information that will be implemented to help in the recovery to baseline conditions.</p> | | Accepted |
| IR-148 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.4.2.1, Alteration and/or Loss of Habitat | <p>Context and Rationale: ECCC analyzes disturbance for caribou at the range level, in this case within the SK1 range. However, the Proponent did not provide an adequate assessment of total disturbance at the range level. The draft EIS (Section 9.3.4.2.1 p. 9-211) reads: “The SK1 Boreal Shield Woodland Caribou Management Unit has relatively low levels of anthropogenic disturbance and was exposed to large fire disturbances in the past 40 years (ECCC 2019). Environment and Climate Change Canada (2019) identified this caribou population as being self-sustaining at a threshold of 40% undisturbed habitat with the total anthropogenic disturbance not exceeding 5% of their habitat. The current anthropogenic disturbance levels (without areas burnt by past forest fires) for the study areas are below this threshold (with the exception of the already disturbed Project Area) and are estimated as: 24.8 ha (14.6%) for the Project Area, 168 ha (3.5%) for the Wildlife LSA, and 599 ha (1.5%) for the Terrestrial RSA.”</p> <p>Analysis of habitat disturbance should be calculated at the range level in order to assess impacts and determine significance.</p> <p>Analysis should be consistent with the methodology described in</p> | <p>Provide the following in order to support analysis of habitat disturbance:</p> <ol style="list-style-type: none">1. Calculation of total disturbance including natural and anthropogenic disturbance at the range level.2. Description of effects on existing habitat at the scale of the range (for < 40% undisturbed habitat in the SK1). Include:<ul style="list-style-type: none">• an account (and GIS file if available) of existing habitat affected, using the following formula: (Project footprint + 500m buffer) – overlapping (permanent alteration(s) + 500m buffer)3. A map of the SK1 range showing all disturbed and undisturbed habitat, including predicted disturbance (direct and indirect) resulting from the Project.4. Description of whether the Project is expected to compromise the ability of the range to be restored to the undisturbed habitat threshold, and provide a rationale for the conclusion. <p>See also related: IR-154.</p> | | Accepted |

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| | | | | | the document Scientific Assessment to Support the Identification of Critical Habitat for Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada (Environment Canada, 2011) [1]. [1] https://publications.gc.ca/site/eng/401605/publication.html , p. 28/41 | | | |
| IR-149 | - | ECCC CNSC | Wildlife and Wildlife habitat | Section 9.3.5.2, Additional Wildlife-specific Mitigation Measures | <p>Context: The EIS describes that ongoing research is performed to inform the development of a Woodland Caribou Management Plan. This includes studies on the effectiveness of linear disruption features on predator/prey movements, and a field program for long-term reclamation planning. Moreover, it is stated that the Plan will include a detailed assessment of the need for habitat offsets.</p> <p>The draft EIS Section 9.3.5.2 states: “A wildlife monitoring plan and a Woodland Caribou Management Plan will be developed to address wildlife-specific mitigation measures based on proven and accepted mitigation following standard industry guidelines and BMPs. The plans will provide guidance to avoid or minimize potential adverse effects of the Project on wildlife and wildlife habitat, including monitoring and follow-up programs, as appropriate. It will be in place during all phases of the Project and will be subject to ongoing review and revision as required. If monitoring identifies a need for additional or revised mitigation measures, a process of adaptive management (as described in the plan) will be triggered.”</p> <p>Rationale: The draft EIS does not present sufficient species-specific mitigation measures for boreal caribou. ECCC is not able to assess potential residual impacts to caribou without specific mitigations.</p> <p>Since the Woodland Caribou Management Plan is still under development, it is difficult to judge whether the measures will be adequate to mitigate and/or offset potential project effects on Woodland caribou and its critical habitat.</p> | <p>Provide the Woodland Caribou Management Plan, to demonstrate effective mitigation of potential project effects, along with wildlife-specific mitigation measures for review.</p> <p>The Plan should be informed by and consistent with the Boreal Caribou Recovery Strategy and demonstrate that avoidance and minimization measures will be applied to mitigate for predicted Project effects to boreal caribou and its critical habitat prior to considering offsetting measures. That is, the Plan should follow the mitigation hierarchy and information should be provided as outlined below:</p> <ol style="list-style-type: none">1. AVOID: Describe all measures that will be taken to avoid effects to boreal caribou and avoid the destruction or alteration boreal caribou critical habitat.2. MINIMIZE: Describe all measures that will be taken to minimize the effects to boreal caribou and minimize the destruction of boreal caribou critical habitat.3. RESTORE ON-SITE: describe the measures that will be taken to restore disturbed areas of the Project, related to construction, operation and maintenance, on boreal caribou critical habitat, remaining after considering the avoidance and minimization measures.4. Characterize the risk of the adverse effects that are likely to result from the Project on boreal caribou and its critical habitat after avoidance minimization, and onsite restoration measures have been considered.5. OFFSET: Describe the measures that will be implemented outside the Designated Project area to mitigate adverse effects, destruction or alteration of boreal caribou critical habitat by the Designated Project during construction and operation.6. Characterize the risk of the adverse effects that are likely to result from the Project on boreal caribou and its critical habitat after avoidance, minimization, onsite restoration, and offset measures have been considered. <p>Describe all relevant uncertainties on the effectiveness of the measures to address adverse effects on boreal caribou and the rationale for the selected measure, in light of the mitigation hierarchy.</p> | <p>Note to Denison: This would be accepted if Denison is able to make a commitment as noted below. The proposed path forward on this IR is to develop a commitment to be added to Denison’s Commitment Register, related to Denison’s offsetting plan meeting the objectives of the province’s Caribou, Boreal recovery strategy. The language around this is still in discussion, and the text in draft.</p> <p>Current Rationale: The IR has not been fully resolved. The Proponent has updated Appendix 9-F to link caribou data, habitat/ecosite data and habitat suitability in its analysis which remain unchanged from conclusions provided in the EIS and has committed to monitoring using remote cameras for presence of caribou within the Project Footprint and within the Terrestrial RSA as part of the Environmental Management System. However, the Caribou Management Framework is still lacking the requested information on the amount of offset required to mitigate effects to caribou. Without the intended outcomes of the offsetting plan, there remains uncertainty regarding whether effects are adequately addressed in a manner that is consistent with the species Recovery Strategy. Additionally, the generic mitigation measures have not been updated to include factors, such as sensory disturbances, during important life stages.</p> <p>In order for ECCC and CNSC to provide additional technical advice on potential impacts to caribou, the Proponent would need to provide the previously requested information on the amount of habitat required to mitigate the adverse effects to caribou resulting from the Project and update the mitigation measures to include factors, such as sensory disturbances, during important life stages.</p> <p><u>Given that ECCC and CNSC understand that the Province of Saskatchewan and ECCC’s Canadian Wildlife Service are in communication on the Denison’s caribou management plans, and the province’s offsetting plan is underway, if Denison are willing to add a commitment to the Commitments Register, this IR could be resolved. The commitment text would include the commitment that “Denison’s offsetting plan will meet the objectives of the Recovery Strategy for the Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal population, in Canada.”</u></p> <p><u>Proposed rationale text for posting: Denison has captured their commitment related to caribou management and offsetting in the Commitments Register, so this IR has been accepted.</u></p> | <u>Accepted</u> |

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| | | | | | | See also related IRs: IR-157. | | |
| IR-149 | IR-149-R1A | ECCC | Wildlife and Wildlife Habitat | Section 9.3.5.2, Additional Wildlife specific Mitigation Measures Proponent response to IR-149 IR-149 Response by Denison | <p>Context: Much of the information presented in the Conceptual Caribou Management Plan is qualitative in nature and does not present specific details regarding a quantitative assessment of impacts following measures to avoid, minimize, and restore on-site and then assess residual effects and determine the offset required to counterbalance the remaining impacts. This is required to understand if offsetting is sufficient to address impacts to caribou. The Proponent also does not provide details on methods that will be used for pre- disturbance wildlife clearance surveys. ECCC is aware that that the Proponent will be participating in restoration trials as part of the ‘Developing Eco-restoration Together’ program.</p> <p>Rationale: ECCC requires the quantitative details on the assessment of impacts to be included within the Conceptual Caribou Management Plan to adequately assess how the Proponent has applied the mitigation hierarchy. Details on the methods that will be used for pre- disturbance wildlife clearance surveys will also be required to verify that the Proponent has adequately considered how they have avoided, mitigated, or restored impacts to caribou.</p> <p>While ECCC understands that the Proponent will be participating in restoration trials as part of the ‘Developing Eco-restoration Together’ program, however, more clarity on the Proponent’s role in the program and the scope of the program is required. Details such as how the outcomes of these programs will result in mitigation measures and offsetting requirements and additional clarity on the scope of the program should also be provided so that ECCC can understand the objectives and deliverables of the program.</p> | <ol style="list-style-type: none">1. Provide a quantitative assessment of impacts following measures to avoid, minimize and restore on-site and then assess residual effects and determine the offset required to counterbalance the remaining impacts.2. Provide details on methods to be used for pre- disturbance wildlife clearance surveys.3. Provide details on the Proponent’s role in the Developing Eco-restoration Together program and how that work may be used in offsetting requirements.4. Provide the scope (i.e., quantitative habitat amount) of the Eco-restoration Together program. | <p>Note to Denison: -The proposed path forward on this IR is to develop a commitment to be added to Denison’s Commitment Register, related to Denison’s offsetting plan meeting the objectives of the province’s Caribou, Boreal recovery strategy. The language around this is still in discussion, and the text in draft.</p> <p>Item two has not been resolved, but this is also in discussion, given overlap with IR-134.</p> <p><u>Updated Rationale (item two is still in discussion):</u></p> <p><u>In responding to item one, the Proponent has not provided a quantitative assessment of impacts following measures to avoid, minimize, restore on-site or offset. The updated draft Caribou Management Framework indicates that the Proponent will use the SK ENV caribou offset calculator to inform decisions on the required offset amount. Without information on the amount of offsetting that will be implemented, ECCC cannot advise on whether the amount is appropriate in the context of the species Recovery Strategy. A follow up to IR 149-R1A can be found within the Advice to the Proponent document.</u></p> <p><u>With regards to Item one, given that ECCC and CNSC understand that the Province of Saskatchewan and ECCC’s Canadian Wildlife Service are in communication on the Denison’s caribou management plans, and the province’s offsetting plan is underway, if Denison are willing to add a commitment to the Commitments Register, this IR could be resolved. The commitment text would include the commitment that “Denison’s offsetting plan will meet the objectives of the Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal population, in Canada.”</u></p> <p><u>Proposed rationale text for posting: Denison has captured their commitment related to one, with regards to caribou management and offsetting in the Commitments Register, so this IR has been accepted.</u></p> <p><u>In responding to item two, the Proponent has clarified that the use of wildlife sweeps will be used for pre-construction and pre-clearing surveys, however there is no information on the methodology that will be used to collect data. The Proponent notes that these sweeps will not be species-specific but will be based on timing of Project related activities. Without documenting how data will be collected (i.e., to identify which species are in the area) there is uncertainty as to whether the methodology implemented will provide relevant results. Additionally, the Proponent notes that methods associated with these surveys will be tailored to species at risk that may potentially be using habitats at certain times of the year; but have provided no method on how these sweeps will be tailored. ECCC suggests the Proponent explain how data will be collected during wildlife sweeps and provide the method on how the sweeps will be tailored to species at risk.</u></p> <p><u>Items three and four have been resolved as the Proponent is no longer using the Eco-Restoration Together Program as part of their offsetting plan. Items one and two remain outstanding.</u></p> | <u>TBD</u> |

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| | | | | | | | Items three and four have been resolved as the Proponent is no longer using the Eco-Restoration Together Program as part of their offsetting plan. Items one and two remain outstanding. | |
| IR-149 | IR-149-R1B | ECCC | Wildlife and Wildlife Habitat | Section 9.3.5.2, Additional Wildlife specific Mitigation Measures Proponent response to IR-149 IR-149 Response by Denison | Context: Section 4.2.2 of the Conceptual Caribou Mitigation plan states: “locating excessive noise generating activities such as the concrete batching operation as far away from sensitive wildlife locations as possible;”. However, no specific mitigation measures are mentioned for impacts to caribou due to noise generated from the Project air strip. Rationale: Noise from the air traffic using the air strip will also generate excessive noise that can impact caribou. Additional information on the timing and frequency of air traffic, as well as specific mitigations related to impacts from air traffic, including mitigations related to frequency and timing of flights, will be necessary to evaluate impacts to caribou due to air strip noise. | 1. Provide additional information on the timing and frequency of air traffic using the Project air strip. 2. Provide specific mitigations related to impacts from air traffic, including mitigations related to frequency and timing of flights. | Item two has been accepted as the Proponent has provided potential measures likely to be incorporated into operations of the airstrip, but item one remains outstanding. The information requested was not provided as the Proponent notes it is too early in the planning phase to provide this information. Once flight schedules have been determined, the Proponent should share them for review. If this cannot be provided at this time, the Proponent should provide information on the frequency and approximate timing of flights, as well as any periods of restricted activity planned for mitigation purposes. In addition, Denison is expected to provide details on specific mitigation measures to address sensory impacts to caribou, such as restricted activity periods to accommodate for the caribou calving season, or different flight paths. Please see the related follow up advice for IR-149-R1B in the Advice to the Proponent document. | Not Accepted |
| IR-150 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.5.2.1, Best Management Practices for working in Boreal Woodland Caribou Range in Saskatchewan | Context and Rationale: In the draft EIS Section 9.3.5.2.1, the Proponent states: “Denison proactively initiated research to provide field-based findings on the effectiveness of linear disruption features on predator/prey movements.” “Results will help the development of proactive and meaningful restoration strategies as an ongoing part of the overall Project (Omnia 2022). Additionally, the 2023 field program will support a program that uses the results from the 2021/2022 Caribou Trail Study in long-term reclamation planning. The program will be led by the University of Saskatchewan and is funded by Denison, an Indigenous-owned environmental company, the Northwest Communities Environmental Services (Métis owned), Mitacs, and the Natural Science and Engineering Research Council of Canada through an alliance grant. The Caribou Trail Study and the reclamation plan will culminate with the development of a Woodland Caribou Management Plan.” ECCC is available to support the Proponent through review of study programs should those programs be made available during the review process. ECCC requests to see the 2021/2022 study to further our review of caribou use in the Project area. | Provide the report for 2021/2022 Caribou Trail study for long-term reclamation planning for ECCC review. | | Accepted |
| IR-151 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.6.4 | Context and Rationale: In the analysis of residual and cumulative effects for woodland caribou, information and analyses on impacts to connectivity and movement across the landscape is lacking. | 1. Using available reports and data, provide an analysis of impacts to landscape connectivity for woodland caribou at the LSA and Range scales. 2. Determine whether the Project is expected to result in a | | Accepted |

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| | | | | | | reduction of connectivity within or between the ranges and provide a rationale for the conclusion. Describe how movement corridor(s) may be affected by Project activities and infrastructure. | | |
| IR-152 | - | CNSC | Woodland Caribou Residual Effects Evaluation | Section 9.3.6.4, Appendix 9-B | <p>Context: Baseline studies for Woodland caribou include:</p> <ul style="list-style-type: none">• Winter Track Count Survey to assess presence, abundance, feeding activity, and ecosite affiliation;• Pellet Group/Browse Availability Survey to detect presence and abundance of caribou, and frequency of occurrence and abundance of lichen;• Covert Camera Survey to determine presence and use of linear features (roads, trails, and hand-cut lines). <p>The Saskatchewan Conservation Strategy for Boreal Woodland caribou [1] states that caribou are very susceptible to predation during the calf-rearing period, and populations are extremely sensitive to even minor changes in mortality rates.</p> <p>Rationale: It is unclear if, or how, any data on seasonal and spatial use of habitat was considered in the residual effect analysis, for example summer/winter home ranges, sensitive life stages including calving (e.g., location of calving sites). It should be noted that the English River First Nation have identified caribou calving areas in the vicinity of the Project footprint.</p> <p>Reference: [1] Saskatchewan Ministry of Environment. 2013. Conservation Strategy For Boreal Woodland Caribou (Rangifer tarandus caribou) in Saskatchewan. Saskatchewan Ministry of Environment. Fish and Wildlife Technical Report 2014.</p> | <p>Please provide a summary of available baseline data on habitat use during all seasons and life stages, in particular sensitive stages such as calving, and how habitat use during all seasons and life stages was considered in the residual effect analysis.</p> <p>See also IR-145 and IR-143.</p> | | Accepted |
| IR-153 | - | CNSC | Woodland Caribou Residual Effects Evaluation | Section 9.3.6.4.1 | <p>Context: According to ECCC (2020), forest fires can directly alter habitat, making it unsuitable for boreal caribou (e.g., through loss of mature conifer stands, loss of lichens and other forage plants, barriers to movement). Boreal caribou generally do not return to burned areas for several decades until the forest is old enough to support lichens and other food sources, although they may make limited use of burned areas to feed on new growth.</p> <p>The residual effects evaluation of alteration and/or habitat loss lists ecosites BS3 and BS7 (regenerating forest types) as available habitat in Table 9.3-22, which represent 43.5% of the Regional Study Area.</p> <p>Rationale: It is unclear whether the ecosites BS3 and BS7 (regenerating forest types) represent suitable habitat for Woodland caribou year-round. More information is required on the habitat</p> | <p>1.Please provide further information on the suitability of ecosites BS3 and BS7 for Woodland caribou in different life stages.</p> <p>2. Please provide the results of a residual effect analysis not including ecosites BS3 and BS7 for conservatism.</p> <p>3. If 2 leads to habitat fragmentation, consider connectivity of habitat patches in the residual effect analysis.</p> | | Accepted |

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| | | | | | quality (e.g., time since last forest fire) and suitability for different life stages of caribou. For conservatism, it is recommended to perform a second residual effect analysis not including regenerating forest ecosites. | | | |
| IR-154 | - | CNSC | Woodland Caribou Alteration and/or Loss of Habitat | Section 9.3.6.4.1 | Context: Lichen, the primary food source for Woodland caribou (up to 70% of the year-round diet), can be exposed to airborne contaminants and dust deposition at distances of 1–40 km (e.g., increased metal concentrations or dust were detected in lichen at distances of 1–40 km from a mine site [1, 2]). Rationale: Further information is requested on how the potential for contamination of the food source “lichen” is reflected in the applied buffers of direct and indirect disturbance for woodland caribou. References: [1] Watkinson et al. (2021). Effects of dust deposition from diamond mining on subarctic plant communities and barren-ground caribou forage. Journal of Environmental Quality 50(4): 990-1003. Doi: 10.1002/jeq2.20251. [2] Chen et al. (2017). Does dust from arctic mines affect caribou forage? Journal of Environmental Protection 8(3): 258-276. Doi: 10.4236/jep.2017.83020. | 1. Please provide additional justification for how the potential for contamination of the food source “lichen” is reflected in the applied buffers for sensory disturbance. See also related IRs: IR-137, IR-148 and IR-156. Suggestions for mitigation and follow-up measures: CNSC recommends the following: <ul style="list-style-type: none">COPC in Lichen monitoring is recommended in transects from the Project site to assess COPC concentrations and confirm whether the chosen buffer is conservative. | | Accepted |
| IR-155 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.6.4.1, Alteration and/or Loss of Habitat | Context and Rationale: In Section 9.3.6.4.1 of the draft EIS, the Proponent presents figure 9.3-14 and table 9.3-22, which “depicts available woodland caribou habitat in the Project study areas” and provide a summary of available Woodland Caribou Habitat in the Project Area, Wildlife Local Study Area, and the Terrestrial Regional Study Area. The Proponent does not provide a biologically relevant explanation on the ecosites that are considered available woodland caribou habitat. According to the amended recovery strategy for Caribou, all habitat within SK1 range has been designated as critical habitat. To align with best current knowledge and the amended recovery strategy, the map and table should show the biophysical attributes, as outlined in Appendix H of the recovery strategy. | 1. Provide a biologically relevant explanation about how available caribou habitat was determined or determine available habitat based on new data from the province of Saskatchewan (See IR-145). 2. Consider referencing Appendix H of the Amended Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada 2020 to define important biophysical features. | | Accepted |
| IR-156 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.6.4.1 Section 9.3.7.3.1 | Context and Rationale: In Section 9.3.6.4.1 of the draft EIS, the Proponent identified that 142 ha of available caribou habitat within the Project footprint will be directly impacted or lost, while an additional 1,165 ha will be indirectly impacted by Project activities such as sensory disturbance. They assessed the residual and | Provide a revised assessment of residual and cumulative effects, taking into consideration that the disturbance within the SK1 range is above the disturbance management threshold required for survival and recovery of the species. | | Accepted |

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| | | | | | <p>cumulative effect of alteration to habitat for woodland caribou as not significant: “The residual effect of alteration and/or loss of available woodland caribou habitat is not expected to result in a change that will alter caribou habitat integrity to the point where it would not be able to sustain the regional woodland caribou population. Therefore, the effect is assessed as not significant.”</p> <p>Section 9.3.7.3.1 of the draft EIS states: “It is not expected that the cumulative effects of alteration and/or loss of habitat will alter the integrity of woodland caribou habitat within the Terrestrial RSA to the point where it is not sustainable or available to contribute to ecological functions. Therefore, the cumulative effects resulting from the Project’s residual effect interacting with residual effects from other projects and activities is predicted to be not significant.”</p> <p>For the residual effect of alteration and/or loss of available caribou habitat (Section 9.3.6.4.1, Table 9.3-24), the Proponent assessed the magnitude as low, the geographic extent as local, the duration as long-term, the frequency as frequent, the reversibility as fully reversible, the context as high and the likelihood as likely. The rationale provided by the Proponent is insufficient to determine the accuracy of these assessments, given the lack of data and the small size of the assessment area. ECCC does not support the residual effects assessment of low magnitude, given the uncertainties related to seasonal use by caribou in the Project area and the current level of disturbance in the SK1 range.</p> <p>For the cumulative effect of alteration and/or loss of available caribou habitat (Section 9.3.7.3.3 , Table 9.3-30), the Proponent assessed the magnitude as moderate, the geographic extent as beyond the RSA, the duration as long-term, the frequency as frequent, the reversibility as fully reversible, the context as high, the likelihood as likely, the significance as not significant and the level of confidence as moderate. The rationale provided by the Proponent is insufficient to determine the accuracy of these assessments, given the lack to data presented for caribou and the small size of the RSA, compared to the SK1 region. ECCC does not support the conclusion of the cumulative effects assessments or for the level of confidence.</p> <p>The Amended Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada 2020 states that the range is currently at the 60% disturbance management threshold. Therefore, any activity likely to result in the alteration or destruction of critical habitat may impact on the species survival and recovery. In addition, the Proponent’s assessment was based on information that was lacking data on calving, wintering and rutting areas, and connectivity and caribou</p> | See also related IRs: IR-137 and IR-154. | | |

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| | | | | | movements. The absence of considerations of the regional context of disturbance does not provide a conclusion based on best available information. | | | |
| IR-157 | - | ECCC | Wildlife and Wildlife habitat | Section 9.3.9 Ungulates, Furbearer and Woodland Caribou Summary | <p>Context and Rationale: The Proponent has committed to developing a Woodland Caribou Management Plan, which will include a “detailed assessment for the need for habitat offsets.” The Woodland Caribou Management Plan will support ECCC’s review of the Proponent’s assessment of residual effects following mitigation and offsetting.</p> <p>This plan should consider ECCC’s Operational Framework for Use of Conservation Allowances (ECCC, 2012). ECCC is available to assist the Proponent in the determination of appropriate offsets that would balance against Project adverse effects after the application of measures to avoid, minimize and restore on-site are adopted.</p> <p>Based on the Amended Recovery Strategy for the Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal Population, in Canada 2020, anthropogenic impacts to local caribou populations experience a lag effect, which occurs over extended periods. This lag effect needs to be adequately considered when proposing offsets.</p> <p>ECCC is available to assist the Proponent in understanding how critical habitat is described in the Recovery Strategy and the determination of appropriate offsets that would balance against Project effects based on the predicted impacts to caribou habitat.</p> | <p>Provide the Woodland Caribou Management Plan for review. The plan should clearly demonstrate efforts to avoid and minimize any Project effects and restore on-site any disturbed areas prior to the consideration of offsetting. Details on how severity of disturbance and vulnerability of the species were considered should be explained.</p> <p>See also related: IR-149.</p> <p>Suggestions for mitigation and follow-up measures: ECCC notes that the Woodland Caribou Management Plan should clearly explain efforts to address Project effects, including any contribution to cumulative adverse effects, after it has been determined that all options in the previous steps of the mitigation hierarchy (i.e., avoidance, and minimization,) have been fully considered and applied.</p> <p>In the Woodland Caribou Management Plan, provide details on how the factors outlined in the Operational Framework for Use of Conservation Allowances (ECCC, 2012) were considered in determining the offsetting amounts, including the severity of disturbance and vulnerability of the caribou population. Important factors including time lag (the amount of time from restoration work to when the habitat would be considered caribou habitat) would also need to be considered.</p> <p>ECCC typically recommends a minimum offset multiplier of 4:1 (offset outcome: area disturbed). This is a benchmark ratio applied to a project that is in the lower end of the risk spectrum, such as one with a low severity impact adversely affecting a low vulnerability ecological component. In general, the minimum 4:1 multiplier accounts for time-lags to restoration, uncertainty in outcomes, a precautionary approach, and the adverse impact itself in its specific context. Offset multipliers are variable and determined by project-specific circumstances and associated risks and uncertainties.</p> | <p>Note to Denison: This would be accepted if Denison is able to make a commitment as noted below. The proposed path forward on this IR is to develop a commitment to be added to Denison’s Commitment Register, related to Denison’s offsetting plan meeting the objectives of the province’s Caribou, Boreal recovery strategy. The language around this is still in discussion, and the text in draft.</p> <p><u>Updated Rationale:</u></p> <p>The updated draft Caribou Management Framework provided by the Proponent is still lacking information regarding offsetting location, amount, habitat type, habitat quality, etc. The Proponent notes that SK ENV is developing a boreal caribou habitat offset calculator, and that the Caribou Management Framework will be finalized using that tool as part of the provincial approvals, but information gaps remain on the amount of habitat offset required to mitigate Project effects.</p> <p>The Caribou Management Framework should be updated with this outstanding information.</p> <p>Given that ECCC and CNSC understand that the Province of Saskatchewan and ECCC’s Canadian Wildlife Service are in communication on the Denison’s caribou management plans, and the province’s offsetting plan is underway, if Denison are willing to add a commitment to the Commitments Register, this IR could be resolved. The commitment text would include the commitment that “Denison’s offsetting plan will meet the objectives of the Recovery Strategy for the Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal population, in Canada.”</p> <p>Proposed rationale text for posting: Denison has captured their commitment related to caribou management and offsetting in the Commitments Register, so this IR has been accepted.</p> | <u>Accepted</u> |
| IR-158 | - | ECCC | Migratory birds | Section 9.4.1.2, Key Indicators and Measurable Parameters | <p>Context and Rationale: In Section 9.4.1.2 the Proponent outlined key indicators for “Migratory Breeding Birds” which includes Waterbirds and Waterfowl, Upland Game Birds and Migratory Songbirds. These are broad categories, which do not allow for assessment of the variation in habitat requirements or ecology of individual species or guilds.</p> | Identify focal species/guilds for each key indicator species within the Migratory Breeding Birds valued components. Provide an updated analysis of Project effects on migratory birds. | | Accepted |

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| | | | | | <p>Updated Rationale: The Proponent should identify additional focal species that can serve as indicator species by representing anticipated impacts to a broader guild of species. Indicator species should be demonstrably sensitive to the potential effect of interest, and suitable for inferring effects on other species.</p> <p>Species may be grouped into guilds for assessment based on similarities in ecology or vulnerability to Project effects, such as species at elevated risk of collision with vehicle traffic.</p> <p>By identifying focal species or guilds for each key indicator species within the Migratory Breeding Birds Valued Components (VCs), ECCC would be able to accurately review the Proponent’s assessment of impacts and mitigation measures in order to assess the accuracy of the Proponent’s conclusions and provide expert advice on the mitigation measures.</p> | | | |
| IR-159 | - | ECCC | Migratory birds | 9.4.3.2.3 Baseline Studies – Migratory Songbirds Appendix 9-B, Section 2.10.2, Results | <p>Context and Rationale: Information presented in the draft EIS is insufficient to accurately predict Project impacts to breeding birds. The Proponent collected a single year of breeding songbird point counts and aerial waterfowl surveys (including avian species at risk). A single year of surveys in which birds may be unusually scarce or abundant could severely compromise interpretation of post-construction monitoring data.</p> <p>Additionally, data presented in the draft EIS is from 2017 and ECCC advises that more recent data is needed for a comprehensive baseline to verify Project impacts.</p> <p>Data from the Saskatchewan Conservation Data Centre (HABISask), the Saskatchewan Breeding Bird Atlas and the Boreal avian Modelling project contain information on avian densities and avian species at risk that could supplement field data.</p> <p>The national standard for major projects recommends a minimum of two years of field surveys to be provided, so that temporal variability can be considered when comparing post-construction against baseline records and other available data.</p> <p>Updated Rationale: ECCC recommends that for major projects, a minimum of two years of field surveys should be provided so that temporal variability can be considered when comparing post-construction against baseline records and other available data. More recent data is needed due to landscape changes that may have occurred since 2017 as well as cumulative effects that have occurred in that time. Additionally, if there was an unusually high population density of birds in 2017 due to extraneous circumstances, Project effects may be attributed to a non-existent</p> | Supplement breeding bird point count data and aerial waterfowl data collected during 2017 with additional pre-construction field data or existing post-2017 data/modelling to provide a comprehensive baseline that can be used to verify Project impacts during construction and operational phases. | | Accepted |

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| | | | | | <p>decline in the population when the discrepancy can be due to natural variability.</p> <p>A more recent baseline will account for interannual variation and any regional effects and will allow for a more accurate review of mitigation and follow-up measures. Data from the Saskatchewan Conservation Data Centre (HABISask), the Saskatchewan Breeding Bird Atlas and the Boreal Avian Modelling project contain information on avian densities and avian species at risk that could supplement field data.</p> | | | |
| IR-160 | - | ECCC | Migratory birds | Section 9.4.3.2.3 Baseline Studies – Migratory Songbirds | <p>Context and Rationale: ECCC advises that the results of the field studies need to be interpreted/analyzed in the context of the study area. The Proponent presents results on areas with highest richness and diversity but does not make a link to habitat that will be lost or experience indirect effects.</p> <p>Updated Rationale: Results regarding the effects of the Project, including a discussion on habitat types that will be lost or indirectly impacted during the life of the Project, and a discussion on the overall impact on the avian community including results from baseline studies as well as other supplemental information as per IR-159 are required to assess the validity of the Proponent’s conclusions and should be used in effects assessment.</p> | <p>Provide results interpreted in the context of Project direct and indirect effects. Include discussion on the habitat types that will be lost or indirectly impacted during the Project and the overall impact on the avian community, using results from the analysis of baseline studies and other supplemental data (as per IR-159).</p> <p>Discussion should support the conclusions of the effects assessment.</p> <p>See also related IRs: IR-161 and IR-162.</p> | | Accepted |
| IR-161 | - | CNSC | Bird Species at Risk | Section 9.4.3.3 Appendix 10-A (ERA) | <p>Context: For the assessment of effects on Bird Species at Risk (SAR), in the EIS it was decided to use representative species for certain SAR birds:</p> <ul style="list-style-type: none">• Olive-sided Flycatcher and Common Nighthawk were selected to represent Barn Swallow.• Yellow Rail and Rusty Blackbird were selected as substitutes for Horned Grebe. <p>No further rationale is provided to demonstrate that the identified surrogate species are representative of the Barn Swallow and Horned Grebe in the EIS. For example, do they share a common diet?</p> <p>Moreover, in the residual effects assessment, limited discussion is provided on the conservatism of chosen suitable habitat types for both surrogate and represented species, in the calculation of habitat loss and alteration, as well as change in mortality. For example, how does habitat for Common Nighthawk and Barn Swallow overlap (do they use identical habitat types?) and how does this affect the calculation of habitat loss and alteration used to evaluate the magnitude of residual effect?</p> | <p>1. Please provide additional information to justify the selection of surrogate species for Barn Swallow and Horned Grebe in the EIS. This should include a description of the similarity of SAR and associated surrogate species and any relevant uncertainties.</p> <p>2. Please provide conservative estimates of habitat loss and alteration for the represented and not directly assessed species (Barn Swallow, Horned Grebe).</p> <p>3. Please provide clarity as to why different surrogate species are used for Horned Grebe between the EIS and ERA.</p> <p>See also related IRs: IR-160 and IR-162.</p> | | Accepted |

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| | | | | | <p>Finally, in the ERA, Lesser Scaup is the surrogate for Horned Grebe. Yellow Rail is also represented by Lesser Scaup but Rusty Blackbird is represented by Olive-sided Flycatcher.</p> <p>Rationale: It is unclear what criteria were applied to select surrogate species for Barn Swallow and Horned Grebe, and how the chosen surrogates relate to Barn Swallow and Horned Grebe in terms of habitat type and range, nesting, and feeding requirements etc.</p> <p>There is also inconsistency with respect to the use of surrogate species for the Horned Grebe between the EIS and ERA supporting document.</p> | | | |
| IR-162 | - | ECCC | Migratory birds | Section 9.4.3.3, Bird Species at Risk | <p>Context and Rationale: Not all avian species at risk present in the study area were included as Key Indicators in the avian species at risk (SAR) valued component (VC). Barn swallow and horned grebe were recorded in the study area, but not included as VCs. Additionally, bank swallow may inhabit the Project area. Impacts to Species at Risk Act Schedule 1 listed species need to be identified, avoided, lessened and monitored.</p> <p>In Section 9.4.3.3. the Proponent states: “It is acknowledged that the listed Barn Swallow (<i>Hirundo rustica</i>) and Horned Grebe (<i>Podiceps auratus</i>) could potentially occur in the Terrestrial RSA. Incidental observations occurred during the baseline studies (Appendix 9-B). To focus the effects assessment on a few key species (described in the following) it was decided to use Olive-sided Flycatcher and Common Nighthawk to represent Barn Swallow as well, and to use Yellow Rail and Rusty Blackbird as a substitute for Horned Grebe. Unlike Horned Grebe, Yellow Rail and Rusty Blackbird are also listed provincially.”</p> <p>Barn swallow, bank swallow and horned grebe may have different nesting habitat requirements than the representative species discussed in the draft EIS. An explanation of how differing species are representative of one another is required, or if an explanation cannot be provided, the species should be assessed individually.</p> <p>Updated Rationale: The management plans for these three species demonstrate the variability in their habitat selection.</p> <p>The Management Plan for the Yellow Rail (<i>Coturnicops noveboracensis</i>) in Canada (Environment Canada, 2013) states “Yellow Rails inhabit shallow wetlands and other wet areas with grass-like vegetation. They breed in wetlands such as damp hay fields or meadows, floodplains, bogs, upper levels of estuaries, salt marshes (Bookhout 1995, Alvo and Robert 1999, COSEWIC</p> | <p>1. Explain how nesting habitat requirements of barn swallow is represented by common nighthawk and olive-sided flycatcher as a VC or assess individually each SAR that overlaps with the Project and is likely to be affected.</p> <p>2. Explain how nesting habitat requirements of horned grebe are represented by yellow rail and rusty blackbird as a VC, or assess individually each SAR that overlaps with the Project and is likely to be affected.</p> <p>3. Assess individually each SAR that overlaps with the Project and is likely to be affected.</p> <p>See also related IRs: IR-160 and IR-161.</p> | | Accepted |

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| | | | | | <p>2009), shallow prairie wetlands, and wet montane meadows (Peabody 1922, Sherrington 1994, Popper and Stern 2000). “</p> <p>The Management Plan for the Rusty blackbird (<i>Euphagus carolinus</i>) in Canada (Environment Canada 2015), states: “Rusty Blackbirds tend to select breeding sites with a combination of freshwater bodies with shallow water and emergent vegetation for foraging that are adjacent to wetlands with conifers or tall shrubs with cover for nesting (Matsuoka et al. 2010a, Matsuoka et al. 2010b, Greenberg et al. 2011).”</p> <p>The Management Plan for the Horned Grebe (<i>Podiceps auritus</i>), Western population, in Canada (ECCC, 2022) states: “The Horned Grebe breeds in small (generally 0.5 to 2 ha, but ranging from 0.24 to 18.2 ha), shallow (at least 20 cm deep, but on average 40 cm), and usually fishless, perennial wetlands, but they can also nest on larger lakes with shallow edges and sufficient emergent vegetation. Breeding sites usually contain at least 40% open water with beds of emergent vegetation, such as sedges (<i>Carex</i> spp.), rushes (<i>Juncus</i> spp.) and cattails (<i>Typha</i> spp.) (Faaborg 1976, Kuczynski et al. 2012, Routhier 2012, Stedman 2018).”</p> <p>Due to differing habitat selection and use, ECCC recommends that each selected VC is given an individual assessment with specific mitigation measures. This will allow for a more accurate review of the chosen mitigation measures.</p> | | | |
| IR-163 | - | ECCC | Migratory birds | Section 9.4.3.3.3, Baseline Studies – Avian species at risk VCs | <p>Context and Rationale: The baseline studies and data analysis for species at risk (SAR) birds is insufficient to accurately predict Project effects.</p> <p>ECCC recommends the use of predictive modeling in relation to survey data and habitat attributes to produce distribution and density maps. Sites within the study area that support particularly high densities or diversity of an individual species, based on direct observation and, where appropriate, distribution or occupancy models, would greatly improve confidence in Project impact predictions.</p> <p>Additional information on specific habitat use or models of habitat used by SAR would facilitate a more complete analysis of Project effects.</p> | Provide additional information, including mapping/modelling of specific habitat requirements for each avian species at risk or provide a justification of models used in the draft EIS. | | Accepted |
| IR-164 | - | ECCC | Migratory birds | Section 9.4.4.2.1, Alteration and/or Loss of Habitat – Migratory Breeding Birds | <p>Context and Rationale: The discussion on impacts to migratory songbirds presented by the Proponent is not sufficient to understand the impacts on various guilds of birds (e.g., aerial insectivores, forest birds, wetland birds, habitat specialists).</p> <p>As per IR-158, focal representative species/guilds should be used as</p> | <p>1. Provide further discussion on impacts to different focal species/guilds within the Migratory Breeding Birds Valued Component.</p> <p>2. Provide mapping of important features or habitat types that</p> | | Accepted |

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| | | | | | <p>key indicators (KI) in the Migratory Breeding Birds Valued Component. A greater level of detail on Project impacts to migratory songbirds with differing habitat requirements is needed for a fulsome assessment of effects.</p> <p>Updated Rationale: A greater level of detail, including a discussion on impacts to different focal species and/or guilds within the Migratory Breeding Birds Valued Component, is required for a more fulsome assessment of effects and identification of mitigation measures. Additionally, mapping detailing important features or habitat types that will be lost due to the Project for different guilds of migratory birds will be required to assess Project effects. This information will be required in order for the Proponent to apply adaptive management, and for ECCC to review the adequacy of these management plans.</p> | <p>will be lost due to the Project for different guilds of migratory birds.</p> | | |
| IR-165 | - | CNSC ECCC | Birds (all species) | Section 9.4.4.2.2 Section 9.4.5.2.4, Avian Deterrence and Prevention of Entrapment Appendix 10-A (ERA) | <p>Context: On p. 9-364 of the EIS, it is stated that exposure to hazardous materials through contact with contaminated waste ponds could affect avian health and contribute to mortality.</p> <p>However, the ERA places the avian receptors only in waterbodies and locations outside of the Project area (see Figure 5-2 in the ERA), i.e., Whitefish Lake, McGowan Lake, the inlet to Russell Lake, and Kratchkowsky Lake.</p> <p>Further, there are insufficient details on the potential effects of the water quality in the water management and treatment facilities on birds, species at risk, and other wildlife, including the risk of bioaccumulation of contaminants. The Proponent should assess potential effects of water quality from these areas using applicable CCME guidelines.</p> <p>Rationale: It is unclear whether the ecological risk assessment based on the chosen exposure locations is protective and conservative for avian species potentially exposed to contaminated waste ponds on the Project site.</p> <p>While mitigation measures such as physical, visual, and/or auditory deterrents are proposed in Section 9.4.5.2.4, the possibility of avian species coming into contact with waste ponds cannot be excluded based on the available information in the EIS. The possibility of birds, species at risk, and other wildlife accessing the water management and treatment facilities for drinking water or other purposes is not discussed in the draft EIS.</p> | <p>Please perform an ecological risk assessment with avian receptors located at the contaminated waste ponds, including:</p> <ol style="list-style-type: none">1. Describe and analyze the possibility of birds, species at risk and other wildlife using the water or waste management facilities and provide an analysis to determine if there is a risk to wildlife that may access these areas.2. Identify the potential toxicity of water management ponds to aquatic migratory birds and species at risk (SAR).3. Describe what measures will be taken if the waters are found to be toxic to migratory birds and SAR. <p>Suggestions for mitigation and follow-up measures: CNSC recommends that Denison ensure adequate mitigation measures are implemented to minimize the potential for avian exposure to pond waters.</p> | | Accepted |
| IR-166 | - | ECCC | Migratory birds | Section 9.4.5.2 Additional Avian Species-specific | <p>Context and Rationale: Avian species-specific mitigation measures are not presented in the draft EIS. The Proponent has committed to providing a variety of environmental management plans.</p> | <p>Provide details on species-specific mitigations for species at risk (SAR) and other avian species that will include:</p> | | Accepted |

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| | | | | Mitigation Measures | <p>Section 9.4.5.2 reads: “Additional mitigation measures specific to the Raptors, Migratory Breeding Birds, and Bird Species at Risk VCs, in accordance with the Migratory Birds Convention Act, and tailored to Project features will be incorporated into various Project management and monitoring plans such as the, erosion and sediment controls, soil and vegetation monitoring, wildlife monitoring, the Decommissioning Plan, air quality monitoring, Spill Response Plan, Radiation Protection Plan, surface water and effluent monitoring, and Waste Management Plan.”</p> <p>Migratory birds, the nests of migratory birds and/or their eggs can be inadvertently harmed or disturbed as a result of many activities, including but not limited to clearing trees and other vegetation, draining or flooding land, or using fishing gear; this is known as incidental take. This inadvertent harming, killing, disturbance or destruction of migratory birds, nests and eggs is prohibited under the MBCA. Incidental take, in addition to harming individual birds, nests or eggs, can have long-term consequences for migratory bird populations in Canada, especially through the cumulative effects of many different incidents. For further details, please refer to the Avoiding Harm to Migratory Birds website at: https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds.html</p> <p>In order to assess the effectiveness of species-specific mitigations and need for additional mitigations ECCC requires details on the species-specific mitigation measures proposed, and the monitoring plans.</p> | <ul style="list-style-type: none">• details on what activity restrictions will be implemented for migratory birds and SAR and when they will be applied;• details on mitigations used during regular maintenance activities such as vegetation management (e.g., mowing), access road repair (e.g., aggregate stockpiles), and infrastructure repair;• details on methods used to detect species listed on Schedule 1 of the <i>Migratory Birds Convention Act</i> (e.g., Pileated Woodpecker) and mitigations/setback distances and timing to reduce risk to these species. | | |
| IR-167 | - | ECCC | Migratory birds | Section 9.4.5.2.1 Work Timing Windows and Habitat Disturbance | <p>Context and Rationale: The Proponent has stated that when it is not practicable to clear outside of the breeding bird window, they will conduct pre-clearing surveys. Section 9.4.5.2.1 states: “Prior to commencing any site clearing (i.e., vegetation clearing and/or soil disturbance) during the nesting season, pre-clearing nest surveys will be conducted at that location within the Project Area.”</p> <p>ECCC does not recommend the use of nest searches or pre-clearing surveys for active bird nests during the breeding season as a mitigation, given the difficulty associated with finding nests reliably and the high likelihood of disturbing nesting birds when searching. Instead, ECCC recommends that clearing and grubbing activities not be conducted during the breeding bird season.</p> <p>The Migratory Birds Regulations 2022 (MBR 2022) brings new scenarios that need to be considered:</p> | <p>Provide the following information:</p> <ul style="list-style-type: none">• details on how vegetation clearing related to site development will be conducted to minimize risk to migratory birds and species at risk (SAR).• the timing window that will be used for vegetation removal to reduce risk to migratory birds and SAR | Response is accepted, but also see AD-57 in the Advice to Proponent table and follow-up IR-142-159-167-R1. | Accepted |

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| | | | | | <ol style="list-style-type: none">Most migratory birds:<ul style="list-style-type: none">Nests are protected only when they are in use or when live eggs or chicks are present.Migratory birds listed in MBR 2022 Schedule 1:<ul style="list-style-type: none">For the 18 species of migratory birds identified on Schedule 1, the MBR 2022 provide year-round nest protection until they can be deemed abandoned.Migratory birds listed under SARA:<ul style="list-style-type: none">For some SARA listed migratory birds, the residence prohibition (s.33) will protect nests that are not active, but are re-used in subsequent years, and the critical habitat prohibition (s.58) will protect nests that are part of the critical habitat identification. Those prohibitions apply everywhere in Canada and at all times of the year. In these cases, a SARA permit will be required. | | | |
| IR-168 | - | ECCC | Migratory birds | Section 9.4.5.2.4, Avian Deterrence and Prevention of Entrapment | <p>Context and Rationale: The Proponent mentions that avian deterrents will be used on power transmission lines, buildings and other Project infrastructure. However, the Proponent does not mention any deterrents that will be used for deterring birds from the water or waste management facilities.</p> <p>Details on deterrents for all Project components should be identified to assess residual and cumulative impacts to migratory birds.</p> | <p>Provide information on avian deterrents to be used to prevent birds or other wildlife entering water or waste management ponds.</p> <p>2. Explain how proposed timing of use of deterrents will reduce risk of migratory birds making contact with treatment waters outside of the nesting season (i.e., during migration and stop overuse).</p> <p>3. Explain which deterrents will be used, which deterrents were considered, and what alternative, adaptive measures will be considered if deterrents are unsuccessful for any Project components.</p> | | Accepted |
| IR-169 | - | ECCC | Migratory birds | Section 9.4.6.3, Residual Effects Evaluation for Migratory Birds, Table 9.4-15 and Map 9.4-11 | <p>Context and Rationale: The analysis of available habitat types for migratory songbirds appears incorrect.</p> <p>In their interpreted ecosite mapping, the Proponent identified 25 different ecosite types. In their table 9.4-15 and map 9.4-11, the Proponent only lists 8 ecosite types that are available migratory songbird habitat. Section 9.4.6 Residual Effects Evaluation for Migratory Songbirds reads: “Considering the baseline data (Appendix 9-B), migratory songbird habitat is described in the following text without species-specific differentiation and referred to as available habitat for migratory songbirds. Based on the baseline study results, 66.8%, 52.2%, and 50.7% of the Project Area, Wildlife LSA, and Terrestrial RSA, respectively, are assumed to provide available habitat for migratory songbirds (Table 9.4-15).”</p> <p>All Project areas, except some anthropogenic features and open water, would be considered available habitat for migratory songbirds. Although some ecosite types may have lower density</p> | <p>1. Explain how information in Table 9.4-15 and map 9.4-11 were derived.</p> <p>2. Explain why other habitat types were not considered as available habitat for migratory songbirds.</p> | | Accepted |

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| | | | | | and diversity, it is expected that all ecosites provide migratory songbird habitat. | | | |
| IR-170 | - | ECCC | Migratory birds | Section 9.4.6.4, Residual Effects Evaluation for Bird SAR, Table 9.4-19 | <p>Context and Rationale: The table and map presented by the Proponent do not appear representative of all available habitat for common nighthawk (CONI). Although CONI do preferentially use open areas such as gravel (often an anthropogenic disturbance) and regenerating forest, as identified in the draft EIS, they also use rock outcrops that can be within forested areas. As this area lies within the pre- Cambrian shield, there are likely rock outcrops that are also available habitat.</p> <p>As aerial insectivores, CONI select nesting areas in close proximity to wetlands or lakes where there is abundant forage.</p> <p>Rationale: Habitat requirements and preferences for all species at risk is required for developing effective mitigations and adaptive management.</p> | <p>1. Provide an updated table and map that considers all available habitat for common nighthawk.</p> <p>2. Additionally, as part of environmental management plans the Proponent should include species-specific mitigations that are biologically relevant to all the species at risk for all Project phases and components.</p> | <p>Item one was accepted, but item two remains outstanding. In Section 9.4.5.2.1, the Proponent has not included species specific mitigations for all species at risk, including common nighthawk. The Proponent should include species specific mitigations for all species at risk, including common nighthawk, so that ECCC can provide advice on the extent of Project impacts to these species.</p> <p>Additionally, the Proponent indicates that prior to site clearing during the nesting season (period from March 15 to August 31), pre-clearing nest surveys will be conducted. ECCC does not typically recommend nest surveys as a pre-clearing activity (please refer to the Advice to the Proponent relating to IR-170). In some instances, surveying for breeding activity using non-invasive methods could be required to determine species presence, and for some migratory birds SAR it may be required to survey for nest trees (residences) prior to clearing as these have year-round protection through SARA and a permit may be required.</p> <p>Specifically, it is not adequate to group SAR together (e.g., all birds) due to the unique life history and habitat requirements of each individual SAR. Denison is expected to provide species-specific mitigation measures for each SAR separately.</p> | Not Accepted |
| IR-171 | - | ECCC | Migratory birds | Section 9.4.6.4, Residual Effects Evaluation | <p>Context and Rationale: Section 9.4.6.4 Residual Effects Evaluation for Bird SAR – Common Nighthawk reads: “Progressive reclamation is anticipated to begin during Construction. However, a conservative approach is used, with Common Nighthawk (CONI) habitat in the Project Area considered to be unavailable for the duration of the Project, only becoming available as habitat following Post-Decommissioning (i.e., during the regeneration of vegetation following Decommissioning).”</p> <p>CONI may nest on the roadsides of access roads within the Project area. As such, the Project area should still be considered available habitat for the duration of the Project and appropriate mitigations and adaptive management should be discussed for this species.</p> | <p>Develop mitigation plans appropriate for avoiding collisions of common nighthawks with vehicles, when and where nighthawks are observed foraging near or roosting on gravel roads. Demonstrate how the planned mitigation activities will result in reduced residual effects from this pathway.</p> | | Accepted |
| IR-172 | - | CNSC | Birds (all species) | Section 9.4.6.4.2 | <p>Context: Populations of listed species may be less resilient to changes in mortality.</p> <p>CSA N288.6:22 Clause 7.2.4.3 states that effects on a few individuals of endangered, threatened, or vulnerable species would not be acceptable.</p> <p>The residual effects assessment for “Change in Mortality” for bird species at risk states that Project mitigation measures identified in Section 9.4.5 are expected to limit interactions between bird species at risk and potential sources of direct and indirect mortality. However, the mitigation measures are not discussed with</p> | <p>Please provide a discussion on mitigation measures with respect to their effectiveness in minimizing mortality for bird species at risk, for which effects on a few individuals would not be acceptable.</p> | | Accepted |

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| | | | | | respect to their effectiveness to limit interactions, specifically for bird species at risk. Rationale: It is unclear if the proposed mitigation measures are effective in preventing mortality in bird species at risk for which even only a few deaths could negatively impact the population. | | | |
| IR-173 | - | ECCC | Migratory birds | Section 9.4.8 Monitoring and Follow-up | Context and Rationale: Monitoring and follow up programs are part of adaptive management and implementation of additional mitigations. In Section 9.4.8 the Proponent states: “Considering the Project planning, baseline survey results, and proposed mitigation measures, no follow-up programs are considered to be warranted at this time.” Project impacts related to mortality of birds, such as collisions with the transmission line, mortality along roads and use of waste and water management facilities should be monitored during all phases of the Project and adaptively managed. | Provide details on the follow-up program to monitor impacts to avian mortality. The follow-up plan should include: <ul style="list-style-type: none">Monitoring of avian use of waste and water facilitiesMonitoring of mortality along access roadsMonitoring of mortality related to transmission linesMonitoring of effectiveness of avian deterrents. | | Accepted |
| IR-174 | - | ECCC | SAR – Bats | Appendix 9-B, Denison Mines Corporation Wheeler River Project, Terrestrial Environment, Wildlife and Vegetation Baseline Inventory, Section 2.1.4 Acoustic Bat Surveys | Context: The Proponent conducted acoustic surveys for bats and confirmed presence of two Species at Risk Act (SARA) schedule 1 listed bat species in the Project area, little brown myotis (Myotis lucifugus) and northern myotis (Myotis septentrionalis). However, the Proponent did not do an effects assessment of either of these bat species. Rationale: Although bats are present in the study area, no work was done to identify hibernaculum or maternal roosting sites. All species at risk that are expected to be present in the Project area should be assessed and species-specific mitigations detailed. | <ol style="list-style-type: none">Conduct an effects assessment for little brown myotis and northern myotis, including the likelihood that tree clearing during the bat roosting period, is likely to ‘kill’, ‘harm’, or ‘harass’ Little Brown Myotis and Northern Myotis and its ability to carry out its life processes.Describe and map locations of suitable myotis hibernacula and/or maternal roost habitat within the Local Study Area and Regional Study Area and explain how these habitats may be affected by Project activities.Describe what mitigation measures will be taken to avoid the breeding period for bats.Describe any pre-construction/pre- clearing surveys will be conducted to identify any hibernaculum and maternal roosting sites. Describe how monitoring will support adaptive management. | <p><u>Note to Denison:</u> There is additional text being drafted related to this topic, but it is still under review and may provide clarity on the outstanding request.</p> <p>Items one, three, and four have been accepted, but the response to item 2, regarding describing and mapping of locations of suitable myotis hibernacula and/or maternal roost habitat within the Local Study Area and Regional Study Area and an explanation of how these habitats may be affected by Project activities, is outstanding.</p> <p>In responding to item two, the Proponent has provided a map of species detected and frequency of detection in the local study area over two days on July 22 and 23, 2019. ECCC notes that analysis is lacking for the regional study area, despite a few autonomous recording units (ARUs) that were placed outside the LSA.</p> <p>Data from two consecutive days in the same month is not an accepted method to document baseline occurrences associated with suitable habitat. The legend for Figure 2-9 is not clear in that frequency of detection is mapped based on two criteria: little brown myotis and little brown/northern myotis.</p> <p>The Proponent should use a scientifically defensible method to document baseline occurrences associated with suitable habitat. The Proponent should clarify the legend and explain the values found within it, including if the turquoise dot represent occurrence of both little brown and northern myotis.</p> <p><u>Baseline data for bat SAR must be adequate to capture within and between year variability and to allow for statistically robust comparison to assess potential impacts on SAR over the lifecycle of the project. In this regard, Denison is expected to provide additional baseline data for bat SAR. If Denison choses to rely on literature data, a justification of applicability to the</u></p> | Not Accepted |

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| | | | | | | | <p>project is required. Nevertheless, Denison is expected to at a minimum commit to additional baseline monitoring prior to any disturbance, and to provide a description of the monitoring methods for review. These baseline surveys must be focused on suitable habitat for bat SAR that is to be identified through the requested mapping.</p> <p>To close this IR, Denison must:</p> <ol style="list-style-type: none">1. Clarify the legend of Figure 2-9 with respect to frequency of detection2. Provide suitable bat SAR habitat information in the form of a map3. Provide additional baseline data for bat SAR based on literature sources and justify applicability to the project4. Provide a description of proposed methods for bat SAR field monitoring for review5. Commit to an EA commitment to collect additional bat SAR field baseline data prior to disturbance | |
| IR-175 | - | CNSC | Provincially Listed Species | Appendix 9-B; section 2.2.2 | <p>Context: Vegetation and wildlife habitat characterization field surveys were completed in 2017, based on which ecosite factsheets were prepared. The factsheets list observations of two provincially listed plant species with a rank of S3 (vulnerable/rare to uncommon; Table 2.4-2) according to the Saskatchewan Conservation Data Centre, which are not discussed in the main EIS document:</p> <ul style="list-style-type: none">• Angle-leaved sundew (<i>Drosera anglica</i>) observed in ecosites BS19, BS20, BS22, BS25• Neat Spike-rush (<i>Eleocharis nitida</i>) observed in ecosite BS25 <p>Table 9.2-12 in section 9.2.6.2.1 of the EIS indicates that there may be indirect disturbance to some of these ecosites (BS19, BS20, BS25). In section 9.2.6.3.1 it is discussed that listed plant species are not likely to return once lost from a specific location.</p> <p>Rationale: Given that not all areas in the revised Project footprint were surveyed for listed plant species in baseline studies, there is uncertainty as to whether any species were missed, in particular those that have been observed in ecosites present in the LSA/RSA (e.g., <i>Drosera anglica</i> and <i>Eleocharis nitida</i>, see also Appendix 2 Table of Appendix 9-B). It should also be noted that rare plant surveys were completed in summer 2017 only (section 2.4.2 of Appendix 9-B), which may underestimate annual rare species that may be dormant in the seed bank in some years due to specific seed emergence requirements.</p> <p>It is acknowledged that the Proponent committed to pre-construction listed plant surveys targeted on ecosites encountered in the Project Area but not previously surveyed, as well as ecosites within the Project Area with high potential to support listed plants.</p> | <ol style="list-style-type: none">1. Please provide a discussion on the potential risks from indirect effects on ecosites with observed rare plant species2. Please provide additional information on the ecosites included in the planned pre-construction listed plant surveys <p>Suggestions for mitigation and follow-up measures: CNSC recommends focusing monitoring on ecosites that have known observations of listed plant species outside of the Project Area (e.g., BS19, BS20, BS22, BS25).</p> | | Accepted |

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| | | | | | More information is requested on the potential indirect effects on rare plant species as well as the planned pre-construction surveys. | | | |
| IR-176 | - | CNSC | Human Health with respect to radiation exposure | Section 10.1.4.2.1 Section 10.1.6.1.4 Appendix 10-A (ERA) | <p>Context: In section 10.1.4.2.1, the Proponent provides an evaluation of air quality constituents of potential concern to human health. It states: “A screening value for radon gas of 200 becquerels per cubic metre (Bq/m3) was available from Health Canada, which applies to total radon including background sources (Health Canada 2009). The radon concentrations which were predicted are incremental concentrations (i.e., above background) and were therefore compared to the applicable incremental screening value of 60 Bq/m3 for indoor air established by the Canadian Nuclear Safety Commission (CNSC) (Health Canada 2010a; Radiation Protection Regulations. SOR/2000-203).”</p> <p>The 60 Bq/m3 radon concentration value also appears in section 7.1.2 of Appendix 10-A (ERA).</p> <p>Further in section 10.1.6.1.4, it is stated: “Radon dose was calculated separately from the dose due to other radionuclides; however, the predicted radon concentration was compared against the CNSC incremental concentration limit of 60 Bq/m3.”</p> <p>The Radiation Protection Regulations do not stipulate a limit for radon above background for sites licensed by the CNSC. The effective dose limits for Nuclear Energy Workers (NEWs) and persons that are not NEWs are listed in section 13 of these regulations, and in subsection 1(3) of these regulations for the general public.</p> <p>The annual effective dose from all sources associated with the licensed activities and within the scope of the Nuclear Safety Control Act and Regulations must be compared to the applicable effective dose limit. For members of the public this limit is 1 mSv per calendar year.</p> <p>In Section 4.2.5.3 of Appendix 10-A (ERA), there appears to be no reference mentioned for the radon equilibrium factors. These factors are a significant input into the dose calculations for radon.</p> <p>Rationale: The reason for the requested change is to ensure consistency with the Radiation Protection Regulations.</p> | <p>The EIS and appendices should be aligned with the Radiation Protection Regulations by:</p> <ol style="list-style-type: none">1. Removing the reference to a 60 Bq/m3 limit.2. Reporting the assessment results as the total dose, from all radionuclides combined including radon progeny, and by comparing this annual effective dose to the effective dose limit. <p>Provide a summary of the conservative assumptions that have been included in the dose calculations.</p> <p>Provide a reference that shows how the radon equilibrium factors were determined.</p> | | Accepted |
| IR-177 | - | HC | Change to an environmental component due | Section 10.1.4.2.1 (p. 10-22) Appendix 10-A | <p>Context: Section 10.1.4.2.1 states that, “Screening values for radionuclide concentrations in ambient air were not available. All relevant radionuclides were assessed in the HHRA in terms of their contribution to the total radiological dose to human and ecological</p> | <p>1. Assess predicted radionuclides in Section 10 Appendix 10-A (ERA) using appropriate available screening values. Alternatively, provide a justification for why a screening wasn’t conducted for</p> | Response is accepted, but also see AD-55 in the Advice to Proponent table. | Accepted |

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| | | | to radiological contaminants | (ERA) : Appendix B Table B.9, Ref. 19-2638 Section 6, Table 6.1-1 (p. 6-7) | receptors” (p. 10-22). Section 10 Appendix 10-A (ERA) states that, “No formal screening was conducted for radionuclides. However, since radiation dose to human receptors is of public and regulatory interest, the radionuclides in the uranium-238 decay series are carried forward as COPCs for further assessment” (Appendix 10-A (ERA): Appendix B Ref. 19-2638). Table 6.1-1 lists radionuclides as a key indicator for air quality, but only uranium and radon are considered in Section 6, and Section 10 Table B.9 does not include doses from uranium progeny in air. Rationale: Health Canada recommends using screening values that are available for radionuclides if they are appropriate for the dose and if the screening values have listed assumptions (such as particulate size and worker exposure time that can be adapted to in Denison’s models). Two examples are ICRP 96, which CNSC uses in their regulatory reports to derive reference air quality values for Pb-210, Ra-226, and Th-230 (CNSC: Regulatory Oversight Report for Uranium Mines and Mills in Canada 2019); and Health Canada’s Guidelines for Management of NORM (Health Canada: Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials, 2011). | radionuclides despite the availability of screening values (e.g., ICRP 96 and NORM Guidelines, 2011). 2. Clarify if uranium progenies in air are considered in the atmospheric transport and air quality modelling and are simply not reported, or if they are not included in the models because no screening criteria are available. | | |
| IR-178 | - | HC | Change to an environmental component due to hazardous contaminants | Section 10.1.4.2.1 (p. 10-22) Section 6.1.4.2, Potential Project Related Effects (p. 6-31) | The Baseline + Project scenario was not provided for radon levels. Context: Section 6.1.4.2 states that the predicted levels for radon were not added to the respective baseline air quality levels (p. 6-31), and further explains that “In all modelled phases of the Project, annual average radon concentrations at receptors beyond the Property Boundary are expected to be indiscernible from background levels.” In Section 10.1.6.1.4, a different approach to evaluating predicted radon levels is mentioned: “the predicted radon concentration was compared against the CNSC incremental concentration limit of 60 BQ/m3”(p. 10-44). Rationale: Without a rationale as to why baseline levels of radon were not included in the assessment, HC cannot fully evaluate the appropriateness of the air quality assessment. While Health Canada is of the opinion that using background radon levels as a screening value is appropriate in this case from a health perspective, different approaches to screening predicted radon levels in different sections appear to be used (i.e., background radon levels vs. CNSC incremental concentration). | 1. Provide further information on whether and how baseline radon concentrations in air were determined. 2. Include baseline radon concentrations in the predicted total concentrations when comparing to existing guidelines; alternatively, provide a rationale for why baseline concentrations of radon were not included. 3. Discuss the potential health implications of the project-only increment-over-baseline radon levels | | Accepted |

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| IR-179 | - | CNSC | Groundwater quality decommissioning objectives. | Section 10.1.4.2.2, Release of Treated Effluent to Whitefish Lake During Decommissioning | <p>Context: It is stated that “This process would continue until the recovered water meets acceptable groundwater quality decommissioning objectives”.</p> <p>Rationale: The information provided does not include groundwater quality decommissioning objectives nor a reference to these objectives.</p> | Please provide groundwater quality decommissioning objectives or a reference to the information. | | Accepted |
| IR-180 | - | CNSC | Human health with respect to hazardous contaminants | Section 10.1.6.1.1, Human Receptors Selection and Characterization | <p>Context: Within the Human Health assessment, offsite receptors during the operation period are only considered downstream of Whitefish Lake. The only identified concern was for Se to the Fisher/Trapper located at Russel Lake. This section cites Indigenous Knowledge as informing the receptor selection and location.</p> <p>Rationale: While the assessment is fairly conservative in the assumptions made on intake and receptor habits, it stands to reason that if the trapper receptor was located closer to the operation, such as at McGowan or Whitefish Lakes, this exceedance of Se could be more pronounced.</p> <p>In terms of maintaining a conservative assessment, if the most vulnerable receptor can be shown to be protected at the point of highest expected COPC concentration, it can be concluded that this receptor would be protected further away from the Project. Considering this, why was the hunter/trapper receptor not also assessed at Whitefish or McGowan Lake? Was Indigenous Knowledge specific in mentioning Whitefish or McGowan Lakes were not used for the activities carried out by identified receptors?</p> | <p>Please provide justification for excluding a receptor from occupancy at lakes closer to the Project during operation (McGowan, Whitefish). Alternatively, conduct a risk assessment to a receptor at these lakes during operation to determine if there is a predicted risk that may require monitoring or mitigation.</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends the following:</p> <ul style="list-style-type: none">Assessment of a receptor located closer to the point of effluent release may need to be considered to ensure there are negligible risksIf Se is expected to exceed hazard quotients further upstream, selenium removal technology may be required as part of the effluent treatment process as a mitigation measure. Other COPC’s exceeding an HQ of 1 may also be identified under this process that could require specific monitoring or mitigation measures. | Response is accepted, but also see AD-59 in the Advice to Proponent table. | Accepted |
| IR-181 | - | CNSC | Human Health with respect to radiation exposure | Section 10.1.6.1.4 | <p>Context: In section 10.1.6.1.4, it is stated: “The maximum incremental radon concentration at the camp worker site during Operation was predicted to be 12.4 Bq/m3, which is below the CNSC limit of 60 Bq/m3 for incremental radon.”</p> <p>As per IR-176, there is no such CNSC limit for incremental radon.</p> <p>The camp worker would be considered a person who is not a nuclear energy worker (NEW) and subject to the dose limits of section 13 and 14 of the Radiation Protection Regulations, not the dose limit for the general public as per subsection 1(3) of the Radiation Protection Regulations. The CNSC has regulatory requirements for the ascertainment and recording of doses of radiation as per section 5 of the Radiation Protection Regulations. Every licensee must ascertain and record the magnitude of exposure to radon progeny, the effective dose and equivalent dose received by and committed to a person who performs duties in connection with any activity that is authorized by the Nuclear Safety and Control Act or is present at a place where that activity is</p> | <p>The EIS and appendices should be aligned with the Radiation Protection Regulations by:</p> <ol style="list-style-type: none">Removing the reference to a 60 Bq/m3 limit for incremental radon.Revising all references to the ‘public dose limit’ applied to camp workers (non-NEWs) to align with section 13 and 14 of the Radiation Protection Regulations. <p>The Proponent should explain why the radon dose for the camp worker appears as 0.13 mSv/year in one instance and 0.02 mSv/year in another.</p> <p>The Proponent is also asked to provide the rationale as to why a non-NEW has a higher radon dose than a NEW.</p> | | Accepted |

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| | | | | | <p>carried on.</p> <p>The camp worker performs duties in connection with the licensed activity and is present at the location where the activity is carried out. Hence, they are not considered to be a member of the general public (who has no connection with the activity)</p> <p>Further, the Proponent indicates that the maximum incremental radon dose to the camp worker was estimated to be 0.13 mSv/year during Operation. The assessment assumes that the camp worker spends 100% of the time indoors. Table 10.1-11 shows the maximum total incremental dose for the camp worker to be 0.02 mSv/year. This appears to be a discrepancy.</p> <p>Table 5.2 in Appendix 10-C provides internal annual dose from radon inhalation. The radon doses to some NEW workers (9.44E-02 mSv/a Driller 1 and 1.03E-01 mSv/a Wellfield Operator 1, 2) here appear less than the radon dose (0.13 mSv/year from section 10.1.6.1.4) to the camp worker, who is a non-nuclear energy worker.</p> <p>Rationale: The reason for the requested change is to ensure consistency with the Radiation Protection Regulations and the environmental impact statement.</p> | | | |
| IR-182 | - | HC | Change to an environmental component due to radiological contaminants | Section 10.1.6.1.4, (p. 10-44) | <p>Context: Section 10.1.6.1.4 states, “The limit is incremental and is exclusive of natural background, such as natural levels of radon and medical exposures. A dose constraint of 0.3mSv/yr was established for the public from all radionuclides and all pathways for the Project, as recommended by Health Canada (2010a). The dose constraint represents a dose lower than the public dose limit that ensures the combined dose from multiple sources does not result in exceedance of the public dose limit. Radon dose was calculated separately from the dose due to other radionuclides; however, the predicted radon concentration was compared against the CNSC incremental concentration limit of 60 BQ/m3” (p. 10-44).</p> <p>Rationale: Calculating radon separately from all radionuclides may underestimate the health risks by not considering combined doses from multiple sources when comparing to the public dose limit constraint of 0.3 mSv/yr recommended by Health Canada (2010a).</p> | 1. Provide clarification on how combined doses from all sources would be accounted for in respecting the public dose limit of 0.3 mSV/yr if radon concentrations are being calculated separately. | Response is accepted, but also see AD-65 in the Advice to Proponent table. | Accepted |
| IR-183 | - | CNSC | Human Health with respect to radiation exposure | Section 10.2 Appendix 10-C | <p>Context: Exposure scenarios for workers have been identified and high-level summaries of the assumptions and resultant dose estimates have been provided. However, the detailed dose calculations have not been provided.</p> <p>Rationale: The method used to estimate effective, equivalent and</p> | Provide the dose calculations for deriving the dose estimates for workers in all exposure scenarios, for at least the most dose significant scenarios. | | Accepted |

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| | | | | | committed dose is required to be verified. Sample dose calculations should be included, to confirm use of acceptable input data, for at least the most dose significant scenarios. | | | |
| IR-184 | - | CNSC | Human Health with respect to radiation exposure | Section 10.2 Appendix 10-C, 2.0 | <p>Context: It is stated in Appendix 10-C, section 2.0 that: “In addition, the CNSC has proposed a 100 mSv 5-year equivalent dose to lens of eye, in accordance with recent recommendations of the International Commission for Radiological Protection (ICRP, 2012a). This implies an average annual equivalent dose to lens of 20 mSv/a and will be considered as an applicable dose limit for workers.”</p> <p>As per section 14 of the Radiation Protection Regulations, the equivalent dose limit for the lens of an eye for nuclear energy workers (NEWs), effective January 1, 2021, is 50 mSv in a one-year dosimetry period.</p> <p>Rationale: The reason of the requested change is to ensure consistency with the Radiation Protection Regulations.</p> | The EIS and Appendix 10-C should be aligned with the Radiation Protection Regulations regarding the equivalent dose limit for the lens of an eye for NEWs. | | Accepted |
| IR-185 | - | CNSC | Human Health with respect to radiation exposure | Section 10.2.3.2 Appendix 10-C Table 3.10-3.12 | <p>Context: The Geometries for External Exposure Scenarios Modelled in MicroShield for Sources in various locations were provided in tables 3.10-3.12 in appendix 10-C. The doses from those scenarios were omitted.</p> <p>Rationale: The method used to estimate effective, equivalent, and committed dose is required to be verified. Sample dose calculations should be included, to confirm use of acceptable input data.</p> | The Proponent is asked to provide all the necessary information and assumptions required to perform the MicroShield calculations independently and to list the resulting calculated values from the listed scenarios. | | Accepted |
| IR-186 | - | CNSC | Human Health with respect to radiation exposure | Section 10.2.3.2.4 Section 10.2.3.2.6 Section 10.2.4 Appendix 10-C, Section 3.2 | <p>Context: In sections 10.2.3.2.4 and 10.2.3.2.6, as well as section 3.2 of Appendix 10-C, the Proponent has stated that workers in the drying and packaging areas of the processing plant will be required to wear powered air purifying respirators (PAPR) to reduce/eliminate inhalation exposure.</p> <p>Further in section 10.2.4, which elaborates mitigation measures, it is stated: “For the drying and packaging/loading areas of the ISR plant, use of PAPR has been assumed. It will be needed in these areas, and it has been planned in these areas to substantially reduce doses from inhalation of uranium dust. Dust levels in these areas will be monitored and kept ALARA.”</p> <p>The use of respirators appears to be in contradiction of the requirements of section 13 of the Uranium Mines and Mills Regulations, which states: <i>No licensee shall rely on the use of a respirator to comply with the Radiation Protection Regulations unless the use of the respirator (a) is for a temporary or unforeseen situation; and (b) is permitted by the code of practice referred to in the licence.</i></p> | <p>Provide the rationale for mandating the use of respirators by workers in the drying and packaging areas of the processing plant.</p> <p>Include the demonstration of the application of the hierarchy of control for radiological protection within the design of these areas of the processing plant.</p> <p>Justify that this approach complies with section 13 of the Uranium Mines and Mills Regulations.</p> | | Accepted |

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| | | | | | <p>The Proponent is also reminded that respirators should not be the first choice for dose reduction in workplaces. They should only be used when the hierarchy of control (elimination, substitution, engineering, or administrative controls) is not possible.</p> <p>Rationale: At this stage of the Project, the Proponent is expected to identify design improvements to these areas of the ISR plant/processing plant following the hierarchy of control for the radiological protection of workers, as per regulatory requirements and as described in REGDOC-2.7.1, <i>Radiation Protection</i>.</p> | | | |
| IR-187 | - | CNSC | Human Health with respect to radiation exposure | Section 10.2.3.2.4 Section 10.2.3.2.6 Appendix 10-C, Section 3.3, 6.0 | <p>Context: The exposure scenarios and assumptions for the workers in the drying area and the packaging/loading area of the processing plant include the wearing of PAPRs, which is assumed to provide a 1000-fold reduction in dust exposure.</p> <p>Further to reference IR-186, the use of a respirator as well as in worker dose predictions for the Project, appears to contravene section 13 of the Uranium Mines and Mills Regulations, and does not follow the hierarchy of controls for radiological protection of workers as described in REGDOC-2.7.1, <i>Radiation Protection</i>.</p> <p>Rationale: At this stage of the Project, the Proponent is expected to identify design improvements to these areas of the ISR plant/processing plant following the hierarchy of control for the radiological protection of workers, as per regulatory requirements and as described in REGDOC-2.7.1, <i>Radiation Protection</i>.</p> | <p>Modify the exposure scenarios and assumptions (i.e., remove the use of a respirator) for the workers in the drying area and the packaging/loading area of the processing facility.</p> <p>Assess the resultant exposures against CNSC regulatory dose limits and the ALARA principle.</p> <p>Identify mitigation measures as per the hierarchy of control for radiological protection.</p> | | Accepted |
| IR-188 | - | CNSC | Human Health with respect to radiation exposure | Section 10.2.4 | <p>Context: The following is stated in section 10.2.4: “Dust inhalation is also a potentially substantial component of worker dose at the core shack. At this location, PAPR will not be required; however, N95 masks will be used, and dust levels will be monitored here...It may be possible to increase air exchange in the core shack, above the planned six exchanges per hour, should this be necessary. This would also reduce radon exposure in the core shack.”</p> <p>If it is possible to increase air exchanges in the core shack, it is not clear why this was not assessed and incorporated in the design of the core shack.</p> <p>Rationale: It appears that a control measure (e.g., air exchange protocols in the core shack) to reduce the exposure to workers has been identified. However, it is not certain if it has been formally documented to ensure that it is incorporated in the engineered design of the core shack.</p> | <p>Provide details on how the control measures to reduce the exposure to both workers through the air exchange protocols in the core shack have been formally documented to ensure that it is incorporated in the engineered design of the core shack.</p> | | Accepted |

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| IR-189 | - | CNSC | Woodland Caribou Ecological Model | Appendix 10-A (ERA) | <p>Context: In the ERA (p. C.12, section 2.3.6 Woodland Caribou) it is stated: “For the ecological model a diet comprised of 50% browse, 20% lichen and 30% macrophytes is assumed for the woodland caribou.”</p> <p>In the EIS, section 9.3.3.3.1, it is stated: “Research has shown that up to 70% of the year-round diet of caribou may consist of ground and arboreal lichens.”</p> <p>Rationale: It is unclear whether the assumptions in the ecological model in the ERA regarding Woodland caribou diet are conservative, given only 20% lichen intake in the model. Lichen is known to accumulate COPC such as metals and dust from the atmosphere.</p> | <p>Please provide additional evidence to support that those Woodland Caribou who may have higher consumption rates of lichen as part of their diet, will remain protected. This can be provided through including a second model that assumes 70% lichen in the diet.</p> <p>See also related: IR-138.</p> | | Accepted |
| IR-190 | - | HC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Table 3-8 (p. 3.31) and Table 3-9 (p. 3.36) Appendix 6, Table 5 (p. 16) | <p>NO2 criteria is not being consistently compared.</p> <p>Context: Provincial and federal air quality criteria/screening values for NO2 have been used inconsistently.</p> <p>Table 3-9 in Appendix 10-A (ERA) uses the 2015 Saskatchewan Ambient Air Quality Standards (SAAQS) value of 300 µg/m3 to compare the maximum concentrations of NO2 at receptor locations for the 1-hour average period, while Table 5 of Appendix 6 uses the 2025 Canadian Ambient Air Quality Standards (CAAQS) of 79µg/m3 for the same average period time.</p> <p>Rationale: By utilizing the SAAQS screening value for NO2, the maximum concentrations at receptor locations exceed the 1-hour threshold solely during the decommissioning stage (Table 3-9). However, if the 2025 CAAQS are applied, the screening values would be exceeded at receptor locations for all project phases. It is best practice to use the more protective air quality standards to evaluate potential human health risks associated with project activities.</p> | <p>1. Compare the predicted maximum concentrations to the most protective applicable air quality standards available. Alternatively, provide a rationale as to why the SAAQS for NO2 were used rather than the more protective 2025 CAAQS to determine potential exceedances and screen for the need for additional mitigation measures.</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends use of the standards from the 2025 CAAQS for NO2 in future mitigation and follow-up plans.</p> | <p>The response to IR-190 acknowledges the predicted exceedances of the CAAQS for NO₂. However, the revised information does not appear to have been carried through to all the health risk assessment documents.</p> <p>HC notes that the new CAAQS for NO₂ also recognizes that there is no population health threshold for human health effects; therefore, any increase in exposure will result in an incremental population risk (Environment Canada and Health Canada, 2012; CCME, 2000). In other words, NO₂ is considered a non-threshold substance, meaning that health effects may occur at any level of exposure. Therefore, guideline values should not be construed as limits to which polluting up to is allowed.</p> <p>Please provide the following information:</p> <ol style="list-style-type: none">1. Present modelled concentrations at the nearest human receptor site (i.e., Risk 2 - seasonal resident at McGowan Lake) in Tables 3-9, 3-10 and 3-11).2. Correct/update Section 3.2.1.3.1: <i>Nitrogen Dioxide</i>, of Revised DRAFT EIS Appendix 10-A (February 2024), as follows:<ol style="list-style-type: none">a. Remove references to the 1970’s National Ambient Air Quality Objectives (NAAQOs) for NO₂. These objectives are no longer relevant and do <u>not</u> support the exclusion of NO₂ from further consideration as a COPC (Ref. AD-67);b. Acknowledge that modelled results exceed the 1-h NO₂ CAAQs at the <i>camp workers location</i> and <i>fence line</i> during all project phases; and,c. Consider NO₂ a COPC for further quantitative assessment and characterize the potential health risk related to 1-h exposure to NO₂.3. Characterize potential health risks from 1-h exposure to NO₂ using HC’s guidance. Alternatively, use the updated 2021 WHO Global Air Quality Guidelines for annual and 24-h NO₂ exposures when calculating hazard quotients.4. Discuss how the proposed mitigation measures to minimize residual effects of the Project on air quality, as identified in Section 16.1.1 of the Revised DRAFT EIS (January 2024), address the health risks identified in Chapter 10. Also specify whether any additional air quality monitoring and/or mitigation measures are proposed specifically to address human health risks. <p>Editorial Revisions</p> | Not Accepted |

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| | | | | | | | <p>1. Corrections are required for Table 3-11: <i>Summary of Air Quality Constituents that Exceed a Screening Value</i>, for NO₂ so that it remains consistent with the results presented in Tables 3-9 and Table 3-10 (i.e., 1-h exceedance at the <i>camp worker location</i> and <i>fence line</i> for all phases).</p> <p>2. Include the updated human risk receptor site names for Risk 2 and Risk 4 for consistency throughout the DRAFT EIS.</p> <p style="margin-left: 40px;">a. “Risk 2 - trapper” is now “Risk 2 - seasonal resident at McGowan Lake.”</p> <p style="margin-left: 40px;">b. “Risk 4 - seasonal resident” is now “Risk 4 - seasonal resident at Russell Lake.”</p> <hr/> <p>World Health Organization (WHO), 2021. WHO global air quality guidelines. Particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. 273 p. Available online at: https://apps.who.int/iris/handle/10665/345329</p> | |
| IR-190 | IR-190-R1 | HC | Change to an environmental component due to hazardous contaminants | <p>Section 6.1.3.2.2 (p. 6-21) Table 6.1-8 (p. 6-22); and, Table 6.1-9 (p. 6-22)</p> <p>Section 6.1.8 (p.6-44)</p> <p>IR-190 Response from Denison</p> | <p>Limitations with the proposed use of passive NO₂ monitoring would not allow comparison of measurement results to the 2025 CAAQS for 1-hour NO₂.</p> <p>Context: In response to IR-190, there was agreement to using the 2025 CAAQS for NO₂ in future mitigation and follow-up plans, which Health Canada supports. However, the proposed air quality monitoring and follow-up plans (Chapter 6.1.8) anticipate continued use passive NO₂ samplers, which do not measure hourly (1-hour) concentrations.</p> <p>Section 6.1.3.2.2 indicates that the assessment makes use of passive samplers to measure NO₂ at two sampling locations. The results from those samplers are presented in tables 6.1-8 and 6.1-9, for a ~30-day sampling period (i.e., a total concentrations for NO₂ in ambient air over ~30 days).</p> <p>While passive samplers provide measurement data for comparison to the annual 2025 CAAQS for NO₂, measurement data for the 1-hour NO₂ standard commonly requires use of an active sampler.</p> <p>Rationale: Health Canada encourages the monitoring of air contaminants when exceedances or near-exceedances of air quality criteria, standards and/or guidance values are predicted or reported, to:</p> <ul style="list-style-type: none"> determine the accuracy of predictions; help verify whether standards are being met; and, assist with implementing or modifying mitigation measures. | <p>1. Provide additional details on proposed air quality monitoring for NO₂ that will allow for comparisons to both the 1-hour and annual 2025 CAAQS and how that will be used to support mitigation and follow-up plans. Distinguish between comparisons with measured and modelled monitoring data, as well as use of passive and active samplers.</p> <p>2. If multiple approaches will be used to monitor NO₂ (e.g., use of passive and/or active samplers, modifications due to differences between project phases, etc.), describe their intended contribution to the monitoring objectives and outcomes (e.g., determine the accuracy of predictions; assist with implementing or modifying mitigation measures).</p> | <p><i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> <p>Please provide the following information:</p> <p>1. Clarify the conditions under which a switch from passive to continuous monitoring would be warranted (e.g., if the 30-d measured NO₂ concentration, after conversion to a 1-h concentration, approaches or exceeds the 1-h CAAQS value).</p> | Accepted |
| IR-191 | - | HC | Change to an environmental | Appendix 10-A (ERA), Table 3-9 (p. | Non-threshold substances are not included in screening and monitoring plans. | 1. Include PM2.5 and PM10 in the secondary air quality screening for short and long- term exposure at human receptors. | | Accepted |

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| | | | component due to hazardous contaminants | 3.36) and Table 3-10 (p. 3.46) Section 6.1.8 (p. 6-44) | <p>Context: Fine particulate matter (PM2.5) is not being considered further in secondary air quality screening for short and long-term exposure at human and ecological receptors because it is not predicted to exceed the screening values of the Ontario Ambient Air Quality Criteria (OAAQC) or the Canadian Ambient Air Quality Standards (CAAQS) for both annual and 24-hour average periods (Tables 3-9 and 3-10). Furthermore, it is not compared against the baseline for analysis.</p> <p>Table 3-9 indicates that coarse PM (PM10) is predicted to exceed the 24-hour CAAQS during all phases of the Project. However, Appendix 10-A p. 3.46 states that, “There were no exceedances of PM2.5 which is generally considered to be a more reliable indicator of potential health effects. However, health effects would be infrequent and reversible, subsiding after exposure; therefore, PM10 was not considered for further quantitative assessment in the ERA.”</p> <p>PM10 and PM2.5 were not included in the air quality monitoring plan (Section 6.1.8).</p> <p>Rationale: Particulate matter and NO2 are considered non-threshold pollutants, meaning that health effects can occur at any level of exposure, The CAAQS for PM2.5 PM.10, and NO2 recognize that there is no population health threshold for human health effects; therefore, any increase in exposure will result in an incremental population risk (Environment Canada and Health Canada, 2012; CCME, 2000). The CAAQS values should not be construed as limits to which polluting up to is allowed. In addition, based on the principles of keeping clean areas clean and continuous improvement, proposed mitigation measures should not be confined to meeting the standards but should also be targeted towards reducing population exposure to CACs associated with the proposed project.</p> <p>Furthermore, although health risks associated with PM2.5 are higher than those associated with PM10, both fractions are considered non- threshold pollutants and identified by IARC (2013) as causes of cancer.</p> <p>Reference: [1] International Agency for Research on Cancer (IARC). 2013. IARC monographs on the evaluation of carcinogenic risks to humans. Volume 109. Outdoor air pollution. Lyon: International Agency for Research on Cancer.</p> | <p>2. Include PM10 and PM2.5 in the air quality monitoring plan as they are non- threshold substances.</p> <p>3. Provide a discussion of the significance of predicted exceedances of health- based standards.</p> <p>4. Identify additional mitigation measures to reduce concentrations of non- threshold air contaminants associated with the Project.</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends use of the <u>2025 CAAQS Management Levels</u> to develop mitigation measures that reduce project contributions of non-threshold pollutants (e.g., PM2.5, NO2).</p> | | |

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| IR-192 | - | CNSC | Human Health with respect to radiation exposure | Appendix 10-A (ERA), Section 3.1.1.2, including Tables 3-1 and 3-2 | <p>Context: Section 3.1.1.2 in Appendix 10-A (ERA) provides the method of how select constituents including cadmium, chromium, selenium and lead-210 were determined. This section does not mention how the other constituents as listed in Tables 3-1 and 3-2 are determined.</p> <p>The values for Th-230 and U-238 in Table 3-1 are unexpected. Typically, these values should be at equilibrium.</p> <p>Rationale: The technical basis for the selection of constituents of concern is required as part of the environmental and human health risk assessments.</p> | <p>1. Provide the methodology of how all listed constituents are determined.</p> <p>2. Provide the rationale as to why Th-230 and U-238 are not in equilibrium.</p> | | Accepted |
| IR-193 | - | ECCC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Section 3.1.1.2 Section 8.2.4.2.3 | <p>Context: Appendix 10-A (ERA) Table 3-1 ‘Screening of Effluent Quality against Surface Water Quality Guidelines for the Wheeler River ERA’ does not include acute water quality thresholds for all COPCs compared against predicted effluent quality. For example, it is stated that the final effluent quality discharge target for uranium is 0.057 mg/L. However, the CCME water short term (acute) water quality guidelines for the protection of aquatic life is 0.033 mg/L. The proposed effluent discharge target for uranium exceeds the acute water quality guidelines, indicating effluent may pose the risk of being acutely lethal to aquatic biota at end-of-pipe.</p> <p>All water quality thresholds should be derived from receiving environment parameters, and there are discrepancies between the values used in Appendix 10-A (ERA) Table 3-1 and the values presented in Tables 8.2-8 and 8.2-10 in Section 8.2.4.2.3 of the draft EIS. No selected screening value for TSS has been calculated from baseline conditions. Un-ionized ammonia, which is a regulated Schedule 4 substance under the MDMER, has not been included.</p> <p>Rationale: A review of all modelling results for all COPCs under the MDMER will assist ECCC in understanding the potential risks to the receiving environment.</p> | <p>1. Provide acute and chronic water quality thresholds for all required COPCs with monitoring required under the MDMER.</p> <p>2. Ensure all water quality thresholds are derived from receiving environment baseline parameters and that these thresholds are consistently applied throughout the draft EIS.</p> | <p>The previous round’s IR has not been fully met. When responding to item one, the Proponent did not update Table 3-1 in Appendix 10-A. And the rationale provided relates to Table 8.2-10, which is not part of the request. The Proponent should update Table 3-1 in Appendix 10-A to include un-ionized ammonia, mercury and phosphorous and should incorporate these parameters into the risk assessment as needed. The Proponent should also correct the following inconsistencies in Table 3-1 in Appendix 10-A:</p> <ul style="list-style-type: none">Table footnote #11 refers to the strontium guideline; strontium is not included in the table and the footnote is also not referenced in the table,Please refer to IR108 for comments on derivation of aluminum, chromium, copper, nickel, manganese and cobalt thresholds. <p>The Proponent responded to item two by modifying Tables 8.2-8 and 8.2-10 to include both acute and chronic water quality thresholds. The Proponent should update Table 3-1 in Appendix 10-A with the corrections flagged in comments IR-108 and IR-114 then update the risk assessment to incorporate these parameters and values as needed.</p> | Not Accepted |
| IR-194 | - | ECCC | Aquatic species | Appendix 10-A (ERA), Section 3.1.1.2 and Section 3.1.2.3 | <p>Context: In the ERA, COPCs should be selected for further assessment based upon the following factors:</p> <ol style="list-style-type: none">COPC concentrations in effluent that exceed selected water quality guidelines for the protection of aquatic biota, andBaseline COPC concentrations in the LSA that exceed selected surface water and sediment quality guidelines for the protection of aquatic biota. <p>However, only COPCs that had concentrations in effluent that exceeded guidelines were assessed further. Baseline concentrations of COPCs in sediment were not considered. In</p> | <p>1. As noted in IR-114, provide the information on predicted effluent quality for COPCs with required monitoring under the MDMER.</p> <p>2. Provide the information on predicted maximum receiving environment surface water concentrations for COPCs with required monitoring under the MDMER in IR-114.</p> <p>3. Update the ERA to assess the risk of any additional MDMER COPC concentrations in effluent that exceed water quality guidelines.</p> | <p><u>Note to Denison:</u> There are multiple elements of this IR outstanding. This IR is being conditionally accepted for the purposes of the EA process, but these issues will need to be resolved during the licensing process. It is expected that a fully revised ERA that both incorporates revisions following closure of EA related IRs and addresses outstanding issues that will be further assessed during the licensing review. This commitment should be captured in the Commitments Register, and relates to various IRs in this table.</p> <p><i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> | Accepted |

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| | | | | | <p>addition to this, not all COPCs that require monitoring under the MDMER had predicted effluent concentrations. From Section 8.2.3.3 Table 8.2-2 of the Aquatic Environment Report, it appears Aluminum in McGowan Lake and Whitefish Lake South and North, and pH in Whitefish Lake North exceed water quality guidelines. Predicted effluent concentrations or near-field surface water concentrations for Aluminum and pH are not provided.</p> <p>Rationale: It is not possible to determine if there is risk from effluent to the receiving environment and aquatic receptors based on the current information provided.</p> | <p>4. Update the ERA to assess the risk of COPCs that had elevated baseline water and sediment quality concentrations in the receiving environment.</p> | <p>Item one of the IR has been met. However additional information is required for items two, three, and four. Similar to ECCC’s rationale provided for IR-124, “the ERA primarily relies on modelling results to identify the maximum predicted levels of COPCs in the receiving environment.” However, due to the upper bound discharge rates being the only model input evaluated, it is unclear whether the model considered scenarios where maximum COPCs might occur as the exclusion of other environmental variables may have resulted in inaccurate maximum environmental concentrations of the COPCs.</p> <p>The Proponent’s responses regarding baseline exceedances of COPC thresholds in the receiving waterbodies requires additional information. The modeling of surface water and sediment COPC’s described in Appendix 10-A, Figures 6-1 and 6-2 respectively, show results for the receiving waterbodies. However, it is unclear if these modeled values are based on the worst-case scenarios that account for environmental variables such as seasonal changes in hydrology and chemistry, or if they have only accounted for changes in operational effluent discharge scenarios to consider the upper bound discharge rates. Including the upper bounds of operational effluent discharges regardless of the variability of the receiving environmental conditions is important factor for determining whether the baseline data and risk assessment fully considered the effects of the operations of the proposed mine, including environmental concentrations of the COPCs, on water quality.</p> <p>The Proponent should provide baseline data and a risk assessment that includes consideration of maximum COPC scenarios for the receiving water bodies, including seasonal variability and sediment depositional areas. The Proponent should provide supplemental information to identify if the environmental model has considered environmental variability such as seasonal changes in water levels, flows and sedimentation. The Proponent should also demonstrate that the model has considered a reasonable expected worst case scenario, such as a 100 year return.</p> | |
| IR-195 | - | ECCC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Section 3.1.2.1 | <p>Context: Figure 3-2 depicts modelled concentrations of COPCs in the receiving environment surface water during all Project phases. Effluent discharge rates during Operations and Decommissioning are not anticipated to differ significantly. However, COPC concentrations seem to decrease rapidly after the end of the operations period despite effluent releases continuing into the decommissioning phase.</p> <p>Rationale: There has been no information provided on predicted changes in effluent COPC concentrations and discharge rates during the decommissioning phase. It remains unclear how COPC concentrations would decrease so quickly following the end of operations.</p> | <p>1. Provide further information on modelled maximum COPC concentrations for each individual Project phase with estimated timing for peak concentrations to appear in the receiving environment.</p> <p>2. Provide further information on predicted effluent quality during the Project decommissioning phase.</p> <p>3. Update ERA figures and conclusions as needed.</p> | <p>Item one has been partially met. The corrections made to Table 3-3 of Appendix 10-A do not match the values which were submitted as the first round IR response (Tables IR195-1 and IR195-2 (Modelled Maximum COPC Concentrations in Sediment by Individual Project Phase)). The Proponent should confirm which table contains the correct information, and make any necessary corrections to the revised draft EIS with an explanation for the differences.</p> | Not Accepted |
| IR-196 | - | ECCC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Section 3.1.2.3 | <p>Context: Table 3-6 provides predicted maximum sediment concentrations of COPCs compared to sediment quality guidelines. Several selected sediment screening values are not the most stringent sediment quality guidelines, with no justification provided. Additionally, copper and lead appear to be missing</p> | <p>1. Provide further information and justification for the selection of less stringent thresholds.</p> <p>2. Update the ERA as needed.</p> | | Accepted |

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| | | | | | <p>guidelines that are available from the Burnett-Seidel and Liber (2013) study.</p> <p>Rationale: The most stringent guidelines should be used for the sediment quality risk assessment in the ERA. Use of the most stringent guidelines will allow the most protective assessment to analyze risks to the receiving environment, aquatic and terrestrial biota.</p> | | | |
| IR-197 | - | ECCC | Aquatic species | Appendix 10-A (ERA), Section 3.2 | <p>Context: It remains unclear if atmospheric deposition from Project related emissions has been incorporated into modelling for the ERA and surface water and sediment quality assessments.</p> <p>Rationale: While expected Project air emissions are unlikely to have direct impacts on the aquatic receiving environment and aquatic biota, this Project effect pathway may have indirect effects through accumulation of COPCs over time or deposition of contaminants that are not expected in effluent, which should be evaluated with predicted emissions data incorporated into water quality modelling predictions.</p> | Incorporate atmospheric deposition from Project-related emissions into water quality modelling and assess any Project related effects to aquatic receptors from this pathway. | <p>The Proponent is not using the correct CSA standard to address this information requirement. The response refers to guidance from CSA N288.1 (i.e., <i>Guidelines for modelling radionuclide environmental transport, fate and exposure associated with the normal operation of nuclear facilities</i>), however, the information requirement specifies CSA N288.6, which is a different standard.</p> <p>In lieu of requesting information on atmospheric deposition of all contaminants of potential concern (COPC) to surface water and associated effects, the Proponent should:</p> <ol style="list-style-type: none">1. Provide an estimate of atmospheric deposition of mercury (all species) from Project-related emissions. Include a sensitivity analysis as well as expected seasonal variations in the deposition rate with an emphasis on accumulated deposition for the lake ice breakup period.2. Update water quality mercury predictions (all species) for Whitefish Lake using scenario(s) that incorporate atmospheric deposition from Project-related emissions. Based on the findings, assess any Project-related effects to aquatic receptors from mercury (all species). Discuss potential effects on sediment quality.3. Discuss how the response was informed by the CSA N288.6 standard (i.e., <i>Environmental risk assessments at class I nuclear facilities and uranium mines and mills</i>. CSA Group; February 2022). | Not Accepted |
| IR-198 | - | HC | Change to an environmental component due to radiological contaminants | Appendix 10-A (ERA) Appendix B, Tables B.7 and B.8 Ref. 19-2638 Appendix 10-A (ERA), Table 4-3 Ref. 19-2638 (p. 4.17) | <p>Context: Section 10 Appendix 10-A (ERA) contains Table 4-3 (p. 4.17), which lists ingestion rates for traditional foods and includes the category “organs” for Mammals.</p> <p>Tables B.7 and Table B.8 in Section 10 Appendix 10-A (ERA) Ref. 19-2638 provide the predicted concentrations of radionuclides for ecological receptors during the Project phases and during future centuries, respectively. They list the concentrations of radionuclides in moose and in moose organs, which is presented as a single cumulative organ value. Other terrestrial and aquatic animals (such as the black bear and woodland caribou) that are a part of the traditional diet of nearby Indigenous communities have higher concentrations of radionuclides than moose, yet concentrations are not provided for organs of these species.</p> <p>Rationale: While Health Canada is not aware of transfer factors to</p> | <ol style="list-style-type: none">1. Provide more clarification on how the mammalian organ ingestion rates are calculated (which animals and relative contribution percentages).2. Provide a rationale for why concentrations of radionuclides were not assessed in organs of animals (other than moose) that are consumed as country foods by Indigenous people harvesting in the area. | <p>Note To Denison: we are in discussions about this IR being conditionally accepted and a potential commitment.</p> | <u>Accepted</u> |

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| | | | | | individual organs, or to organs in animals that are not ruminants, it would be beneficial to have a better understanding of radionuclide concentrations in the organs of other animals that may be consumed by local Indigenous communities. | | | |
| IR-198 | IR-198-R1 | HC | Change to an environmental component due to radiological contaminants | Annex 1 Response to Information Requests (Denison Mining) – August 18, 2023 IR-198 Response from Denison – COPC Concentrations in Organs (Pages 74, and 354-357 of 419) Appendix 10-A (ERA) | <p><i>Environmental Risk Assessment for Wheeler River</i> (September 9, 2022) does not include an assessment of radionuclides based on their mass concentrations in country foods (the assessment is only based on radionuclide concentrations).</p> <p>Context: As part of the response to IR-198 estimated Pb-210 concentrations in moose organ and caribou organ of 7.15 and 49.4 mg/kg (ww) are reported, respectively. However, Appendix 10-A: <i>Environmental Risk Assessment for Wheeler River</i> (September 9, 2022) does not include an assessment of lead among the non-radionuclide COPCs.</p> <p>Using the organ meat consumption figure from the Patuanak community (16.2 g/day), exposure to Pb-210 from caribou organ meat is estimated at over 11 ug/kg bw per day (based on the response to IR-198) which would be close to 10 times greater than the 95th percentile dietary lead exposure estimates for the general Canadian population consuming retail foods.</p> <p>Rationale: While the abundance of radionuclides may pose a health risk with respect to radioactivity, their presence as chemical contaminants may also have an impact on health. This is demonstrated by the case of Pb-210 described above. Due to their potential toxicological significance to human health, Health Canada recommends assessing arsenic, cadmium, lead and mercury as part of country food assessment, regardless of the method employed to determine COPCs.</p> | <p>1. Provide a rationale on why radionuclide mass concentrations were not assessed for their impact to human health.</p> <p>2. Provide an assessment of Lead (Pb) as a chemical contaminant (non-radionuclide) COPC to better understand potential health risks and inform management, mitigation, monitoring and/or follow-up planning.</p> | <p><u>Note To Denison:</u> This IR is being conditionally accepted. If Denison commits to monitoring lead and mercury in country foods, as well as including these in any further assessment conducted to determine their potential risk to human health from consumption of country foods, this IR can be resolved.</p> <p>This commitment would include:</p> <ol style="list-style-type: none">1. Establishing/confirming baseline concentrations of Hg in water, sediment, and fish tissues before construction;2. Regular monitoring during construction, operation and post-closure; and,3. Undertaking an HHRA should monitoring results exceed established/confirmed baseline levels, to inform decisions on adaptive management and mitigation measures. <p><i><u>Thise Proposed rationale text for posting:</u> Denison has captured their commitment related to monitoring lead and mercury in country foods, as well as including- <u>arsenic, cadmium, lead, and mercury these</u>-in any further assessment conducted to determine their potential risk to human health from consumption of country foods. This commitment includes <u>(would include)</u>:</i></p> <ol style="list-style-type: none">1. Establishing/confirming baseline concentrations of Hg in water, sediment, and fish tissues before construction;3. Regular monitoring during construction, operation and post-closure; and,4. Undertaking an HHRA should monitoring results exceed established/confirmed baseline levels, to inform decisions on adaptive management and mitigation measures <p><i>This IR has been accepted for the purposes of the current EA process, and the aforementioned issues will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> | Accepted |
| IR-199 | - | ECCC | Change to an environmental component due to hazardous contaminants | Appendix 10-A (ERA), Sections 3.2.1 and 3.3.1, Wheeler River Project IMPACT Model | <p>Context: Model calibrated concentrations of selenium, uranium, and lead- 210 are under-predicted compared to measured baseline concentrations for water quality in the IMPACT modelling based on Figure 3-2. Calibrated concentrations of cobalt are under-predicted and there is poor agreement between model calibrated and measured concentrations of arsenic, lead-210, polonium-210, and radium-226 for sediment quality in Figure 3-3.</p> <p>Rationale: It is unclear how poor agreement between model calibrated and measured baseline concentrations of COPCs impacts the near-field and far-field modelling predictions of COPCs during all Project phases. It is also unclear why measured concentrations of COPCS could not be used directly as model inputs when there was poor agreement.</p> | <p>1. Provide justification as to why model calibrated concentration inputs of COPCs were preferable for use in predictive modelling of water and sediment quality over measured baseline concentrations.</p> <p>2. Provide a rationale detailing how under- or over-predicted model calibrated COPC concentration inputs influence IMPACT model predictions and uncertainty for water and sediment quality. Provide specific details on how this may impact the risk analysis for parameters that have been highlighted as having poor agreement between calibrated and measured concentrations (i.e., arsenic, selenium, uranium, lead-210, polonium-210, and radium-226).</p> | <p><i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> <p>The Proponent has not fully responded to either item for this IR. In the response for item one, the table provided in the response supports the statement added to Section 3.2.1 of Appendix A from Appendix 10-A, that there is little difference between the geometric and arithmetic means for parameter concentrations in water. It is important to clarify if this is also the case for sediment. Apart from arsenic and radionuclides, all modelled sediment concentrations are at or below geometric mean for sediment. Given that geometric means are typically lower than arithmetic means (and at most equal) this might indicate a consistent underestimation by the model for parameter concentrations in sediment. The proponent indicates that the geometric mean is more representative of the central value of the data distribution. ECCC does not support this view because a median or mode would be used to find a central value,</p> | Accepted |

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| | | | | | | | <p>depending on what was meant. The geometric mean may have been used because it is less influenced by outlier values, but these should be analyzed and removed if necessary before calculating the mean, as described in Section 6.3.3.6 of CSA N288.6:22. The only reference to geometric means in CSA N288.6:22 is for calculating means of literature values. Otherwise, when considering field data, an arithmetic mean is referred to.</p> <p>Typically, parameter concentration statistics are calculated individually for each site to highlight differences and help identify more sensitive sites. Differences between sites are expected because of differences in lake size, catchment area and other environmental factors. Pooling data from all sites smooths out high and low values, which compounds the smoothing done by using a geometric mean. This reduction in precision causes unreliability when evaluating model predictions, since the range of parameter concentrations at baseline is not well characterized.</p> <p>To address the lack of clarity, the Proponent should provide a table comparing arithmetic and geometric means for parameter concentrations in sediment, as they have done for water concentrations. If differences are significant, then modify graphs in Figure 3-3 of Appendix A from Appendix 10-A to compare arithmetic means of baseline data with modelled results. For parameters with sufficient data to calculate meaningful statistics, the Proponent should demonstrate that concentrations in Russell Lake are not significantly different than those in McGowan and Whitefish Lakes. If water quality is significantly different between lakes, then the Proponent should modify graphs in Figure 3-2 of Appendix A from Appendix 10-A to compare lake-specific baseline and modelled concentrations.</p> <p>In the response to item two, the statement “<i>it is not appropriate to calibrate the model to baseline conditions as we are most interested in impacted conditions</i>” is incorrect, because the point of calibration is to demonstrate the model correctly simulates site conditions to predict concentrations. Inaccurate model predictions during baseline indicate the site and its system of interactions is not well understood, and the model would not be able to produce accurate predictions during operations either. Section 7.3.6 of CSA N288.6:22 states “<i>The models may be calibrated to give the best possible agreement with available monitoring data so that risk assessors can have confidence in model-predicted concentrations for areas and media that are poorly represented in monitoring programs.</i>” The monitoring data is insufficient to characterize baseline concentrations for most of the parameters in water since there are often less than 50% of samples with concentrations above the detection limits. This limits the parameters that can be used to evaluate the model to concentrations in water of chloride, sulphate and arsenic, as well as concentrations in sediment. The Proponent should demonstrate the accuracy of the model by comparing model outputs with measured concentrations for those parameters where there is sufficient data to calculate meaningful averages, quantify model uncertainty, and discuss the influence of uncertainty on risk assessment conclusions.</p> <p>Denison is expected to:</p> <ol style="list-style-type: none">1. Calculate the model to baseline conditions, compare arithmetic and geometric means for parameter concentrations in sediment;2. Calibrate model to baseline conditions;3. Calculate parameter concentration statistics individually for each site; and4. Modify graphs as needed if significant differences are observed. | |

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| IR-200 | - | HC | Indigenous Peoples' health / Socio- economic conditions | Section 10 (p. 4.10) Appendix 10-A (ERA), Table 4-4 (p. 4.19) | <p>Indigenous consultation should be included in the Country Foods analysis.</p> <p>Context: The Proponent obtained country food consumption data through engagement with a single local fisher/trapper and from a dietary survey administered by CanNorth to the English River First Nations (ERFN) in 2017. However, the potential health risks to consumers of traditional food were only assessed using the data obtained from the CanNorth dietary survey. Section 10 of the EIS <i>states the following</i>: “The diet assumptions for the fisher/trapper are conservative and are based on engagement with a local fisher/trapper. The diet of the fisher/trapper is representative of one person, who consumes a unique composition and quantity of traditional foods (e.g., ingestion rate of 175 kg/yr of caribou, equivalent to approximately 2 to 3 servings per day). Most people fishing, hunting, and trapping in the Local Study Area and Regional Study Area would consume traditional foods more consistent with the average traditional foods consumer diet which was developed from the ERFN country foods study. In comparison, the ERFN country foods study in Section 10 Appendix 10-A (ERA) Table 4- 4 indicates a caribou ingestion rate of 2.6 kg/yr (1 to 2 servings per month) and a total game ingestion rate of 21.3 kg/yr” (p. 4.10).</p> <p>Rationale: Health Canada is in general agreement that the dietary habits of the local fisher/trapper may be an outlier and not necessarily representative of most of the local population. However, a rationale has not been provided to demonstrate whether and how the 2017 ERFN dietary survey results are representative of consumption patterns of local Indigenous communities. Also, it is unclear whether or how the ERFN dietary survey results account for the consumption patterns of vulnerable or more sensitive subgroups (e.g., heavy consumers, children and women of child-bearing age)</p> | <p>1. Evaluate the suitability of using the 2017 EFRN survey results and consider surveying additional community members (such as local hunters/trappers) to obtain more representative country food consumption rates for use in the traditional foods risk assessment, and for communicating the results to the communities.</p> <p>2. Additionally, consider evaluating consumption patterns (and applicable TRVs) of sensitive or vulnerable populations (e.g., elders, toddlers, women of childbearing age) in the traditional food risk assessment and provide risk levels for these sub-groups separately.</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends providing the community with the opportunity to validate the ERFN 2017 survey results.</p> | | Accepted |
| IR-200 | IR-200-R1 | HC | Indigenous People'' health / Socio- economic conditions | Section 10 (p. 4.10) Appendix 10-A (ERA), Table 4-4 (p. 4.19) IR-200 Response from Denison | <p>The traditional foods risk assessment should be updated to include an “Intense Land User” scenario and consider all relevant sub-groups.</p> <p>Context: See ‘Rationale for Status’ in IR-200</p> <p>Rationale: Health Canada notes that the response to IR-1 confirms that the use, diet and consumption rates used to assess the “Trapper” receptor are representative of “intensive land users” from the ERFN and possibly others. This change in the assumption is significant and should be integrated into the traditional foods risk assessment. Suggestions and follow-up measures have been provided to assist in responding to this information request, which benefits from the clarity provided in response to IR-1.</p> <p>Health Canada also notes that the response to IR-200 did not consider evaluating consumption patterns (and applicable TRVs) of</p> | <p>1. Update assumptions used in the risk assessment to reflect the new information provided in response to IR-1. (e.g., the <i>ERFN Trapper’s use of the area as representative of current and future land users</i>).</p> <p>2. Update the risk assessment in the EIS and ERA for the “Trapper” receptor (i.e., Intensive Land Users) to account for the representative nature of their described diet (i.e., consumption rates and composition).</p> <p>3. Update the rationale and decisions related to management, mitigation, monitoring and follow-up. Include a specific discussion for those COPCs that contribute to elevated health risks among “intensive land users” and those raised by Indigenous communities (i.e., selenium, mercury & cadmium).</p> | | Accepted |

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| | | | | | sensitive or vulnerable populations (e.g., elders, toddlers, women of childbearing age) in the traditional food risk assessment and provide risk levels for these sub-groups separately. | 4. Revise receptor’s descriptor/title from “Trapper” to “Intensive land users” throughout the EIS and ERA to be consistent with proposed revisions made in response to IR-1. Consider evaluating consumption patterns (and applicable TRVs) of sensitive or vulnerable populations (e.g., elders, toddlers, women of childbearing age) in the traditional food risk assessment and provide risk levels for these sub-groups separately. Alternatively, provide a fulsome rationale to justify their exclusion. | | |
| IR-201 | - | ECCC | Aquatic species | Appendix 10-A (ERA), Section 5.0 | Context: For the ERA methodology the Proponent followed CSA N288.6-12 for the assessment of risk to aquatic biota from radionuclide and non-radionuclide COPCs. This is the 2012 version, and a more recent 2022 version was publicly released. Rationale: The Proponent should review the most up-to-date version of the standard to ensure no changes to the methodology of the COPC exposure assessment are required for the ERA. | Update the COPC exposure assessment methodology in the ERA using the most recent CSA N288.6-22 standard, as needed. | | Accepted |
| IR-202 | - | CNSC | QA/QC | Appendix 10-A (ERA), Section 6.0- Quality Assurance | Context: This section provides only Quality Assurance (QA) of the ERA, including planning and preparation of the ERA. Rational: The Quality Control (QC) aspects are not included. Both QA and QC aspects provide confidence that ERA results are defensible and fit for use in decision-making. The N288.6 (Clause 10.2) requires that “Appropriate QA/QC requirements shall exist for all aspects of the ERA and should be specified prior to conducting the ERA”. | Please include appropriate QC aspects, as per a Clause 10.2 of the N288.6. | | Accepted |
| IR-203 | - | CNSC | Sediment Quality and Benthic Invertebrates | Appendix 10-A (ERA), Section 6.2 Future Centuries Sensitivity Analysis | Context: This section of the ERA states “If treated effluent was released at the maximum upper bound discharge rate, the modelled concentrations of all COPCs are expected to be below their corresponding sediment quality guidelines.” It appears from Figure 6-2: “Comparison of maximum concentrations of COPCs in sediment at expected and upper bound discharge rate” that cadmium and vanadium would be over their sediment quality guidelines indicated if maximum upper bound discharge rates are used. Rationale: It is not clear which is correct; the statement that no exceedances of sediment quality guidelines when considering the maximum upper limit effluent release, or the figures indicating there could be exceedances for cadmium and vanadium. This discrepancy in the ERA should be explained and corrected. | Please provide clarity on if cadmium and vanadium are expected to be over the sediment quality guidelines for the maximum upper bound discharge rate scenario. | | Accepted |

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| IR-204 | - | CNSC | Human health with respect to hazardous contaminants | Appendix 10-A (ERA), 7.1.1, Non-radiological Human Health Risk Assessment | <p>Context: In the human health risk assessment of the non-radiological COPCs, it was determined that the Project incremental HQ was predicted to remain below 0.2 for all non-carcinogens and all pathways during all phases of the Project, except for selenium for the fisher/trapper at Russell Lake from the fish ingestion pathway.</p> <p>Rationale: Given that the fisher/trapper receptor will likely be exposed to higher concentrations of selenium from the consumption of fish at Russell Lake, there is an elevated risk of selenosis in exposed individuals. This potential for selenosis would be further exacerbated in individuals who consume fish taken from other lakes closer to the mining operation. There is, however, no discussion of mitigation of these risks to exposed individuals.</p> | <p>Please provide a discussion of measures that could be applied to mitigate the risk of selenosis in exposed individuals who consume fish from Russell Lake and other waterbodies closer to the mining operation.</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends the following:</p> <ul style="list-style-type: none">Selenium abatement technologies may be considered to eliminate or reduce selenium in effluent entering the lake system.If HQs continue to exceed 0.2, then it may be necessary to post fish consumption advisories, in consultation with the Medical Officer of Health for the jurisdiction where the Project is located. | | Accepted |
| IR-205 | - | CNSC | Geology and Groundwater | Section 7, appendix H | <p>Context: In this appendix the analytical concentration of various groundwater samples taken from monitoring wells is reported.</p> <p>Rationale: There is one sample labeled as “Tracer Tank” with no definition available in the current report. It is difficult to judge whether the results presented are relevant to the EIS and how it may impact the findings therein.</p> | <p>Please clarify the definition of “tracer tank”.</p> | | Accepted |
| IR-206 | - | CNSC | Current use of lands and resources for traditional purposes | Section 11 Section 12 Section 15 Section 16 | <p>Context: Impacts to Lands and Resources Use have been identified by Indigenous Nations and communities.</p> <p>Rationale: Additional information is required to demonstrate whether Indigenous Nations and communities were engaged directly by Denison regarding the cumulative effects assessment, significance determination and residual effects, and thus the overall conclusions on potential adverse impacts of the Project on the potential or established Indigenous and/or treaty rights and effects of changes to the environment on Indigenous peoples, pursuant to paragraph 5(1)(c) of the CEAA 2012.</p> | <p>Please describe any outstanding or residual issues or concerns raised by Indigenous Nations and communities that Denison was unable to address. In addition, outline any plans to find solutions or continue discussions with the potentially impacted Indigenous Nations and communities.</p> | | Accepted |
| IR-207 | - | CNSC | Current use of lands and resources for traditional purposes | Section 11, Perceived Risks to Lands and Resources | <p>Context: The EIS states: “Resource users may also experience changes in their perception of the quality of resources for consumption such as the palatability of fish or wildlife or have apprehensions about the safety of resources for consumption. These changes may affect the patterns of ILRU during all Project phases including Post Decommissioning. The ERFN refer to this indicator as a “psycho-social’ effect, meaning that even if people know their fears are “<i>perceived fears, the fear ... is real and has real impacts on ERFN members’ perception of their overall health and well-being</i>” (ERFN and SVS 2022a).” (p. 11-11)</p> | <p>How does Denison plan to work directly with Indigenous Nations and communities who currently use the potentially impacted areas, including the RSA, to mitigate and monitor the perceived risks and/changes to the RSA?</p> <p>Has Denison had discussions with the potential impacted Indigenous Nations and communities on how fear and avoidance behaviors and related impacts on traditional land use will be mitigated, especially within the RSA?</p> <p>Additional information is needed to determine if Denison has engaged directly with the Indigenous Nations and communities to develop potential mitigation measures to address fear and</p> | <p>Response is accepted, but also see AD-60 in the Advice to Proponent table.</p> | Accepted |

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| | | | | | <p>Resource harvesters may experience Project-related disturbances and, depending on how these changes are perceived, it may cause some resource harvesters to avoid the Project Area.</p> <p>Reductions in harvests may occur based on fear or uncertainty about the ongoing quality of country foods. For example, <i>“People stopped picking berries in this area when Key Lake mine was established because of concerns about health impacts”</i> (ERFN and SVS 2022b).</p> <p>Rationale: CNSC’s Generic Guidelines for the Preparation of an EIS state: “The EIS will document specific suggestions raised by Indigenous groups for mitigating the effects of changes to the environment on Indigenous peoples (section 5(1)(c) of CEAA 2012). For the mitigation measures intended to address the effects of changes to the environment for Indigenous peoples, the Proponent must discuss the residual effects with the Indigenous groups prior to submitting the EIS.”</p> <p>These changes may affect the patterns of ILRU during all Project phases including Post Decommissioning.</p> | <p>avoidance impacts, such as a community monitoring program, which could help to reduce the perceived risk to lands and resource use through education, collaboration, and long-term monitoring with Indigenous Nations, in order to build trust.</p> <p>Suggestions for mitigation and follow-up measures: It is recommended that Denison consider engaging with potentially impacted Indigenous Nations and communities on the collaborative development and implementation of a monitoring program to help address concerns about potential impacts on lands and resources as a result of the Project. The program(s) could help to monitor changes over time related the potential perceived risk of contamination of the land from Project activities and subsequent effects on the quality of fish, vegetation, and wildlife resources, which in turn could affect the safety of traditional foods and human health, and impacts on culture practices, and overall community well-being that travel to region yearly.</p> | | |
| IR-208 | - | CNSC | Indigenous physical and cultural heritage | Tables 11.1-3, 11.1-4 and 11.1-5 Section 11.1.3.2.6 | <p>Context: Black bear is listed as a species hunted by several Indigenous nations, including Pinehouse residents. CNSC participated in an in-person engagement with Pinehouse residents in October 2022 and bears eating waste was identified as a concern for hunting and consumption.</p> <p>Rationale: Perceived risk of eating animals that are contaminated by hazardous or radiological wastes could deter community members from harvesting animals that are normally part of their traditional diet. Fencing for waste was specified as a deterrent for human trespassers, not animals.</p> | Please specify measures that Denison will take to ensure bears and other animals do not scavenge from waste facilities. | | Accepted |
| IR-209 | - | CNSC | Indigenous Peoples' health / Socio-economic conditions | Section 12.1.4.2.1 (p. 12-22) Section 12.1.5 Section 12.1.6.2 | <p>Context: KML indicates that working at a mine camp could inhibit community members from participating in cultural activities and sharing them with family and community members, resulting in a loss of cultural knowledge and language, thus impact knowledge transmission (p. 12-22).</p> <p>Rationale: Denison addresses this by briefly identifying culturally sensitive policies which would eliminate residual effects (p. 12-30)</p> | Please provide detailed proposed mitigation measure for KML’s concerns related to loss of cultural knowledge and language should they work for Denison. | | Accepted |
| IR-210 | - | CNSC | Current use of lands and resources for traditional purposes | Section 12.1.4.2.2, Potential Effect 2: Change in Traditional Diet, Perceived Suitability | <p>Context: The EIS states: “Project activities could change the perceived suitability of country foods. An ecological risk assessment (ERA) was conducted to consider both radiological and toxicological risks to ecological receptors such as terrestrial and aquatic invertebrates, terrestrial and aquatic vegetation, fish, and</p> | Given concerns with psycho-social impacts and the influence of perception discussed by ERFN earlier on in the EIS, does Denison have information on the perspectives from Indigenous Nations and communities to validate this conclusion is applicable? | | Accepted |

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| | | | | of Country Foods (p. 12-26) | <p>terrestrial and aquatic mammals and birds. Results for the radiological assessment predicted no exceedances of the radiation dose benchmark for the ecological receptors. For non-radiological COPCs, no exceedances were predicted except for selenium in fish from Russell Lake, based on a conservative dietary assumption for one resource user. The traditional foods diet for the fisher/trapper is conservative as it assumes that their annual fish consumption (183 kg of fish per year) would be obtained from Russell Lake, meaning the exceedance of the benchmark for selenium from fish would only occur if fish were only sourced from this one lake. This one exceedance could potentially change the perceived safety of country foods for community members and make country foods a less desirable part of a traditional diet.</p> <p><u>Experience from other uranium operations in northern Saskatchewan suggests that resource use will continue despite the potential selenium exceedance. An examination of members of the Hatchet Lake Denesų́łné First Nation who live in Wollaston Lake near the Rabbit Lake operation found that over years of being active on the landscape both with and without the presence of the uranium industry, members had developed their own culturally appropriate practice of risk assessment and management based on their relationship with the land. Hatchet Lake Denesų́łné First Nation members appear to be more concerned with the direct effects of uranium mining on the local environment and less concerned about uranium mining’s effects on their health through consumption of plants and animals. This is likely due to their high level of confidence in recognizing affected plants and wildlife and avoiding them (Elias et al. 1997).</u></p> <p>The usage patterns of the ERFN Trapper have similarly allowed for continued use and access to areas proximal to other uranium operations. The ERFN Trapper had a positive relationship with other uranium operations in the ILRU LSA. He also continued to trap (i.e., used his trapline in Fur Block N-18), fish, and opportunistically pick berries, and consumed those resources during operations (KPI Program 2021). Good relationships between Denison and a new trapper who eventually takes over the trapline from the ERFN Trapper would promote continued use.” (p. 12-26)</p> <p>Rationale: The underlined reference suggests that negative perceptions may not prevent traditional resource users from continuing to consume, due to adaptation to potential risks in the environment.</p> | | | |
| IR-211 | - | CNSC | Accidents and Malfunctions | Section 14.6.1, Bounding Scenario | Context: Scenario 1 describes a spill of uranium concentrate into the lake. It’s not clear how the ecological risk assessment was | Please clarify why grouse, vole, and deer were chosen as receptors for the ecological risk assessment performed for | | Accepted |

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| | | | | 1, Vehicle Accident and Aquatic Release of Radioactivity | <p>performed. It is stated that sediment concentrations in post-remediation conditions are expected to exceed the benthic invertebrate benchmark and that these results indicate that a spill of uranium concentrate could potentially affect benthic invertebrate populations following a spill, but the spatial extent would be limited. For water, it is stated that when evaluating the potential effect, a comparison was made between the results of the estimated short-term water quality 1,892 µg/L (1.892 mg/kg) and the guideline (33 µg/L). This indicates that there may be some aquatic species that could be affected, but the effects are expected to be transient as the water concentration quickly drops to a long-term level of 0.19 µg/L. However, when looking at dose to other receptors, the results of the ecological risk assessment indicated short-term ingestion of contaminated water resulting from an accident would not result in potential risks to grouse, vole, or deer, however rationale for how these receptors were chosen is not provided.</p> <p>Rationale: It’s not clear from the EIS, why the receptors grouse, vole, and deer were chosen to evaluate ecological effects from a potential spill, and why they differ from receptors in the ERA. It is also not clear if the pathway from sediment ingestion/contact was considered for semi-aquatic receptors as they could be exposed to the increased concentrations post-spill. It is also not clear if SARA species exposure to sediment and water post-spill was considered.</p> | accidents and malfunctions scenario 1 and clarify if the sediment pathway to receptors post-spill was considered, as well as if SARA species were considered. | | |
| IR-212 | - | HC | Human health with respect to hazardous contaminants | Section 14 (p. 14-3) Appendix 16-C (p. 14 & 15) | <p>The follow-up plan does not sufficiently describe how various parties will be engaged in the design, implementation, and review of monitoring programs.</p> <p>Context: Section 14 of the EIS states that “The overarching fear of contamination from the mine is woven in to almost every other concern noted by participants in the TK study. It is worth acknowledging this concern separately given the potential for mental health impacts related to people’s experiences of fear and anxiety” (p. 14- 3).</p> <p>The commitment regarding monitoring and follow-up activities appears limited to “<i>shar[ing] information in a transparent manner with the General Public, and specifically those Communities of Interest and Nearby Land Users with whom Denison is regularly engaging about the Project. Such an information-sharing program would consider the involvement of the Regulators to make sure the information available addresses the issues identified as concerns</i>” (p. 14).</p> <p>Rationale: Country food safety is not regulated federally unless foods are sold commercially. Certain aspects of country food safety</p> | <p>1. Provide details of how local, provincial and federal authorities, and Indigenous Nations and communities will be engaged in developing the follow-up and monitoring program, including the information-sharing program.</p> <p>2. Describe the steps that will be taken if there are any exceedances of established benchmarks or deviation from predictions.</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends that the Proponent’s plan for communicating follow-up results (environmental and country foods) aims at, among other things, responding to community concerns regarding country foods to minimize avoidance of this resource. This goes beyond a passive dissemination of information and developing a strategy based on dialogue and the direct involvement of communities in monitoring, surveillance, and risk communication activities.</p> | | Accepted |

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| | | | | | and availability may be covered by provincial regulators. It is unclear whether and how various levels of government and potentially affected communities would be involved in the development of the follow-up and monitoring program. It is also unclear what the information sharing program entails and how it would inform any adaptive management if monitoring results deviated from the prediction | | | |
| IR-213 | - | CNSC | Accidents and Malfunctions | Section 14.5.3 Appendix 14-A | <p>Context: The Proponent states that the assessment of accidents and malfunctions began with the initial identification of hazard scenarios. Hazard scenarios were identified using a systematic approach that considered the existence of sources of hazards and initiating events for the Project in consideration of Project activities and components.</p> <p>The hazard identification was conducted to identify a comprehensive list of potential project-related accident and malfunction scenarios associated with the key project components and activities with further details provided in Appendix 14-A. The initial hazards were then screened qualitatively based on likelihood and consequence to determine overall risk level using a risk matrix approach. Bounding scenarios were then selected from this initial list of hazard scenarios.</p> <p>The results of numerical analyses (RESPEC, 2021) of detailed strip model suggest that the deformation imposed on the cemented steel casing from downward movement of the rock mass may exceed the assumed casing-strain yield limits and the failure limit locally after extracting the uranium ore. However, this potential hazard is not identified in the hazard identification.</p> <p>Rationale: Exceedance of steel casing yield limits and failure limit would either compromise the steel casing integrity or damage the steel casing and result in the leakage of injected solution, which could impact on mine operation and contaminate the surrounding groundwater.</p> | Please include the hazard of steel casing yield or damage in the table of hazard identification evaluation and conduct an initial risk screening and further detailed assessment as required. | | Accepted |
| IR-214 | - | CNSC | Accidents and Malfunctions | Section 14.5.3 Appendix 14-A, section 3.2.3 | <p>Context: Hazard scenarios were identified using a systematic approach that considered the existence of sources of hazards and initiating events for the Project in consideration of Project activities and components. Details for how each of these project components and activities are considered in the initial hazard scenario identification process are provided in the accidents and malfunctions TSD (see Appendix 14-A; Ecometrix 2022).</p> <p>However, in Table 3-1 to Table 3-14 in Appendix A of Appendix 14-A, the following inconsistencies were identified:</p> <ol style="list-style-type: none">consequences for the hazards ID# 1.1, 1.5, 1.7, 14.2 include occupational major injuries; however, the severity | Please clarify or correct all inconsistent and/or inaccurate information in Tables 3-1 to 3-14 in Appendix A of Appendix 14-A. | | Accepted |

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| | | | | | <p>(S) is denoted as number 2 that appears to be inconsistent with consequence rating number in Figure 14.5-2</p> <p>ii. Hazard ID# 1.5 has a L=2, but it is described as a highly unlikely event, which is inconsistent with the term in Figure 14.5-2</p> <p>iii. Hazards ID# 3.6 and 3.7 have a L=1, but they are described as low probability event that is inconsistent with the term in Figure 14.5-2</p> <p>iv. Hazards ID# 8.2, 8.3, 9.1, 10.1 to 10.5, 11.1, 11.5 have a L=1, but they are described as unlikely events, which are inconsistent with the term in Figure 14.5-2. Rationale needs to be provided how stockpile erosion is considered to have a L=1</p> <p>v. Hazard ID# 12.1 has a L=2 and S=3, but it's risk ranking is moderate, which is inconsistent with the term in Figure 14.5-2</p> <p>vi. Hazard ID# 13.3 has a L=2. Based on the operation experience in the similar projects in the northern Saskatchewan, ponds lining failure and leakage is a very likely event. Rationale needs to be provided to support L=2 or change the number for L.</p> <p>Rationale: Inconsistent or inaccurate/incorrect information was included in Accidents and Malfunctions assessment.</p> | | | |
| IR-215 | - | CNSC | Human health with respect to hazardous contaminants | Section 14.6 | <p>Context: One of the potential risks of a uranium mine and mill is a spill of untreated effluent.</p> <p>Rationale: In the EIS, it doesn't appear that the scenario of a spill of untreated effluent to the environment has been considered.</p> <p>A failure of the piping containing the untreated effluent could result in an uncontrolled release to the environment and could affect the groundwater, soil quality, and terrestrial biota.</p> | Please evaluate and provide the results for a bounding scenario of a spill of untreated effluent or provide justification for its exclusion. | | Accepted |
| IR-216 | - | CNSC | Human Health with respect to radiation exposure | Section 14.6.1 Section 14.6.7 Appendix 14-A | <p>Context: Radiological doses to human receptors, including workers (i.e., driver(s) of the vehicles), from the Bounding Scenarios 1 (Vehicle Accident Including Rollover, Collision, Run Off Road) and 7 (Vehicle Accident Including Rollover, Collision, Run Off Road) have not been assessed.</p> <p>Rationale: An estimate of the effective doses to human receptors, including workers, are required to determine whether the expected doses meet the dose limits set out in the Radiation Protection Regulations.</p> | Provide estimates (including calculations) of the potential radiological doses to human receptors, including workers, resulting from Bounding Scenarios 1 and 7. | | Accepted |
| IR-217 | - | CNSC | Accidents and Malfunctions | Sections 14.6.1 and 14.6.2 | <p>Context: Highway 914 crosses the Wheeler River 10 km southwest of the access road junction. A vehicle accident, including a rollover,</p> | Please provide information on all water crossings along the transportation corridor and justification why bounding scenarios | | Accepted |

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| | | | | | <p>collision, or run off road, at or near the bridge could potentially result in a release of uranium concentrate and release of fuels and chemicals into the surface water at this location. Denison believes that a release of uranium concentrate and a release of fuels and chemicals at this location would bound the releases at any other water crossing along the transportation corridor. However, no information on what other water crossings along the transportation corridor exist and how bounding scenarios 1 and 2 would bound the risk of releasing uranium concentrate and fuels and chemicals at other crossings.</p> <p>Rationale: The release of uranium concentrate and fuels and chemicals at water crossings would contaminate the water body at the crossings and pose a risk to the environment and public health.</p> | <p>1 and 2 would bound the effects of the accidental releases of uranium concentrate and fuels and chemicals at these crossings.</p> | | |
| IR-218 | - | CNSC | Accidents and Malfunctions | Sections 14.6.1.1 and 14.6.1.4 | <p>Context: Table 14.6-1 indicates that the average flow of Wheeler River south of Russel Lake is 17,340 L/s or 17.34 m3/s. This rate is used for uranium dissolution rate calculation. However, in section 14.6.1.4, it states that the average annual flow is 24.3 m3/s. In Table 14.6-3, the last two rows appear to be added wrongly.</p> <p>It also states that sediment quality results are shown in Table 14.6-5 for post-remediation conditions. During minimum flow conditions, the affected volume is expected to be smaller, resulting in a higher sediment concentration. In comparison, higher flow conditions are expected to result in a greater footprint and lower concentrations. However, in Table 14.6-5, the average sediments concentration and porewater concentration appear to be incorrect and switched between average flow and maximum flow.</p> <p>Rationale: Inconsistent/inaccurate information provided in the EIS.</p> | <p>Please clarify and correct the inconsistent information on average flow rate of Wheeler River at the crossing and incorrect information in Table 14.6-3, and average sediment concentration and porewater concentration under average and maximum flow conditions in Table 14.6-5.</p> | | Accepted |
| IR-219 | - | CNSC | Accidents and Malfunctions | Sections 14.6.1.1.1 and 14.6.1.4.1; Sections 5.1.1 and 8.1 of Appendix 14-A | <p>Context: When assessing the release characterization of Bounding Scenario 1, the Proponent assumed that 95% of the released uranium concentrate can be recovered from the release location without sufficient justification, and that different water column depths, i.e., 10 cm and 5 cm, and average water depth of 1.2 m at the release location were used without explanation.</p> <p>Rationale: As the recovery rate of the uranium concentrate would have an impact on the assessment of its potential effects, it is necessary to understand how the recovery rate and water level were selected for assessing this bounding scenario.</p> | <p>Provide further rationale for assuming 95% recovery rate and for using different water column depths for uranium concentrate release characterization.</p> | | Accepted |
| IR-220 | - | CNSC | Accidents and Malfunctions | Section 14.6.1.1.1 Appendix 14-A, Section 5.1.1 | <p>Context: The Proponent states that based on drum deformations performed in a previous analysis (McSweeney et al. 2004), if a drum experienced a crush force of 100,000 lbs., then the deformation of the drum would cause the lid to detach from the</p> | <p>Please provide information and/or rationale as to whether drum stacking would impact drum failure at different speeds and confirm whether 55% drum fail for such an accident is still valid.</p> | | Accepted |

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| | | | | | <p>drum. Using this drum failure mechanism, and assuming the drums weigh 450 kg and are arranged four across in the truck, at a speed of 48 km/h, the front 25% of the drums would fail, at 60 km/h to 97 km/h 55% would fail, at 145 km/h 75% would fail, and at ≥193 km/h all would fail. Given that the speed of the truck is likely between 60 km/h to 97 km/h, it was concluded that less than 55% of the drums would fail upon a traffic accident scenario.</p> <p>It is assumed to be 40 drums per shipment, so some stacking or rows of drums should be expected in this scenario. The drums stacked above could be at greater risk of deformation in a traffic accident. It is not clear whether drums stacking was considered in the previous study cited by the Proponent and whether less than 55% fail is still an adequate percentage of drum failures in such traffic accident scenarios if drums stacking is needed.</p> <p>Rationale: Drum failure percentage will impact the release quantity of uranium in such an accident scenario and then impact the consequence assessment. Therefore, the drum failure should be adequately assessed and supported with sufficient information and justification.</p> | | | |
| IR-221 | - | CNSC | Accidents and Malfunctions | Section 14.6.1.3, Appendix 14-A, Section 7.1 | <p>Context: It is projected that there would be about 100 drums packaged per mill operating day. One trip per day for 330 days per year is assumed for the probability evaluation. This means 100 drums per trip, which is inconsistent with description in section 14.6.1.1.1 where assuming 40 drums in one shipment per day.</p> <p>Rationale: Shipments per day will impact the probability evaluation, and number of drums per trip will impact the release of uranium during an accident.</p> | Please clarify the number of shipments per day and number of drums per shipment that are expected and re-calculate the probability as necessary. | | Accepted |
| IR-222 | - | CNSC | Accidents and Malfunctions | Section 14.6.2.4 | <p>Context: Bounding Scenario 2 consists of the aquatic release of fuel and hazardous chemicals due to traffic accidents. The EIS states that amongst the fuels considered for this scenario, the consequences of the release of gasoline and solvents are bounded by the consequences associated with the release of diesel. Both gasoline and solvents are lighter with higher vapour pressure; therefore, they have a shorter half-life in the aquatic environment and a lesser tendency for adsorption to sediments and suspended solids in the water column. There is no other justification provided to show that the release of diesel can bound other chemicals such as sulfuric acid and sodium hydroxide that are heavier than diesel.</p> <p>Rationale: The release of either sulfuric acid or sodium hydroxide during accident could change the water PH significantly at the releasing location, which would post a negative impact on the local environment.</p> | Please provide further justification that the consequences of the release of sulfuric acid and sodium hydroxide can be bounded by the consequences associated with the release of diesel. | | Accepted |

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| IR-223 | - | CNSC | Accidents and Malfunctions | Section 14.6.4.1 Appendix 7-A, Appendix K | <p>Context: The EIS states that the 3D strip numerical model predicted that stresses and displacements did not show instability in the altered sandstone or basement rock at the location where a freeze wall would be placed around the Phoenix Deposit boundary (RESPEC 2021). The potential damage to the freeze wall due to mine-induced stresses and displacements under this scenario is excluded.</p> <p>Rationale: One outer section of the freeze wall (i.e., north-east freeze wall of the phase 4 mining area) and some internal cross walls are located in the desilicified zone. The RESPEC 2021 report (i.e., Appendix K of Appendix 7-A) appears not to have included the desilicified zone in the geomechanical modeling, nor is provided the stresses and the displacements/deformation of the area northeast of the phase 4 ore body where a significant extent of the desilicified zone exists.</p> | <p>Please provide information on the stresses and displacements/deformation of the area northeast of the phase 4 ore body from the geomechanical studies to demonstrate the resulted stresses and displacements will not impact on the freeze wall integrity after IRs for geomechanical studies for ore extraction are addressed.</p> <p>Technical Discussion Required: Yes</p> | | Accepted |
| IR-224 | - | CNSC | Human Health with respect to radiation exposure | Section 14.6.5.4 Appendix 14-A | <p>Context: For the Bounding Scenario 5 (Process System and Piping Failure), doses to receptors at distances of 100 and 500 metres (0.25 and 0.01 mSv respectively) are predicted. The assessment also indicated that the dose to the unprotected worker staying inside the processing plant during the spill could exceed the 50 mSv dose limit specified by CNSC if workers did not leave the area quickly after the spill.</p> <p>The Proponent did not provide the dose calculations for deriving the dose estimates.</p> <p>Rationale: The method used to estimate effective, equivalent, and committed dose is required to be verified. Sample dose calculations should be included, to confirm use of acceptable input data.</p> | <p>Provide the dose calculations for deriving the dose estimates for workers and members of the public for Bounding Scenario 5 (Process System and Piping Failure).</p> | | Accepted |
| IR-225 | - | CNSC | Human Health with respect to radiation exposure | Section 14.6.5.4 Appendix 14-A | <p>Context: With the Bounding Scenario 5 (Process System and Piping Failure), the Proponent states that Denison ensures that the process is designed to include control measures to reduce the exposure to both workers and members of the public as low as achievable. The measures would ensure that the processing plant is adequately ventilated, and that spills or leaks are detected by loss of system pressure, observation, or flow imbalance.</p> <p>It is not indicated where these additional measures have been detailed/elaborated within the EIS.</p> <p>Rationale: Control measures to reduce the exposure to both workers and members of the public as low as achievable, that are identified in the assessment of Bounding Scenario 5, must be formally documented to ensure that they are carried over into the engineered design of the processing plant.</p> | <p>Provide details on how the control measures to reduce the exposure to both workers and members of the public, identified in the assessment of Bounding Scenario 5, have been formally documented and incorporated in the engineered design of the processing facility.</p> | | Accepted |

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| IR-226 | - | CNSC | Accidents and Malfunctions | Sections 14.6.6.1 and 14.6.6.4 | <p>Context: It is stated that in the case of the accident and for a release amount of 1 kg inside the processing plant, the dose to offsite receptors at 200 m from the Project site was calculated to be less than the CNSC public dose limit of 1 mSv. The analysis also indicated that the dose to a worker in a full-face-piece powered air-purifying respirator who stays in the area would be 88 mSv, which exceeds the annual worker dose limit of 50 mSv.</p> <p>Rationale: Section 14.6.6.1 indicates that 2 kg of uranium concentrate could be released in case of the accident. No rationale is provided why 1 kg rather than 2 kg uranium concentrate is used for dose calculation. If 2 kg is used as the source term, the dose to offsite receptors at 200m and workers in the area would be higher.</p> | Please provide the rationale for using a source term of 1 kg rather than 2 kg of uranium concentrate for the dose calculation to offsite receptors and workers. If sufficient rationale cannot be provided, the doses to offsite receptors and workers should be recalculated using 2 kg uranium concentrate, and the results provide. | | Accepted |
| IR-227 | - | CNSC | Accidents and Malfunctions | Section 14.6.6.1.1 | <p>Context: Bounding Scenario 6 involves a fire and/or explosion within the processing plant, resulting in the release of a large amount uranium to the atmosphere. The airborne source term for this scenario is estimated with equation developed by the United States Department of Energy (USDOE), where the respirable faction is assumed to only include particles of 10 mm and smaller.</p> <p>Rationale: No rationale was provided to support the consideration of only 10 mm and smaller particles. As provided in Table 14.6-3, the particle size of uranium <15 mm is less than 20%. Majority of the uranium particle size is larger than 10 mm. The airborne source term is an important factor for the effects assessment and should be calculated with transparent and justified information/data.</p> | Provide rationale for only considering 10 mm and smaller particles for the respirable fraction. | | Accepted |
| IR-228 | - | CNSC | Human Health with respect to radiation exposure | Section 14.6.6.4 Appendix 14-A | <p>Context: For the Bounding Scenario 6 (Facility Fire and/or Explosion), the predicted dose is less than 1 mSv to a member of the public 200 metres away from the Project site. The analysis also indicated that the dose to a worker in a full-face powered air-purifying respirator who stays in the area would be 88 mSv, which exceeds the annual worker dose limit of 50 mSv.</p> <p>The Proponent did not provide the dose calculations for deriving the dose estimates.</p> <p>Rationale: The method used to estimate effective, equivalent, and committed dose is required to be verified. Sample dose calculations should be included, to confirm use of acceptable input data.</p> | Provide the dose calculations for deriving the dose estimates for workers and members of the public for Bounding Scenario 6 (Facility Fire and/or Explosion). | | Accepted |
| IR-229 | - | CNSC | Human Health with respect to radiation exposure | Section 14.6.6.4 Appendix 14-A | <p>Context: With the Bounding Scenario 6 (Facility Fire and/or Explosion), the Proponent states that Denison would ensure that the design of the plant includes control measures to reduce the exposure to both workers and members of the public to levels that</p> | Provide details on how the control measures to reduce the exposure to both workers and members of the public, identified in the assessment of Bounding Scenario 6, have been formally | | Accepted |

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| | | | | | are as low as achievable. The measures would ensure that the processing plant is adequately ventilated. It is not indicated where these additional measures have been detailed/elaborated within the EIS. Rationale: Control measures to reduce the exposure to both workers and members of the public as low as achievable, that are identified in the assessment of Bounding Scenario 6, must be formally documented to ensure that they are carried over into the engineered design of the processing plant. | documented and incorporated in the engineered design of the processing facility. | | |
| IR-230 | - | CNSC | Accidents and Malfunctions | Section 14.6.7.4 | Context: It is stated that a conservative penetration time of 15 min was applied in the assessment. Based on this assumption, the maximum depth of contamination could be 90 cm (for penetration rate of 0.1 cm/s). It is not clear why the penetration time of 15 minutes is considered conservative as the penetration time would depend on the time needed for the emergency response team to respond. It is also stated that the wide range of the calculated velocities is a result of variation of soil conditions and the slope of the surface. The distance that the groundwater can travel under these extreme (i.e., conservative) conditions ranges from 0.15 m to 100 m. It is not clear how the groundwater travel distance of 0.15m and 100m is calculated. Rationale: The penetration time will influence the penetration depth of the released materials, which in turn, considering the groundwater travel distance, will impact the potential areas and volumes of contaminated soils and shallow groundwater. | Please provide justification for applying 15 minutes of penetration time, and why it is considered conservative. In addition, please provide information on how the groundwater travel distance of 0.15 m and 100 m was obtained. | | Accepted |
| IR-231 | - | CNSC | Accidents and Malfunctions | Sections 14.6.6.4 and 14.6.6.5 | Context: The EIS states that in the unlikely event of an unmitigated accidental release of uranium due to a dryer explosion, doses to the workers are expected to have a moderate effect, while doses to members of the public are expected to have a minor effect. Based on this evaluation, the severity of the consequences of this accident and malfunction scenario is predicted to be moderate. In consideration of both probability and consequences, the overall risk related to Bounding Scenario 6 is predicted to be low. Rationale: When there is an explosion within the process plant, it is likely there will have worker fatality. The severity of the consequences of an explosion would be catastrophic and the risk of Bounding Scenario 6 would be higher. | Please re-evaluate the consequence and the risk of Bounding Scenario 6 by considering the potential worker fatality resulted from an explosion. | | Accepted |
| IR-232 | - | ECCC | Change to an environmental | Appendix 14-A, Table 3-7, ID# 7.1 | Context: The Proponent indicates in Appendix 14-A, Table 3-7 that a release of sulfuric acid is a low consequence event therefore | 1. Provide the volume and the concentration of sulfuric acid that will be stored on site. | | Accepted |

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| | | | component due to hazardous contaminants | Appendix 14-A, Table 5-5 | <p>would not require further assessment. However, according to a Safety Datasheet on high concentrated sulfuric acid (ICSC–0362 - SULFURIC ACID, concentrated (> 51% and < 100%) (ilo.org)), the substance is incompatible with certain materials and can give off toxic fumes. Furthermore, it reacts with various metals to produce hydrogen gas, which is explosive.</p> <p>The Proponent provides estimates of chemicals, including sulfuric acid, to be transported to site in Appendix 14-A, Table 5-5. The annual consumption of sulfuric acid is estimated at 15,417 m3, in 617 trucks per year, but the concentration is not stated.</p> <p>Rationale: Given the high reactivity and inherent corrosive nature of sulfuric acid combined with the volume and concentration that may be stored on site, ECCC requests that the Proponent provide a detailed risk assessment related to a terrestrial spill of sulfuric acid, specifically at the processing plant.</p> | 2. Provide a detailed risk assessment of the fate and behavior of sulfuric acid during a release into the environment. | | |
| IR-233 | - | HC | Human health with respect to hazardous contaminants | Appendix 14-A, Section 8.7 (p. 8.10) | <p>An effects assessment for a transportation accident scenario involving radioactive materials was not included.</p> <p>Context: The Proponent provided an effects assessment relating to a diesel spill on the ground (Section 14 Appendix 14-A, Section 8.7). However, no information was provided regarding the potential human health effects of a uranium concentrate release at the two locations considered (Section 14 Appendix 14-A p. 8.10).</p> <p>Rationale: An accident involving radioactive material may have an impact on human receptors, based on the proximity of receptors and the proposed response protocols.</p> | 1. Assess and describe the potential health effects (chemical and radiological) of a transportation accident involving a uranium concentrate spill at the following locations: a) km 160 of Hwy 914, which is the location of a cultural camp that has been established by the ERFN. b) km 67 of Hwy 914, which is a gathering location for the Kineepik Métis Local associated with the Northern Village of Pinehouse. c) All other potential sites of importance for the public and Indigenous peoples. | | Accepted |
| IR-234 | | CNSC | Effect of Environment | Section 15.2.2 | <p>Context: Effects of seismic events on the uranium extraction and post decommissioning are not assessed.</p> <p>Rationale: Seismic events could further exacerbate the stability of the voids induced by the uranium extraction, which will result in extra stresses and displacements/deformation in the overlying rock formations. These extra stresses and displacements/deformation could impact on the mine operation and post decommissioning groundwater flow and contaminant transport.</p> | <p>Please provide an assessment of seismic events on the mine-induced voids stability and the resulted effects on the mine operation and post decommissioning.</p> <p>Technical Discussion Required: Yes</p> | | Accepted |
| IR-235 | - | ECCC CNSC | Fish and fish habitat | Section 15.5.2, Expected Environmental Conditions | <p>Context: In this section it is stated that: “Table 15.5-1 and Table 15.5-2 summarize the predicted mean values of the climate variables for the Tomblin Lake regional grid unit, following the RPC4.5 and RCP8.5 scenarios, respectively, as indicated by the Climate Atlas (PCC 2019).”</p> | 1. Provide the source of the data displayed in Max 1-Day Precipitation (mm) category in Tables 15.5.1 and 15.5-2. 2. Provide detailed calculations for the following average values: <ul style="list-style-type: none">25.9 mm 26.7 mm in Table 15.5-1: Predicted Climate Conditions of a RCP4.5 Moderate Carbon Future | | Not Accepted |

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| | | | | | <p>RCP4.5 represents predicted climate conditions of a moderate carbon future.</p> <p>RCP8.5 represents predicted climate conditions under a high carbon future.</p> <p>The values shown in Tables 15.5-1 and 15.5-2 show averages of 25.9 and 26.7 mm for RCP4.5 and 25.9/27.5 mm for RCP8.5. These values do not correspond to the source indicated by the Proponent.</p> <p>Rationale: Based on the Proponent’s description we would expect to find the same values for “Max 1-Day Precipitation (mm)”in the Climate Atlas for RCP4.5 and RCP8.5 scenarios. ECCC was unable to duplicate the results.</p> <p>ECCC queried the Climate Atlas for Tomblin Lake and returned a result of “Region Geikie River.” https://climateatlas.ca/find-local-data</p> <p>ECCC then queried the Climate Atlas for Max 1 Day Precipitation (mm). https://climateatlas.ca/data/grid/782/maxdaypr_2030_85/line https://climateatlas.ca/data/grid/782/maxdaypr_2030_45/line The results displayed an array of values ranging from 83.6 mm (2050) to 87.3mm (2092) for a Regional Concentration Pathway RCP8.5 scenario and values ranging from 48.9mm (2050) to 89.5 mm (2083) for an RCP4.5 scenario.</p> <p>These values do not match the averages shown in Tables 15.5-1 and 15.5-2.</p> | <ul style="list-style-type: none">25.9 mm 27.5 mm in Table 15.5-2: Predicted Climate Conditions of a RCP8.5 High Carbon Future <p>3. Explain how the data shown in Tables 15.5.1 and 15.5.2 were used in the precipitation risk assessment.</p> <p>4. Denote the differences between “mean”, “value/max value”, and “fluctuation”, in the calculation of extreme event risk.</p> <p>5. Compare model derived data against:</p> <ol style="list-style-type: none">Natural variability of the observed data.Variability in the statistics generated via observation based time series. <p>Technical Discussion Required: Yes</p> | | |
| IR 236 | - | ECCC ERAD | Fish and fish habitat | Section 15.5.2, Expected Environmental Conditions | <p>Context: It is stated that, “Table 15.5-1 and Table 15.5-2 summarize the predicted mean values of the climate variables for the Tomblin Lake regional grid unit...”</p> <p>As per the Proponent’s description, Tomblin Lake was chosen as representative location for Wheeler when Climate Atlas was used as data source.</p> <p>Rationale: In those two tables, for the “Max 1-Day Precipitation (mm)” the historical average is given as 24.1mm. Local time series analysis for the climatic region in which Wheeler Project is located provide averages (for 1-day max precipitation) of approximately 30+ mm.</p> <p>It is the Proponent’s responsibility to keep the required database current and up to date, because the length of the time series</p> | <p>1. Provide a clear explanation on how the historical mean for 1-Day Max Precipitation was calculated.</p> <p>2. Compare the values obtained via various means (ex: copied from the internet, modeled via some online algorithm, derived from specialty literature), against time series analysis based on observations.</p> <p>Technical Discussion Required: Yes</p> | | Not Accepted |

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| | | | | | influences all derived statistics. Statistical analysis of extreme events is highly dependent of the mean with extreme values reaching values 3 to 4 times higher than the mean. | | | |
| IR-237 | | CNSC | EA follow-up and monitoring program | Appendix 16-C throughout, including Table 1.5-1: Wheeler River Monitoring and Follow-up Program Summary (p. 8-15) | <p>Context: CNSC’s Generic Guidelines for the Preparation of an EIS state: “The EIS should provide discussion on the follow-up program’s requirements, and include:</p> <ul style="list-style-type: none">objectives and structure of the follow-up program and the VCs targeted by the programtabular summary and explanatory text of the main components of the program including:<ul style="list-style-type: none">a description of each monitoring activity under that component<u>which of the two generic program objectives the activity is relevant to (e.g., verify EA predictions, determine effectiveness of mitigation measures)</u>the specific statement from the EA that goes along with that generic objective and will be the focus for that activity (e.g., program objective: verify predicted effects; environmental assessment effect: no potential adverse effects)the specific monitoring objective for that activityplanned schedule<u>roles and responsibilities to be played by the Proponent, regulatory agencies, Indigenous people, local and regional organizations and others in the design, implementation and evaluation of the program results</u><u>possible involvement of independent researchers</u><u>program funding sources</u>information management and reporting (reporting frequency, methods and format)<u>possible opportunities for the Proponent to include the participation of the public and Indigenous groups, during the development and implementation of the program</u> <p><u>The follow-up program plan should be sufficiently described in the EIS to allow independent judgment as to the likelihood that it will deliver the type, quantity and quality of information required to reliably verify predicted effects (or absence of them) and confirm the effectiveness of mitigation measures.”</u> (Section 11)</p> <p>Rationale: The Summary of Monitoring and Follow-up Programs provided in Appendix 16-C contains very high-level information,</p> | <p>It is recognized that this document will evolve over the planning process and be finalized prior to the EA Decision; however, as plans are developed and revised, CNSC staff expect that updates will be made to this document and provided with any future versions of the EIS.</p> <p>Appendix 16-C Summary of Monitoring and Follow-up Programs must include sufficient details to allow CNSC staff to determine the likelihood that it will deliver the type, quantity and quality of information required to reliably verify predicted effects (or absence of them) and confirm the effectiveness of mitigation measures. This includes concrete monitoring plans (sampling locations, frequency, etc.).</p> <p>Additionally, please incorporate any relevant information included in the EIS into this Summary.</p> | | Accepted |

| Original IR# | Follow-Up IR # | SME | Project Effects Link | Reference to EIS, appendices, or supporting documentation | Context and Rationale | Information Requirement (IR) | Rationale for Status | Status |
|--------------|----------------|------|---|---|---|--|---|----------|
| | | | | | <p>and while some of the aspects detailed in the Generic EIS Guidelines are included, the aspects underlined are missing or appear incomplete.</p> <p>Further, all information from throughout the EIS should be incorporated into this Summary. For example, the EIS notes that: “Groundwater samples will be collected at least monthly and semi-annually in the wells within the freeze wall and on the freeze wall perimeter, respectively” (p. 7-109) and that “At least five to seven multi-well clusters are proposed across the mined area (Figure 7.8-2). Sampling will include KI parameters or the full suite of COPC at different times in the remediation process” (p. 7-111).</p> <p>These details (only examples) are not included in Appendix 16-C.</p> | | | |
| IR-238 | - | CNSC | Current use of lands and resources for traditional purposes | Various sections of the EIS, including: Section 8 Section 9 Section 10 Section 11 Section 12 Section 15 Section 16 Appendix 16-C (p. 3) | <p>Context: The EIS indicates that “further detailed [follow-up and monitoring programs] will be developed as Project designs are finalized that may influence the nature, frequency, and locations of monitoring. In addition, input from regulatory agencies, the public and Indigenous Peoples will be considered.” (Appendix 16-C, p.3)</p> <p>It is not clear in several section(s) of the EIS and the Indigenous Engagement Report, whether Denison has provided the interested Indigenous Nations and communities with the opportunity to participate in the development, implementation, and review of monitoring and mitigation measures, as per the guidance of REGDOC-3.2.2 and CNSC’s Generic EIS Guidelines.</p> <p>Rational: As outlined in Section 11 of CNSC’s Generic Guidelines for the Preparation of an EIS, please include roles and responsibilities to be played by the Proponent, regulatory agencies, Indigenous people, local and regional organizations and others in the design, implementation and evaluation of the monitoring program results as well as possible opportunities for the Proponent to include the participation of the public and Indigenous Nations and communities, during the development and implementation of the program.</p> | <p>Please provide additional information to demonstrate whether Indigenous Nations and communities were engaged directly on the potential mitigation and monitoring measures to address the concerns raised regarding potential impacts of the Project on the potential or established Indigenous and/or treaty rights.</p> <p>Provide a rationale if this engagement has not been completed. As the Project develops, please provide concrete actions Denison will take in the follow-up and monitoring programs to engage Indigenous Peoples to alleviate concerns and incorporate their interests, and when this engagement is planned to take place.</p> | <p>This response has not been accepted.</p> <p>Please provide additional information and updates on engagement activities to the EIS and IER (to date) that demonstrate whether Indigenous Nations and communities have been engaged directly on the potential mitigation and monitoring measures to address the concerns raised regarding potential impacts of the Project on the potential or established Indigenous and/or treaty rights. See also AD-62 in the Advice to Proponent table.</p> | Accepted |

Annex 3 Draft Advice to Proponent Table

Federal Indigenous Review Team (FIRT) – Advice to the Proponent for the Wheeler River Environmental Impact Statement (EIS) May 2024**The [March 2023 Advice to the Proponent table](#) and [November 2023 Advice to the Proponent table](#) with Denison’s responses are available below

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Advice to the Proponent |
|--------|--|--|--|---|
| AD-72 | Canadian Nuclear Safety Commission (CNSC) | Section 7.4.2 | Denison’s response to IR-61 was accepted, but the term “inducted seismic” should be updated to “induced seismicity” in section 7.4.2.4 | CNSC staff requests that Denison review the draft EIS for inaccuracy of scientific terms which cast doubt on the credibility of the EIS, such as the use of the term “inducted seismic” instead of “induced seismicity” in section 7.4.2.4. It is suggested that Denison review the entire revised EIS once again to address similar inaccuracies. |
| AD-73 | CNSC | Section 8.1.3.4.2 Probable Maximum Precipitation (PMP) Events Appendix 8C | In Section (List of Appendices, p. iv) of “S8_App 8-C Hydrological Effects Assessment Report Wheeler River” states “Appendix III- Response to IR-103”. This is incorrect and refers to IR-103. | This reference should be edited to “Appendix III- Response to IR-102.” |
| AD-74 | Environment and Climate Change Canada (ECCC) | Section 2.2.3 Project Description Proponent response to IR-12-R1B | The Proponent provided maps of the proposed water management structures for the road to the airstrip and the airstrip in Attachment IR-12. However, they should commit to including them in the Final EIS. Inclusion of these maps will allow for improved understanding of site water management and transportation of non-contact water. | ECCC recommends that the Proponent Include maps of the proposed water management structures for the road to the airstrip and the air strip, provided in Attachment IR-12, in the Final EIS. |
| AD-75 | ECCC | Section 8 (Aquatic Environment); Appendix 10-A (ERA) | The predicted effluent concentration of 42 ug/L for the proposed Project represents a very high concentration of selenium. For comparison, the Canadian Council of Ministers of the Environment (CCME) guideline is 1 ug/L (January, 2022: Proposed Approach for Coal Mining Effluent Regulations – Discussion Document (canada.ca)) | Given the high selenium concentrations predicted in the discharge, ECCC recommends that the Proponent: <ul style="list-style-type: none">Identifies effective mitigation measures (including source control) to avoid effects in the receiving environment, and Analyzes the extent to which selenium concentrations in effluent can be reduced. |
| AD-76 | ECCC | Section 2.2.3 Project Description Proponent response to IR-12 | While the Proponent did provide in Attachment IR-12 the requested proposed water management structures, for the road to airstrip and the airstrip, the information surrounding the proposed water management structures is found within multiple documents which makes it difficult for readers to understand the resulting impacts to water quality. | The proposed water management structures for the road to airstrip and the airstrip should be included in the Final EIS to allow for the effects of these structures to be more readily understandable. Additionally, the Proponent should respond to questions within a single document to reduce the complexity involved in understanding the environmental effects of the Project. |
| AD-77 | ECCC | Section 8.4.4.2.3, Aquatic Environment IR-124-R1 Response from Denison | CSA N288.6-22 is the latest standard for the nuclear industry for the assessment of risk associated with releases from the nuclear industry to the environment. The statistical and environmental considerations required in the establishment of baseline data as well as the use of mathematical models are set out in the standard to ensure that the risk assessments are defensible. | The Proponent should apply CSA N288.6-22 to risk assessment for sediment where appropriate. |
| AD-78 | ECCC | Section 9.3.3.3, Baseline Studies Section 9.3.5 Mitigation Measures IR 142, 159, and 167 Responses from Denison IR-142-159-167-R1 | It is unclear how conducting wildlife sweeps seven days in advance will adequately identify and mitigate for all species, especially species at risk. Similarly, uncertainty remains regarding how adaptive management mechanisms will be triggered. Note that active terrestrial nest searches for birds, including avian species at risk, are generally not recommended by ECCC or the province of Saskatchewan (Publications Centre) | The Proponent should develop species specific mitigation measures, and provide these for review. Species specific mitigations should take into account the ecology of individual species at risk, including habitat requirements, nesting/denning or other important landscape features and timing of life stages as they relate to project construction and operation. The Proponent should conduct literature |

¹ Unless otherwise stated, the section noted refers to the draft EIS

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Advice to the Proponent |
|--------|------------|---|--|---|
| | | IR-170 | <p>saskatchewan.ca) because they are likely to cause disruption to breeding activities and are largely ineffective for passerines.</p> <p>However, if avian nest searches in simple habitats (as outlined in the <u>Guidelines to avoid harm to migratory birds</u>) are undertaken, then information should be provided on methods and timing for review. Conducting a nest search seven days in advance of works may be too far in advance to detect all possible nests. Nest searches should be conducted as close to the clearing or construction dates as possible. Developing species specific mitigation measures based on habitat potential mapping, prior to nest searches, can reduce construction delays, as advice on these measures would be available for implementation.</p> <p>For certain projects or locations, additional more specialized surveys may be warranted (e.g., radar surveys, or foot-based counts of colonially nesting birds).</p> | reviews to find proven mitigations for all species at risk within the project area. ECCC is available to discuss these measures with the Proponent. |
| AD-79 | ECCC | Section 9.3.6.4 IR-149-R1B | <p>In their IR response, the Proponent states “English River First Nation and SVS (2022) compiled an IK study documenting current and past land use, knowledge of the land, and participants’ perspectives on potential Project effects, as well as cumulative effects from past mining and other developments. The report identified a wildlife corridor used by several species, including woodland caribou. The corridor runs between Cree Lake (approximately 40km southwest of the Terrestrial RSA and Russell Lake (in the southern portion of the Terrestrial RSA (Feature 1001-09; ERFN and SVS 2022). The report identified a caribou calving area: Feature 1009-07 covering large portions of the Terrestrial RSA with the exception of the most western, northern, and eastern extents. This area is also described as offering good caribou habitat year-round (ERFN and SVS 2022).”</p> <p>The Proponent has also provided mapping showing that there are calving areas within the RSA.</p> <p>Calving is an important life history function that occurs within specific biophysical attributes. It is important to mitigate these effects.</p> | Since both the mapping provided as part of the EIS and the English River First Nation study indicates that there is calving areas within the RSA, incorporating mitigation measures related to timing of sensory disturbances during calving season into the Caribou Management Framework would enhance the caribou management plan. |
| AD-80 | ECCC | Section 9.4.1.2, Key Indicators and Measurable Parameters IR-158 | <p>The Proponent identified key indicator species for migratory songbirds, waterbirds and upland game birds, but did not provide any justification on why these species were chosen. It is important to understand why a certain species was chosen as an indicator in order to assess whether the that species possesses similar life history characteristics.</p> | <p>During pre-construction, construction and operational monitoring, the Proponent should consider any trends and changes to the avian community, including the key indicator species which are representative of other species that may be more difficult to monitor for implementation of adaptive management. (see IR-159 for additional input).</p> <p>Appendix 9-D provides an assessment of three additional key indicator species (Barn Swallow, Bank Swallows, Horned Grebe). All eight key indicators for avian species at risk should be accounted for.</p> |
| AD-81 | ECCC | 9.4.3.2.3 Baseline Studies – Migratory Songbirds Appendix 9-B, Section 2.10.2, Results IR-159 | <p>Although the Proponent notes that the supplemental data did not result in a different conclusion in the EIS and would not require updates to the mitigation measures, it was acknowledged that the data did provide further context for the RSA. Interpreting the original baseline data as well as the supplemental data in the context of the Project (i.e. what species were at what densities in which areas/ecosites) provides a more robust baseline with which to compare construction and operational monitoring data. This is particularly important in the context of species’ natural variability.</p> | Even if the supplemental data did not change the conclusions in the EIS, the data is essential for comparison reasons. Data collected during construction and operational monitoring should be compared with baseline data to test predications on impacts from the project, and whether mitigation measures are effective. |
| AD-82 | ECCC | Section 9.3.3.3, Baseline Studies IR-143 and 144 Responses from the Proponent | <p>In their IR response, the Proponent notes that “the majority of these data points illustrated in Figure 2-2 and Figure 2-3 in revised draft EIS Appendix 9-F are located beyond the LSA and to the north and east of the Project Area.”</p> | ECCC advises that the Caribou Management Framework should consider the entire LSA as being used by caribou for all their life functions and that mitigation |

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ¹ | Context and Rationale | Advice to the Proponent |
|--------|------------|--|---|--|
| | | | <p>ECCC notes that the baseline studies done for the Project were limited in scope and scale, and the map showing telemetry data from the province of Saskatchewan shows caribou use throughout the LSA and RSA.</p> <p>ECCC notes that trail camera, pellet, incidental and telemetry data only provide a small snapshot of actual habitat use.</p> | <p>measures, including offsetting, be developed with the understanding that this Project poses a medium level risk to caribou using the area.</p> |
| AD-83 | ECCC | Section 9.3.3.3, Baseline Studies IR-149-R1A IR-152. | <p>ECCC notes that the Proponent indicates a commitment to continuing to work with the province regarding caribou offsetting through the finalization of the Caribou Management Framework.</p> | <p>ECCC notes that at this time there are not enough details in the Caribou Management Framework for ECCC to provide advice on the appropriateness of the offsetting measures.</p> |
| AD-84 | ECCC | Section 9.3.5.2, Additional Wildlife specific Mitigation Measures Proponent response to IR-149 | <p>ECCC notes that Figure 2.4 of Appendix 9-F, shows that there is suitable calving habitat in close proximity to the airstrip, including within the LSA just west of the airstrip and along the Wheeler River at the southeast end of the LSA. ECCC notes that information is not yet available on the timing and frequency of air traffic.</p> <p>The Proponent has provided some potential measures likely to be incorporated into operations of the airstrip. The Proponent states that they will use the most direct path, however, important areas for caribou (e.g. calving grounds) may be located along the most direct route. Figure 2.4 of Appendix 9-F, shows that there is suitable calving habitat in close proximity to the airstrip, including within the LSA just west of the airstrip and along the Wheeler River at the southeast end of the LSA.</p> | <p>ECCC advises that mitigation and monitoring should be developed to address sensory impacts as a result of the airstrip. The Caribou Management Framework should incorporate consideration of the proximity of air traffic to important landscape features for caribou, as well as timing of flights during important life stages (e.g. calving).</p> |
| AD-85 | ECCC | Section 9.3.6.4.1 Section 9.3.7.3.1 | <p>The Proponent notes that the size of the SK1 Boreal Shield range is estimated at 18,034,870 ha (ECCC 2020), resulting in an estimated additional Project-related disturbance of 0.001% at the scale of the SK1 Boreal Shield Woodland Caribou Management Unit. The Proponent concludes that the contribution of the Project to cumulative effects on woodland caribou within the SK1 conservation unit are negligible.</p> | <p>Although the Proponent has provided information to show that the Project has negligible impacts at range scale, this Project poses a medium risk to caribou at the local and regional scale due to the proximity of important features for caribou within the LSA and RSA. Mitigations for sensory disturbance during critical life stages such as calving should be developed and included within the Caribou Management Framework. Measures to monitor the effectiveness of implementation are also needed.</p> |
| AD-86 | ECCC | Section 9.3.5.2 Appendix 9-E Wheeler River Project Caribou Management Framework | <p>Much of the information presented in the Wheeler River Project Caribou Management Framework is qualitative in nature and does not present specific details regarding a quantitative assessment of impacts following measures to avoid, minimize, restore on-site and determine the offset. This is required in order to understand if offsetting is sufficient to address impacts to caribou.</p> <p>The updated Wheeler River Project Caribou Management Framework indicates that the Proponent will use the SK ENV caribou offset calculator. Without information on the amount of offsetting that will be implemented, ECCC cannot advise on whether the amount is appropriate in the context of the species Recovery Strategy.</p> <p>Although the Proponent has provided an updated draft Caribou Management Framework, information regarding offsetting remains outstanding. The Proponent notes that SK ENV is developing a boreal caribou habitat offset calculator and that the Caribou Management Framework will be finalized using that tool as part of the provincial approvals.</p> | <p>Information is still lacking on the amount of habitat offset required to balance against Project effects. Therefore, the Caribou Management Framework should be updated with outstanding information.</p> <p>The Proponent should consider offsetting effects associated with this Project. However, ECCC is unable to specify an offsetting amount at this time as there was insufficient information provided by the Proponent. ECCC acknowledges that the Proponent has committed to working on their offset plan with the province of Saskatchewan. However, offsetting measures, outputs, and priority locations should be confirmed in draft plans and submitted for review. Without additional information on the Proponent’s mitigation measures, including offsetting measures, ECCC cannot provide advice on whether project effects will be mitigated.</p> |

Federal Indigenous Review Team (FIRT) – Advice to the Proponent for the Wheeler River Environmental Impact Statement (EIS) November 2023

** The new [newest Advice to Proponent table](#) is available above

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ² | Context and Rationale | Advice to the Proponent |
|--------|------------|---|---|--|
| AD-50 | ECCC | Section 2.2.1.4.2, Wellfield Operation Section 2.2.1.4.2.2, Secondary Containment of Mining Solution – Pumping | Providing a report or memo by the Proponent’s consultant Newmans Geotechnique Inc. as a public record will more effectively explain the “information on the freeze wall integrity and basis for the design, which relies on site field data and lived experience from several exiting [sic] Saskatchewan mining operations”, than a summary (attachment IR-10) of the material presented by Greg Newman during the meeting with the FIRT on April 19, 2023. | The response from the Proponent in IR-10 is accepted based on the meeting between ECCC, Denison and the CNSC, as well as the Proponent’s consultant and the presentation by Greg Newman (Newmans Geotechnique Inc.) as well as the summary of the meeting noted in attachment IR-10. However, the Proponent should provide a public record of the consultant’s memo or a report that explains the details of the freeze wall containment and monitoring that were provided during the April 19, 2023 meeting instead of the summary provided by the Proponent in attachment IR-10. |
| AD-51 | CNSC | Section 8.3.3 and 8.5, Aquatic Environment and Fish health | Denison has committed to additional baseline data gather as part of their response to IR-107. | Also related to IR-120 and IR-125, CNSC staff recommend Russell Lake be included in this baseline collection to increase the robustness of the established baseline in the final EIS. |
| AD-52 | CNSC | Section 8.3.3.1, Methodology and Metrics | Denison has indicated that exposure to other pre-existing stressors could result in abnormal conditions or deformation(s) in existing population, but the extent of existing conditions should be evaluated to ascertain whether the rate is increasing as a result of proposed activities once in operation. | Related to IR-121, CNSC staff recommend that Denison add text to EIS to reflect that no gross abnormalities in fish were observed during field work. |
| AD-53 | CNSC | Section 8.3.8, Monitoring and Follow-up | Section 8.3.8 of the EIS states: "Changes in fish communities/populations will be assessed through comparison of Construction, Operation, and Decommissioning results to pre-development." Tracking changes in fish communities / populations in reference lakes over time should be conducted, as reference lakes can be used to differentiate natural temporal variation with potential project impacts. Denison has committed to inclusion of reference lakes in study designs used to assess changes in fish communities / populations over time. | Related to IR-122, CNSC staff recommend that Denison strengthen discussion of reference lakes, and their use, in EIS. |
| AD-54 | CNSC | Section 9 Various pages in section 11.1, Land and Indigenous Resource Use Section 12 Section 14 | The increased road traffic (14-18 trucks per day during construction/operations) may have indirect impact on ungulates, furbearers and wood land caribou presence/absence for traditional and subsistence hunting have been raised to CNSC staff when meeting with Indigenous Nations and communities and are presented in the EIS. | Related to IR-128, Denison should have follow-up discussions with the Ministry of Saskatchewan Highways, Indigenous Nations and communities (including KML and ERFN) and stakeholders regarding adding additional pull-outs to the highway to ensure safety for northern residents. |
| AD-55 | ECCC | Section 9.2.5.2.7, Waste and HazardousMaterials Management | Vehicles and equipment with engines adhering to Tier 4 emission standards should be employed where feasible in order to minimize emissions. Regardless of engine tier used, best management practices should be followed, including proper maintenance of engines and anti-idling measures. | Related to IR-139, the Proponent should commit to following best management practices regarding the use of vehicles and equipment, including proper maintenance of engines and anti-idling measures. |
| AD-56 | ECCC | Section 9.3.1.3.1, Spatial Boundaries for Ungulates, | The EIS and the IR response did not provide sufficient information to understand how the Regional Study Area (RSA) boundaries for caribou were determined. | Related to IR-137, An assessment typically involves setting a geographic area for the assessment for the direct and indirect effects of a proposed project; this area is |

² Unless otherwise stated, the section noted refers to the draft EIS

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ² | Context and Rationale | Advice to the Proponent |
|--------|------------|--|--|---|
| | | Furbearers and Woodland Caribou | | <p>sometimes referred to as the Local Study Area (LSA). ECCC advises that the LSA is likely to extend beyond the Project footprint and a 500m buffer. ECCC demonstrated that the application of a 500m buffer to mapped anthropogenic features best represents the combined effects of increased predation and avoidance on caribou population trends at the national scale (Environment Canada, 2011). However, adverse effects of projects including predator and prey access to undisturbed areas, reduction in connectivity, and sensory disturbance to individuals of boreal caribou can vary and extend several kilometers depending on project activities and ecological context. The LSA should at the minimum capture the above-mentioned effects.</p> <p>A Proponent will also set a geographic area for the assessment within which the cumulative effects of the proposed Project are possible; this is sometimes referred to as the RSA. Typically the range(s) is(are) the proper scale to assess cumulative effects. However, assessing cumulative effects may require a different approach for large continuous ranges than for smaller discrete ranges. The impact of disturbance that may be concentrated in part of a large continuous range may be masked given the size of the range. For large continuous range it may be relevant to assess cumulative effects at the scale of the range but also at a smaller scale.</p> <p>The Proponent should consult with experts of the relevant jurisdiction in order to determine the local and regional study area, and provide a justification of the extent of the study areas in the impact statement.</p> |
| AD-57 | ECCC | Section 9.4.5.2.1 Work Timing Windows and Habitat Disturbance | <p>In their response to IR-167, the Proponent states: “Site clearing and other works that involve disturbance of vegetation and/or soil will be completed during least-risk timing windows for migratory birds and SAR (i.e., winter), where practical, to avoid disturbance during sensitive time periods. It is noted that additional information related to timing windows and species as it concerns Project activities has been provided in response to IR-134.</p> <p>Pre-clearing surveys will be conducted and set-back buffers implemented, as needed. The pre-clearance surveys will be completed prior to all clearing events, regardless of the time of year / season when clearing is set to occur. If nests or tree cavities should be encountered during pre-construction surveys or ongoing monitoring activities, any subsequent Project activities will be in accordance with the 2022 Migratory Birds Regulations.”</p> <p>ECCC does not recommend the use of nest searches or pre-clearing surveys for active bird nests during the breeding season as a mitigation. Instead, ECCC recommends that clearing and grubbing activities not be conducted during the breeding bird season.</p> <p>ECCC does not recommend active nest searches in most cases and for most species, in part because there is a great degree of difficulty associated with reliably detecting nests and a high likelihood of disturbing or damaging active nests while searching.</p> <p>Exceptions to the general nesting period exist, and these include interannual variation and nest searches for certain species which may breed outside of these general periods. Under the MBCA it is prohibited to destroy a nest with a live bird or viable egg, even if this occurs outside of what might be considered a normal nesting period.</p> | <p>Related to IR-167, provide details on how vegetation clearing related to site development will be conducted to avoid harm to migratory birds and species at risk (SAR).</p> |
| AD-58 | HC | Section 10.1.4.2.1 (p. 10-22) | Section 6 of the Draft EIS contains Table 6.1-1 (p. 6-7), which lists radionuclides as a key indicator for air quality. | Related to IR-177, consider rewording Table 6.1-1 to “radon” instead of “radionuclides” to avoid confusion. |

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ² | Context and Rationale | Advice to the Proponent |
|--------|------------|--|--|--|
| | | Appendix 10-A (ERA): Appendix B Table B.9, Ref. 19-2638 Section 6, Table 6.1-1 (p. 6-7) | Only uranium and radon are considered in Section 6, and Section 10 Table B.9 does not include doses from uranium progeny in air. | |
| AD-59 | CNSC | Section 10.1.6.1.1, Human Receptors Selection and Characterization | <p>Within the Human Health assessment, offsite receptors during the operation period are only considered downstream of Whitefish Lake. The only identified concern was for Se to the Fisher/Trapper located at Russel Lake. This section cites Indigenous Knowledge as informing the receptor selection and location.</p> <p>While the assessment is fairly conservative in the assumptions made on intake and receptor habits, it stands to reason that if the trapper receptor was located closer to the operation, such as at McGowan or Whitefish Lakes, this exceedance of Se could be more pronounced.</p> <p>In terms of maintaining a conservative assessment, if the most vulnerable receptor can be shown to be protected at the point of highest expected COPC concentration, it can be concluded that this receptor would be protected further away from the project. Considering this, why was the hunter/trapper receptor not also assessed at Whitefish or McGowan Lake? Was Indigenous Knowledge specific in mentioning Whitefish or McGowan Lakes were not used for the activities carried out by identified receptors?</p> | <p>Denison has addressed IR-180, but has not considered the suggestion for establishment of additional treatment technologies of COPCs.</p> <p>CNSC staff maintains that there may be the need to establish additional treatment for effluent should environmental monitoring during operation indicate COPC's are accumulating in the environment beyond what is anticipated in the EIS.</p> <p>This is a firm reminder that this will be evaluated as part of the licensing phase of the project, should it proceed.</p> |
| AD-60 | CNSC | Section 11, Perceived Risks to Lands and Resources | <p>The EIS states: "Resource users may also experience changes in their perception of the quality of resources for consumption such as the palatability of fish or wildlife or have apprehensions about the safety of resources for consumption. These changes may affect the patterns of ILRU during all Project phases including Post Decommissioning. The ERFN refer to this indicator as a "psycho-social" effect, meaning that even if people know their fears are "<i>perceived fears, the fear ... is real and has real impacts on ERFN members' perception of their overall health and well-being</i>" (ERFN and SVS 2022a)." (p. 11-11)</p> <p>CNSC's Generic Guidelines for the Preparation of an EIS state: "The EIS will document specific suggestions raised by Indigenous groups for mitigating the effects of changes to the environment on Indigenous peoples (section 5(1)(c) of CEAA 2012). For the mitigation measures intended to address the effects of changes to the environment for Indigenous peoples, the Proponent must discuss the residual effects with the Indigenous groups prior to submitting the EIS." These changes may affect the patterns of ILRU during all Project phases including Post Decommissioning.</p> | <p>Related to IR-207, as Denison continues to work with Indigenous Communities of Interest on community specific monitoring regimes, please provide additional information in the IER on any updates on engagement activities to date that have taken place with KML and ERFN and any other Indigenous Nations and communities who utilize the area, with respect to follow-up monitoring plans that are being developed to support the Project licensing and permitting.</p> <p>If Denison has made commitments with respect to this, this is information that should also be included in the commitments report.</p> |
| AD-61 | CNSC | Various sections of the EIS, including: Section 9 Section 10 Section 11, including Section 11.1.4.3.1 (p. 11-46) Section 12 Section 16 | <p>ERFN indicated they are concerned about declining moose populations from an influx of hunters; more people may be accessing the area year after year, and worried populations may be affected by the Project (21-EN-ERFN-473.13).</p> <p>Further, the EIS highlights that: "Vehicle collisions are the most likely source of direct mortality for moose. Effective mitigation measures (e.g., breaks in snowbanks; speed limits; and exclusion fencing around contaminated waste pads and ponds) will be implemented to reduce moose mortality." (p. 11-46)</p> <p>To address potential concerns specific to Project related effects to wildlife species of interest to the Indigenous Communities of Interest, Denison has committed to collaborating with ERFN and KML on a monitoring regime suited to each of their interests and needs.</p> | Related to IR-129, Denison needs to ensure that the proposed monitoring regime with ERFN, KML and other Indigenous Nations who utilize the area are included in the commitments table for future EIS submissions. |
| AD-62 | CNSC | Various sections of the EIS, including: Section 8 | IR-238 requested that Denison provide additional information to demonstrate whether Indigenous Nations and communities were engaged directly on the potential mitigation and | Related to IR-238, If Denison has made commitments with respect to engagement activities with Indigenous Nations and communities on potential , this is information that should be included in the commitments report. |

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| | | Section 9 Section 10 Section 11 Section 12 Section 15 Section 16 Appendix 16-C (p. 3) | monitoring measures to address the concerns raised regarding potential impacts of the Project on the potential or established Indigenous and/or treaty rights. As well, it requested that Denison provide a rationale if this engagement has not been completed. As the Project develops, please provide concrete actions Denison will take in the follow-up and monitoring programs to engage Indigenous Peoples to alleviate concerns and incorporate their interests, and when this engagement is planned to take place. | |
| AD-63 | ECCC | Appendix 6-C Climate Baseline and GHG Emissions Report | ECCC recommended that the identification of the sources of GHG emissions and quantification of these emissions be described for the post-decommissioning phase, as was done for the other phases. ECCC recommended that the Proponent discuss the potential impacts that the Project may have on Canada’s ability to meet its climate-related targets, following the guidance of the Strategic Assessment of Climate Change (SACC) and the Draft Technical Guide Related to the Strategic Assessment of Climate Change: Guidance on quantification of net GHG emissions, impact on carbon sinks, mitigation measures, net-zero plan and upstream GHG assessment. | Related to AD-18 , ECCC recommends the identification of the sources of GHG emissions and quantification of these emissions be described for the post decommissioning phase. This information will be useful for future development of a net-zero plan. |
| AD-64 | ECCC | Appendix 6-C Climate Baseline and Greenhouse Gas Emissions Report | ECCC noted that more specific data, such as regional data from provinces, forest companies, or literature may be available. The use of Table 20 of the draft Technical Guide does not apply. ECCC recommended that the Proponent also consider biomass that are not aboveground and confirm whether soil carbon is taken into account, as well as wetlands. ECCC recommended that the Proponent provide a quantitative and qualitative description of the Project’s impact on carbon sinks, following the guidance of the SACC and the draft Technical Guide. | Related to AD-19 , ECCC recommends that the Proponent revisit the land use calculation provided in the draft Environmental Impact Statement as the use of Table 20 of the draft Technical Guide for the above ground mass of vegetation species is not appropriate. This table is for above-ground woody vegetation in cropland systems which does not apply in this instance. A simple site survey would determine above-ground biomass on site using basic information such as site class and species. More specific data, such as regional data from provinces, forest companies, or literature may be available, while generic national data is available (e.g., Biomass Estimates for Major Boreal Forest Species in West-Central Canada (publications.gc.ca), Canada’s Forest Biomass Resources: Deriving Estimates from Canada’s Forest Inventory (nrcan.gc.ca)). ECCC reiterates the advice that the Proponent provide information regarding the consideration of biomass that are not above ground, specifically whether soil carbon and wetlands are taken into account. ECCC also restates the advice that the Proponent provide a quantitative and qualitative description of the Project’s impact on carbon sinks, following the guidance of the SACC and the draft Technical Guide. |
| AD-65 | CSNC | Appendix 7-A, Section 4.3.3, Hydrochemistry by Hydrostratigraphic Unit Appendix 7-C, Section 3.5 | In response to IR-82, Denison highlights the importance of the S redox couple (S(2-)/S(6+)) near the ore zone. | Related to IR-82, CNSC staff recommend that Denison consider the inclusion of hydrogen sulfide test kits for in-field measurements of H2S to supplement qualitative interpretations (e.g., absence of "rotten egg" odor associated with sulfide) relating to redox conditions. |
| AD-66 | ECCC | Appendix 7-C, Numerical Modelling: Post Decommissioning Evaluation,Section 2.3.1.4, Desilicified Zone | The Proponent states in both the EIS and their response that a hydraulic conductivity value of 5x10-6 m/s was uniformly assigned to the model layers representing the Desilicified Zone. They additionally state that this value is consistent with packer and pumping tests screened in this unit that have interpreted hydraulic conductivity values ranging from 1x10 ⁻⁶ to 3x10 ⁻⁵ m/s (Appendix C), with a geomean of 6.0x10 ⁻⁶ m/s. In their IR response, the Proponent stated that the hydraulic conductivity used as the model base case (5x10 ⁻⁶ m/s) is similar enough to the geometric mean value (6x10 ⁻⁶ m/s) that no | Related to IR-89, while repeat modelling using the geometric mean hydraulic conductivityof 6x10 ⁻⁶ m/s is not required, include a statement in the EIS to indicate that the geometric mean hydraulic conductivity was not used in the model and providing justification for using the value of 5x10 ⁻⁶ m/s instead. |

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| | | | <p>consequential change to the model would occur if the geometric mean were to be used. The use of the value of 5x10⁻⁶ m/s as the model base case was not substantiated.</p> <p>ECCC accepts the response to Part 1 of the IR as the Proponent has stated that 5x10⁻⁶ m/s and 6x10⁻⁶ m/s are similar enough hydraulic conductivities that redoing modelling with the geometric mean is not expected to consequentially change outputs for either the PHREEQC orFEFLOW model. However, the reasoning for selecting the value of 5x10⁻⁶m/s was not clear.</p> | |
| AD-67 | Health Canada (HC) | Appendix 10-A, Section 3.2.1.3.1, p.3.43-3.44 | <p>Inappropriate use of an outdated standard in assessing health and environmental effect(s) from short-term exposure to nitrogen dioxide (NO₂).</p> <p>The Draft EIS technical supporting document (Appendix 10-A) appears to misinterpret Health Canada’s 2016 Human Health Risk Assessment for Ambient Nitrogen Dioxide (NO₂) in setting its screening criteria and evaluating the health impacts from exposure to Nitrogen Dioxide. The document states:</p> <p><i>“Health Canada published a national one-hour maximum acceptable level of 400 µg/m³ for NO₂ in ambient air using a risk assessment approach (Health Canada, 2016b). This value considers sensitive human populations.”</i></p> <p>This statement is inaccurate.</p> <p>As indicated in Health Canada’s 2016 publication, this value (400 µg/m³) refers to the National Ambient Air Quality Objective (NAAQO) for NO₂, developed in the 1970s. The Canadian Ambient Air Quality Standards (CAAQS) were later developed in consideration of both human health and the environment to replace existing Canada-wide standards, including the NAAQOs, and in many cases are the most stringent Canadian air quality standard, guideline or objective.</p> <p>The new CAAQS for NO₂ also recognizes that there is no population health threshold for human health effects; therefore, any increase in exposure will result in an incremental population risk (Environment Canada and Health Canada, 2012; CCME, 2000). In other words, NO₂ is considered to be a non-threshold substances, meaning that health effects may occur at any level of exposure. Therefore, guideline values should not be construed as limits to which polluting up to is allowed.</p> | <p>The CAAQS are recommended as the most stringent air quality standard for assessing health and environmental effect(s) from short-term exposure to NO₂ in the project.</p> <p>The CAAQS are generally calculated for specific multi-year averages and for a particular statistical form so that extreme and unpredictable events do not drive risk management. However, if the data is not available for comparison to a full CAAQS timeframe, Health Canada suggests using model results for at least one calendar year to allow for a basic comparison with the CAAQS statistical form. The modelling results should be able to indicate the frequency of CAAQS exceedances, which can be used in the discussion as to whether any anticipated human health impacts are anticipated</p> <p>Modelled predictions within an air quality assessment’s study area should be compared to the most stringent air quality standards, guidelines or objectives applicable to the region that may be affected by project activities. In this case, CAAQS are the most stringent levels and CAAQS are not restricted to applications only within the context of the Air Quality Management System (AQMS). Evaluation against the CAAQS may be considered in determining the nature and severity of the project’s impact on air quality levels and the resulting mitigation measures that may be required to maintain good air quality levels or to prevent an exceedance of the CAAQS.</p> <p>As health effects can occur even at levels of exposure below the limits set out in the CAAQS, they should not be viewed as “pollute-up-to” levels. It should be acknowledgeable that health risks exist below the guidelines. In addition, the principles of keeping clean areas clean and continuous improvement are operative, thus proposed mitigation measures should not be confined to meeting the standards, but should also be targeted towards reducing population exposure to CACs associated with the proposed project.</p> <p>This advice is also relevant to IR-190 and may be of use in responding to that request for a comparison of the predicted maximum concentrations to the most protective applicable air quality standards available (i.e., CAAQS).</p> |
| AD-68 | ECCC | Appendix 16-A Summary of Residual Effects Appendix 16-B Summary of Cumulative Effects | <p>ECCC recommended the inclusion of an assessment of potential GHG mitigation measures throughout all phases of the Project including a Best Available Technologies / Best Environmental Practices (BAT/BEP) Determination, as described in Section 3.2 of the draft Technical Guide.</p> <p>ECCC also recommended the development of a credible Net-Zero Plan on how to achieve the target of 0 kt CO₂ eq/year, for the year 2050 and beyond, following the guidance of the SACC and the draft Technical Guide.</p> | <p>Related to AD-49, ECCC notes the comment provided by the Proponent stating, “Denison will consider the option of preparing a climate resiliency assessment with consideration to best available technologies / environmental practices (BAT/BEP) as well as a net-zero plan as the Project advances”. ECCC continues to recommend that the Proponent align with best practices by including in the EIS a Best Available Technologies / Best Environmental Practices (BAT/BEP) Determination and a credible Net-Zero Plan on how to achieve the target of 0 kt CO₂ eq/year, for the year 2050 and beyond, following the guidance of the SACC and the draft Technical Guide.</p> |

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| AD-69 | CNSC | Appendix 16-C | <p>The EIS and the Summary of Monitoring and Follow-up Programs provided in Appendix 16-C contains very high-level information. It is not clear which monitoring programs will be employed to demonstrate regulatory compliance, and compliance with the commitments Denison has made to its Indigenous and non-Indigenous Stakeholders.</p> <p>The CNSC’s Generic Guidelines for the Preparation of an Environmental Impact Statement (EIS), also state: “The EIS will then describe mitigation measures that are specific to each environmental effect identified. Measures will be written as specific commitments that clearly describe how the proponent intends to implement them and the environmental outcome the mitigation is designed to address.</p> <p>CNSC staff requested in the March 2023 letter to Denison (e-Doc 6991467) a Commitments Table for the Wheeler River EIS. This letter requested information of all commitments made by Denison with detailed information such as:</p> <ul style="list-style-type: none">✓ details of the commitment✗ which phase(s) of the project will the commitment be carried out (e.g., all phases)✓ where the commitment is referenced (which document, table, etc. and where it can be found)✗ how this commitment will be tracked (project EA follow-up program, site-wide programs, etc.) <p>Several commitments to Indigenous Nations and communities from the August 2023 submission appear to be missing from this table and should be included in the next submission.</p> | <p>For the next draft EIS submission, the evergreen Commitments Table should be updated to include:</p> <ul style="list-style-type: none">• which phase(s) of the project will the commitment be carried out (e.g., all phases)• how this commitment will be tracked (project EA follow-up program, site-wide programs, etc.) and;• all commitments to Indigenous Nations and communities |
| AD-70 | ECCC | Appendix 16-C Summary of Monitoring & Follow-up Programs | <p>ECCC recommended that the Proponent consider developing a GHG follow-up program to measure and compare actual GHG emissions against the EIS estimates, including reporting the Project’s actual emissions and updating the emissions estimates as needed.</p> | <p>Related to AD-48, ECCC acknowledges that the Project will likely be required to report annually per section 46 of the Canadian Environmental Protection Act as the annual emissions are likely to be over 10,000 tonnes of CO2e. However, ECCC’s suggestion incorporates additional components to align with the goal outlined in Appendix 16-C of the draft EIS to “assess the environmental performance of the project relative to the predictive assessment that has been completed in support of the environmental assessment process”. This would involve comparing actual vs. estimated emissions following the terms of the SACC’s net GHG emissions equation and evaluating the effectiveness of GHG-related mitigation measures.</p> |
| AD-71 | ECCC | Conceptual Caribou Management Plan | <p>Section 4.2.1 of the Conceptual Caribou Management Plan states that "The Project components are also west of the known home range of woodland caribou (based on tracking data received by the Ministry of Environment; Figure 4-2), although the absence of data does not mean the absence of caribou and Denison has observed caribou in the area." Calculation of home range is normally based on statistical analyses of telemetry data. Home range cannot be inferred from telemetry points and incidental observations from a map</p> | <p>Related to IR-149, the Conceptual Caribou Management Plan should be corrected to remove the reference to caribou home range.</p> |

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| AD-01 | Canadian Nuclear Safety Commission (CNSC) | Glossary sections | <p>There are terms used throughout the EIS that may either need defining, or inclusion in the glossary.</p> <ul style="list-style-type: none">“Bounding”, “bounding case” and “bound” are used frequently throughout the EIS to describe the scope of the assessment. For example, p. 2-6 the EIS States: “Denison has bound the environmental assessment above the deposit...”“Laydown”. P. 2-54 states: “During Construction, Denison plans to create a laydown area next to the future domestic landfill to temporarily store construction waste. Examples of materials include clean wood, plastics, metal, and concrete. The construction laydown area will not be lined, but it will have a berm surrounding the area to minimize run-on and runoff.”“Deflagration” (p. 2-22)“Speed of sound” The EIS states: “Deflagration means the material burns slower than the speed of sound, thus no shock waves are generated. Propellant permeability enhancement methods reach injection pressures of up to 8,000 psi and are near instantaneous over periods of milli seconds...” (p. 2-22) - Explain briefly what is meant by “speed of sound”“Dries” (p. 2-65): “the main dries will be located in the processing plant”“Scarified” 2-84 Laydown areas will be scarified, covered with 0.5 to 1.0 m of stockpiled overburden, and vegetated with native, self-sustaining species.“Furblock” (p. 4-29)“Cutlines” (p. 4-101) | Add this terminology to either one of the early glossaries, or when describing the methodology, in order to help readers understand these terms (particularly non-technical readers, such as Indigenous peoples and members of the public). | Thank you for the advice comment. This will be addressed once the EIS is updated following the conclusion of the information requirement (IR) process. |
| AD-02 | CNSC | General | Mining solution and lixiviant are used interchangeably throughout the EIS. When both are used periodically, may be difficult for a member of the public to recognize that these are one in the same (mining fluid seems more often used). | Be consistent in how this is referred to, in order to ensure it’s clear to readers that these are one and the same. | Thank you for the advice comment. This will be addressed once the EIS is updated following the conclusion of the information requirement (IR) process. |
| AD-03 | CNSC | Throughout the Executive Summary (ES) and draft EIS | <p>Errors in formatting and grammar were identified throughout ES and EIS. Some examples are underlined below:</p> <ul style="list-style-type: none">“often referred to as “the final uranium product (yellowcake” (ES, p.16)“Whitefish Lake;;” (ES, p.47)“Forest fires are common throughout most of northern Saskatchewan, however, and are an important natural disturbance of northern boreal forest ecosystems” (p.72) | Please correct these and any other formatting, spelling or grammatical errors. | Thank you for the advice comment. This will be addressed once the EIS is updated following the conclusion of the information requirement (IR) process. |

³ Unless otherwise stated, the section noted refers to the draft EIS

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| | | | <ul style="list-style-type: none">• “Other comments that the process reminded them of fracking, which carried a negative connotation...” incomplete sentence (EIS, p. 2-3)• “.During this phase, water taking will mainly be used by the processing plant and wellfield remediation and to support the potable water plant and wash bay.” (EIS, p. 8-29)• “In McGowan Lake, meanmercury concentrations in Northern Pike” (EIS, p. 8-224)• “Flows and water levels in lakes and rivers within the LSA will realize some adverse change (reduction) as a result of overprinting drainage areas reporting specifically to Whitefish Lake and water taking from this same waterbody.” (8-38)• “Residual effects characteristics specific to Fish Health are defined in Table 8.5-6 with evaluation of residual effects provided in ” (EIS, p. 8-242)• “Potential Project residual effects on the Fish Health VC are primarily related to c the controlled” (EIS, p. 8-249)• “...resulting in a moderate level of uncertainty.” (EIS, p. 9-47)• “...the assessment. Error! Reference source not found. Provides a summary of unique identification numbers referenced within Section 10.1.” (10-10)• “Kineepik Métis Local #9 have also note how the Project...” (EIS, p. 11-57)• “But do not compose the same volume of consumption” (EIS, p. 11-56) – should this be comprise?• “Phoenix Infrastructure. I In total, approximately 284 ha” (EIS, p. 11-156) <p>Please note, this list is not exhaustive.</p> | | |
| AD-04 | CNSC | Section 2.2.1 Mining (p. 2-4 to 2-5) | An arial view could be useful to help a reader understand the proposed freeze wall earlier in section 2 (e.g., The shape, whether it surrounds the deposit). This is unclear but there are good images further down in the EIS (i.e., Figure 2.3-1 on p. 2-78). | Consider adding image to Section 2.2.1, similar to or containing aspects of Figure 2.3-1. | Thank you for the advice comment. This will be addressed once the EIS is updated following the conclusion of the information requirement (IR) process. |
| AD-05 | Transport Canada (TC) | Sections 2.2.3.2, 2.2.3.10, 2.2.5.1, 2.3.1.6, 8.3.4.2.2, 11.1.4.4.2, | The two water crossings over Kratchkowsky Creek and Hart Creek and the water intake and effluent discharge/intake pipeline and diffuser at Whitefish Lake may be subject to the <i>Canadian Navigable Waters Act</i> (CNWA). However, these works may be exempt from the CNWA, if they meet the requirements of the Minor Works Order. | <p>*This advice pertains to the regulatory phase.*</p> <p>It is recommended that the Proponent self-assess each work using TC’s Project Review Tool as follows: https://npp-submissions-demandes-ppn.tc.canada.ca/projectreview-outildexamenduprojet</p> <p>If the works do not fit the Minor Works Order, the Proponent has the option to either submit an application for approval to the NPP, or use the public resolution process, as these are all unscheduled waterways. The full text of the Minor Works Order is available here:</p> | Acknowledged and Denison will address this in the regulatory phase as highlighted. |

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| | | | | https://laws-lois.justice.gc.ca/eng/regulations/SOR-2021-170/page-1.html . Background information on the NPP, the Minor Works Order, the application for approval process and the public resolution process are available here: https://tc.canada.ca/en/programs/navigation-protection-program/apply-npp | |
| AD-06 | Environment and Climate Change Canada (ECCC) | Section 2.2.3.8, Project Description | <p>In this section it is stated that: “The third step of the Industrial Wastewater Treatment Plant (IWWTP) is anticipated to further neutralize and improve the remaining water quality proposed to be achieved with further pH adjustments through agitated tanks and a clarifier with negligible solids generation expected at this stage. Several additional technologies including ion exchange are being evaluated as part of an ongoing Best Available Technology Study to be complete as part of future permitting.” ECCC would be interested in reviewing this study when it becomes available.</p> <p>Considering that the third step of the effluent treatment process in the IWWTP is still undergoing development, ECCC cannot make final conclusions regarding the efficacy of the treatment process. When final treatment technologies have been evaluated and selected, ECCC would like to review this information to allow for release to the environment.</p> | ECCC requests the opportunity to review the Best Available Technology Study and selected treatment technologies for the IWWTP when the report becomes available. | The BATEA information for the IWWTP will be included in Denison’s application to the CNSC for a license to operate. As such, ECCC can direct their review request for review to the CNSC. |
| AD-07 | TC | Section 2.2.5.3 | <p>With respect to the proposed airstrip, under the <i>Aeronautics Act</i>, the proposed airstrip would be considered an “aerodrome”, which is defined as:</p> <p>“aerodrome means any area of land, water (including the frozen surface thereof) or other supporting surface used, designed, prepared, equipped or set apart for use either in whole or in part for the arrival, departure, movement or servicing of aircraft and includes any buildings, installations and equipment situated thereon or associated therewith.”</p> <p>Aerodromes, including the one proposed by Denison, are subject to the <i>Aeronautics Act</i> and the Canadian Aviation Regulations (CARs).</p> | <p>*This advice pertains to the regulatory phase.*</p> <p>The proponent must notify the Minister of Transport of the proposed airstrip (aerodrome). This notification, being a summary report to the Minister of Transport, is required by section 307 of the CARs (CARs 307). CARs 307 also requires Denison to undertake consultation in the prescribed manner before it constructs the proposed aerodrome at the mine site. Details of the consultation are to be included in the above-mentioned summary report to the Minister of Transport.</p> <p>CARs 307 identifies the requirement to consult to include anyone seeking to undertake a prescribed aerodrome work at a certified or non-certified aerodrome, whether it is the creation of a new aerodrome or, at an existing aerodrome, lengthening an existing runway or making a new one. The Regulation also provides minimum expectations for how the consultation should be conducted, including timelines, who to notify and under what circumstances. The intent of the Regulation is to compel consultation in advance of an aerodrome work that will result in sustained and regular impact on interested parties as identified in the Regulation.</p> | Acknowledged and Denison will address this in the regulatory phase as highlighted. |

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| | | | | <p>As the proposed aerodrome will not be within 4 kilometres of a city or built-up area, under CARs 307, the proponent is required to consult the following interested parties:</p> <ul style="list-style-type: none">(i) the Minister of Transport,(ii) the providers of air navigation services,(iii) the operator of a certified or registered aerodrome located within a radius of 30 nautical miles from the location of the proposed aerodrome work,(iv) the authority responsible for a protected area located within a radius of 4 000 m from the location of the proposed aerodrome work,(v) any local land use authority where the proposed aerodrome work is to be carried out, and(vi) the owner of any land bordering the land on which the proposed aerodrome work is to be carried out. <p>Proponents are encouraged to share their plans with the local land use authority before the consultation period. The local land use authority may have information about other nearby projects or developments that could impact on the proponent's plans.</p> <p>In summary, regarding the airstrip (aerodrome), the proponent must complete the consultation and file the summary report with the Minister of Transport, prior to commencing construction of the aerodrome.</p> <p>Further details can be found at: https://laws-lois.justice.gc.ca/eng/regulations/SOR-96-433/FullText.html#s-307.01.</p> <p>TC recommends that the proponent contact TC's Aerodromes Group at CASPNR-SACRPN@tc.gc.ca before starting the consultation, to ensure it is completed in accordance with CARs 307.</p> | |
| AD-08 | CNSC | Figs. 3.4-1, 4.3. 1, and where applicable throughout the EIS | Some maps in the EIS do not contain highway numbers. | Please consider including the highway numbers on the maps early in the Draft EIS when laying out the project location so the reader can become familiar with road network within northern Saskatchewan when discussions take place. | Thank you for the advice comment. This will be addressed once the EIS is updated following the conclusion of the information requirement (IR) process. |
| AD-09 | CNSC | Section 4, including Figures 4.3.1 and/or 4.3.2 and where applicable throughout the EIS. | The maps included in the EIS in sections do not have any Treaty boundaries. First Nation Treaties should be included on the map. Not all First Nations reserves, and boundaries are included on the map such as Cree Lake and Slush Lake, please include on map and consider adding others from the NAD. | It is recommended that Denison update the maps in these sections to include Treaty Boundaries and community locations are included on the Project location map in Figure 4.3.2 and other maps throughout the entire EIS where applicable. | Thank you for the advice comment. This will be addressed, as possible, once the EIS is updated following the conclusion of the information requirement (IR) process. |

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| AD-10 | CNSC | Section 4 | Overall, CNSC believes that Denison is abiding by the communications strategies and products identified in their PIDP, but would be interested in additional information that is available. | While CNSC staff are satisfied that the proponent meets the requirements with this EIS, further clarity and detail on the strategic planning behind these communications activities would be beneficial and would further support the overall goals of the Project’s engagement activities. | Acknowledged. Further details on the Public Information Program and Public Disclosure will form part of the documentation submitted in support of the CNSC licensing for the Project. |
| AD-11 | CNSC | Section 4 Indigenous Engagement Report (IER) | There is a summary of what engagement activities will occur moving forward. However, it is not clear which engagement activities/meetings will occur during the different stages of the EA/ project life cycle. Please provide additional details upon submission of the Final EIS. | Denison should consider clarifying in the updated IER which engagement activities will occur during each stage of the project moving forward as per Reg Doc 3.2.2 before submitting the Final EIS. | The engagement activities as outlined in the draft EIS are reflective of the iterative nature of engagement with respect to the Project. At the time of the filing of the final EIS, Denison will describe the status of engagement and future expected engagement activities to occur, which will continue to be aligned with the requirements of Reg Doc 3.2.2. |
| AD-12 | CNSC | Section 4 IER | Information included in the EIS Section 4 and IER regarding engagement activities, communication and issues and concerns raised will need to be updated when the next version of the EIS is submitted. The EIS and IER will need to be updated to include information from Fall of 2022 until approximately two months prior to the submission date of the next EIS. | When re-submitting the EIS, ensure that the engagement log, issues and concerns tables and information about engagement activities done to date have been updated. No action needed only advice to update this section before submission with most up to date engagement activities including any that take place with other Indigenous Nations and communities not included in the Draft EIS. | Acknowledged. |
| AD-13 | CNSC | Section 4 IER | Denison states that validation of VC selection was completed with ERFN, the Northern Village of Beauval, the Northern Village of Pinehouse Lake, and the Northern Hamlet of Patuanak (hereafter Beauval, Pinehouse, and Hamlet of Patuanak, respectively). The EIS states that this was completed through a shared online survey. The EIS also indicates that YNLR was also included in this process. | How has Denison validated VC selection with the other Indigenous Nations and communities that have showed interest and if so, by what methods (survey’s, engagement, meetings, review of Draft sections etc.?) Did Indigenous Nations and communities select any VC’s that were not included in the EIS and if so why not? Please elaborate and provide more details in the EIS on any other methods used including engagement sessions that were completed with Indigenous Nations and communities, through in-person community workshops, VC selection approval through early review of Draft EIS sections. | Section 4 of the draft EIS describes the approach taken related to the Indigenous and non-Indigenous Communities of Interest in relation to the Wheeler River Project. Denison has engaged with these entities regarding the validation of the VC selection. Denison has not undertaken VC validation activities with other Indigenous Nations or communities that have shown interest in the Project, owing to the systematic approach to engagement Denison has been following. This approach is consistent with the methodology presented to the CNSC by Denison in early 2020, for which confirmation was received in mid-2020 and reflected in the draft EIS. All activities undertaken in relation to engagement on VCs are currently described in the EIS; there are no additional details to add. Denison can confirm that it is unaware of additional or new VCs brought forward by other Indigenous Nations or communities that are not suitably captured within the current draft EA approach. |
| AD-14 | CNSC | Section 4.3.1, Pg 246 | On this page, Denison states that MN-S is “currently structured with a President, an Executive, a Provincial Metis Council, Regional Presidents, and Local Presidents. The wording of ‘Regional President’ is incorrect and should be changed to say, ‘Regional Director’. | Please update all wording of “Regional President” to “Regional Director” when referring to MN-S. | Thank you for the advice comment. This will be corrected in the final EIS. |

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| AD-15 | ECCC | Sections 5.3.4 (Table 5.3-3); 8.1.3.3 Climate Change; 8.1.3.4 Climate Change Influenced Extreme Events; Table 15.4-1: Summary of Potential Effects of Short-term Extreme Weather Events on the Project and Associated Mitigation; Section 15.5 Climate Change. | <p>The Proponent indicates that the Project’s full lifetime is roughly 40 years (including the post-decommissioning phase) and that climate conditions are important design considerations for a number of sensitive aspects of the Project. Potential future climate changes and their potential effects on the Project and Valued Components (VCs) are described in various sections of the draft EIS. Notably, in Section 15.5.2, ensemble mean projections are provided for several climate variables for two future time periods and emissions scenarios (RCP 4.5 and 8.5). In Section 8.1.3.4, the Proponent describes possible future changes in short-duration precipitation extremes (based on Intensity Duration Frequency or IDF curves from the IDF_CC tool) and indicates that an increase in their frequency and magnitude may occur over the Project lifetime “... and may require consideration for greater storage and conveyance capacity for Project water management infrastructure” (p.8-41).</p> <p>The Proponent indicates that aspects of the Project are being designed to meet standards based on design values that appear to be derived from observed (i.e. historical) climate conditions (e.g. water management infrastructure; see Table 15.4-1). In Section 15.5.3, they indicate that an adaptive management approach will be used to address some aspects of future climate change as necessary. For example, page 15-19 of the draft EIS states that: “Denison will develop an Emergency Preparedness and Response Program for the Project to address forest fires and extreme weather that may occur. If unforeseen effects on the Project occur from longer and more severe forest fire seasons associated with climate change, or increased frequency or severity of extreme weather (e.g., ice storms, snowstorms, flooding), Denison will apply adaptive management that includes monitoring climate factors so that they can proactively mitigate or prevent adverse climate effects on the Project.” (Emphasis added).</p> | <p>ECCC recommends that when considering potential future climate change and relevant effects on the Project, the Proponent consider the range of variability from the ensemble of models (not just the ensemble mean). ECCC also recommends that the Proponent consult the 2019 Canadian Standards Association Guidance on Intensity Duration Frequency for Canadian Water Resources practitioners , which provides examples of alternative methodologies to estimate future return values for design as needed.</p> <p>In terms of adaptive management, ECCC recommends that the Proponent clearly outline what climate factors will be monitored to mitigate or prevent adverse climate-related effects. This should include information on when and how the climate factors would be monitored and under what circumstances particular adaptive management approaches would be applied.</p> | <p>Please see response to IR-15, IR-103, IR-104, IR-235, and IR-236.</p> <p>The probable maximum precipitation (PMP) value of 493 mm selected for design of water management infrastructure, such as ponds, is similar to total annual precipitation (456 mm from Key Lake station, and 483 mm from 1981-2020 climate normals).</p> <p>The selected PMP is well above (>5 times higher): 1) current/measured 24-hour maximum precipitation, 2) modelled 1 in 100 year 24-hour return for current conditions, 3) modelled 1:100 year 24 hour return for a future (2020-2050) period, 4) the predicted maximum 1-day precipitation under different emissions scenarios for the future (including RCP8.5 in the 2021-2050 period).</p> <p>For comparison to the design PMP of 493 mm:</p> <ul style="list-style-type: none">- the measured maximum 24-hour precipitation from Key Lake station was 42.9 mm and 72 mm from 1981-2020 climate normals.- the modelled existing/current 1 in 100 year, 24 hour return using the IDF_CC Tool for the Wheeler River Project site was 79.9 mm and at the Key Lake area was 56.4 mm.- the modelled future (2020-2050) climate 1 in 100 year, 24 hour return using the IDF_CC Tool for the Wheeler River Project site was 88.6 mm and at the Key Lake area was 62.0 mm.- the predicted future climate (2021-2050) under the highest CO2e emissions scenario (RCP 8.5) shows maximum 1-day precipitation of 25.9 mm. <p>The PMP is much higher (> 5 times higher) than the observed and predicted 24-hour maximum precipitation and the 1:100 year 24 hour return. Completing the design using a large PMP provides confidence that the water management infrastructure will be sufficient and function under future climates as it relates to potential changes in precipitation.</p> |
| AD-16 | CNSC | Section 5.10 (p.70) and throughout the EIS | <p>In section 5.10 of the ES, where the seven scenarios are listed, formatting is inconsistent. Likelihood is in quotes in some places, but not in all.</p> <p>Not significant is bolded inconsistently throughout the EIS.</p> <p>As well, in many cases noted as “not significant”, where others note “are not expected to have a significant effect”.</p> | <p>Suggest making formatting consistent if going to use quotes and bolding to highlight sections of the text.</p> <p>Also, validate that use of “not significant” and “are not expected to have a significant effect” are consistently used (where appropriate).</p> | <p>Thank you for the advice comment. This will be addressed, as possible, once the EIS is updated following the conclusion of the information requirement (IR) process.</p> |
| AD-17 | ECCC | Appendix 6-A Air Quality Technical | Some of the off-road vehicles have an emission rating of Tier 2 but in Appendix 6-A Section A.10 the Proponent claims that “for non- | ECCC recommends that the Proponent choose engines that meet the most stringent emission standards to the extent possible, which | Please see response to IR-139. |

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| | | Supporting Document A.10 | road diesel combustion, Tier 4 emission factors were assumed”. Choosing an engine with a lower Tier will increase emissions in NOx significantly and the Proponent should be using the best available technologies to minimize environmental impacts. | are Tier 4 for the compression-ignition engines, during all phases of the Project. | |
| AD-18 | ECCC | Appendix 6-C, Climate Baseline and GHG Emissions Report | <p>Understanding Project emissions is important to inform analysis of a Project’s potential impact on Canada’s emissions targets and climate change commitments.</p> <p>ECCC notes that Section 4.0 and Appendix C: Greenhouse Gas Emissions Calculations of Appendix 6-C identifies the source of emissions and quantifies them in the construction, operation, and decommissioning phases of the Project, in accordance with the Draft Technical Guide Related to the SACC (Draft Technical Guide). While ECCC recognizes that the emissions will be relatively small in the post-decommissioning phase, the identification and quantification of the emissions in this phase is not found in the draft Environmental Impact Statement (EIS). The post- decommissioning phase is expected to last 15 years, likely going past 2050.</p> <p>The draft EIS does not discuss emission intensities of the Project, only the grid electricity. The draft EIS also does not discuss the Project’s potential impacts on Canada’s climate targets.</p> | <p>ECCC recommends that the identification of the sources of Greenhouse Gas (GHG) emissions and quantification of these emissions be described for the post-decommissioning phase, as done for the other phases.</p> <p>ECCC recommends the Proponent include discussion on the emission intensities of the mining of the product, following the guidance of the SACC and the Draft Technical Guide.</p> <p>ECCC recommends that the Proponent discuss the potential impacts that the Project may have on Canada’s ability to meet its climate-related targets, following the guidance of the SACC and the Draft Technical Guide.</p> | <p>The Post-Decommissioning phase only includes monitoring (physical, chemical, and biological) and regulatory site inspections. These activities are not expected to generate any significant GHG releases. Notwithstanding, the calculated GHG emissions estimates for Construction, Operation and Decommissioning are expected to be sufficiently conservative to capture any incidental GHG releases during monitoring and inspection activities.</p> <p>The EIS anticipated an annual average production rate of approximately 4,082 metric tonnes of U₃O₈ and an annual net GHG releases of 30,702 metric tonnes CO₂e over the operations phase of the project. The annualized GHG intensity during operations is estimated at 7.5 tonnes of CO₂e / tonnes of U₃O₈.</p> <p>Section 2.5 of the EIS provides a summary of the anticipated GHG releases and a comparison to the nation- and province-wide GHG emissions. The project is expected to contribute less than 0.0043% to the nation-wide annual average. Given this very low contribution, the project is not expected to impact Canada’s ability to meet its climate-related objectives and targets.</p> <p>Also see response for AD-19 (second paragraph).</p> |
| AD-19 | ECCC | Appendix 6-C, Climate Baseline and GHG Emissions Report | <p>The draft EIS lacks information related to estimates of impact on carbon sinks and emissions from land-use changes. As land use shifts from a vegetated site prior to development, to an industrialized site, removal of vegetation and peat will have impacts on carbon sinks and construction emissions.</p> <p>Section 6, Appendix 6-C, 4.1.2 Land Use Change states that site-specific information of above-ground mass of vegetation was not available and default data from Table 20 of the Draft Technical Guide were applied. The default data is contained in this table is not applicable in this case, as they represent aboveground woody vegetation in cropland systems.</p> <p>ECCC recognizes that the usage of the median value of 0.51 for the carbon content is reasonable.</p> <p>From the information given in the draft EIS, it does not seem that the soil carbon was taken into account. In the absence of detailed information, the Proponent assumed that the area cleared would also be excavated (and drained in the case of wetland areas) which would create significant additional emissions from soil disturbances and drainage.</p> <p>Section 4.1.2 also states the Project involves clearing an area of</p> | <p>Land Use Change Regarding the lack of site-specific information of above-ground mass of vegetation, an initial site survey on-site using basic information such as site class and species would assist in determining the above-ground biomass. More specific data, such as regional data from provinces, forest companies, or literature may be available, and generic national data is available (e.g., Fo148-1-2E.pdf (publications.gc.ca), 4775.pdf (nrcan.gc.ca)).</p> <p>ECCC recommends that the Proponent also consider biomass that are not aboveground and confirm whether soil carbon is taken into account, as well as wetlands.</p> <p><i>Carbon Sinks</i> ECCC recommends that the Proponent provide a quantitative and qualitative description of the Project’s impact on carbon sinks, following the guidance of the SACC and the Draft Technical Guide.</p> | <p>Limited site-specific data were available to characterize land use change and impacts on carbon sinks. As such, the use of default values from the SACC/IPCC in conjunction with some limited habitat/vegetation data (extracted from Chapter 9.2 Terrestrial Environment – Vegetation and Ecosystems, Listed Plant Species and Wetlands) was employed and is considered reasonable at this stage of the assessment. Please note that additional information on the land use change GHG calculations can be found in Appendix 6-C Climate Baseline and Greenhouse Gas Emissions Report.</p> <p>In accordance with our discussions with the CNSC, Denison is committed to re-assessing the GHG and climate change components of the EIS and other elements of the SACC once more detailed, site-specific data becomes available (i.e., detailed feasibility and engineering studies). This is expected to include more detailed study around overall GHG emissions, carbon sinks and mitigation options, best available technologies / best environmental practices, climate resiliency, net-zero carbon planning and offsetting.</p> |

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| | | | approximately 169.6 hectares. There are no estimates on the impact on carbon sinks related to the Project. | | |
| AD-20 | NRCan | Section 7.3.1, Physical Geography | Drumlins and eskers in the region trend Northeast to Southwest as opposed to northwest to southeast as written on page 7, line 18. Correct orientations are used on page 7, line 23. | NRCan recommends revising the text. Please refer to 250 000 scale Surficial Geology Lines from Quaternary mapping, CSRS NAD83 Zone 13, Saskatchewan Geological Survey 2017. | Acknowledged. The typo in the draft EIS, Section 7.3.1 will be corrected in the final EIS. In Section 7.3.1. the text will be updated to say the following: “The most important associated topographic features in the region are the northeast to southwest trending drumlins and eskers...” See also response to IR-54. |
| AD-21 | NRCan | Section 7.3.2.3, Metacrystalline Basement Rock | Pegmatite missing from list of basement rock types. | NRCan suggests addition of pegmatite to the list of basement rock types as shown on Figure 7.3-6. | Denison will update the final EIS per NRCan’s suggestion. |
| AD-22 | NRCan | Section 7.3.3.1, Aquifer Properties, Section 7.3.2.3, Metacrystalline Basement Rock, Appendix 7A, 2.0, 2.3.1, 2.3.2 | The terms “metacrystalline” and “metagranitic gneiss” are not frequently used terms in scientific literature. Gneiss is, by definition, a metamorphic rock. | NRCan suggests revision to “Crystalline Basement rocks” or “Basement metamorphic rocks”, and “granitic gneiss” as used in Figure 7.3-6. Please refer to Oxford Dictionary of Earth Sciences. | Denison will update the final EIS per NRCan’s suggestion. |
| AD-23 | NRCan | Appendix 7A, 2.3.1, Metacrystalline basement rock | Orogeny is the process, orogen (or orogenic belt) is the feature produced by orogeny. | NRCan suggests replacing “Tran Hudson Orogeny” with Trans Hudson Orogen”. | Denison will update the final EIS per NRCan’s suggestion. |
| AD-24 | NRCan | Appendix 7A, 2.3.1, Metacrystalline basement rock | Quartzite is by definition a metamorphic rock, and the term is used later without the meta-prefix. | NRCan suggests replacement of the term “meta-quartzite” with “quartzite”. | Denison will update the final EIS per NRCan’s suggestion. |
| AD-25 | NRCan | Appendix 7A, 2.3.4, Athabasca Group Sandstones and Conglomerates | Sands are unlithified, whereas you are referring to grain sizes in this case. | In Table 2-1, NRCan suggests replacing the term “sands” with “grain sizes” under MFc and MFb descriptions. | Denison will update the final EIS per NRCan’s suggestion. |
| AD-26 | NRCan | Appendix 7A, 2.3.5, Overburden | Typo on page 2, line 7: “A grain size sample was collected in GWR-033 from approximately 9 m below ground surface, and the same consisted of 8.8% clay (less than 4 µm). | NRCan suggests revision of “same” to “sample” and clay to “clay-sized” grains. | Denison will update the final EIS per NRCan’s suggestion. |
| AD-27 | CNSC | Section 8.2.1.3 – Spatial and Temporal Boundaries | It is noted that McGowan Lake is an identified reference lake for the Key Lake Mill site. With the establishment of the Wheeler River mine, effluent would be flowing into McGowan Lake, which could potentially interfere with Key Lake’s environmental monitoring program by compromising McGowan Lake’s baseline conditions. Depending on the loading of COPC’s into McGowan Lake and resultant water concentrations, it may no longer be accepted as an acceptable reference lake for use by Key Lake. This would require Cameco to modify their monitoring program at the Key Lake Mill. | The CNSC advises Denison to communicate with Cameco to ensure they are aware of this situation. Coordination between the two companies may be necessary to ensure Key Lakes environmental monitoring program is not compromised. It is recommended to discuss this potential issue with Cameco ahead of time to determine the best path forward. | Denison will communicate with Cameco through the Saskatchewan Mining Association to highlight the timing of the start of the Project as it may relate to Cameco’s use of regional lakes for reference lake purposes. McGowan Lake will no longer be suitable as a reference lake for Cameco once the Wheeler River Project starts operating, since it will be downstream of treated effluent release. Alpha Lake (LA-9 in Denison’s aquatic baseline studies) will likely be outside of any influence from Denison’s activities. |

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| | | | | | Please note that Denison has previously been in communication with the Saskatchewan Ministry of Environment, Environmental Protection Branch regarding the baseline study work Denison completed as part of the Environmental Assessment process and the potential changes to McGowan lake (a Cameco's reference lake) from the proposed Wheeler Project. Reference: Email from Janna Switzer (Denison) to George Bihun (MOE) on May 12, 2020. |
| AD-28 | ECCC | Section 8.2.4.2.3 Appendix 10-A, Section 3.1.1.2 | <p>Tables 8.2-9 and 8.2-10 in Section 8.2.4.2.3 Part II_S8 Aquatic Environment and Table 3-1 in Appendix 10-A Section 3.1.1.2 demonstrate predicted maximum effluent concentrations of Constituents of Potential Concern (COPCs) and maximum predicted receiving environment concentrations.</p> <p>The final effluent quality discharge target for uranium is 0.057 mg/L. However, the Canadian Council of Ministers of the Environment (CCME) water short-term (acute) water quality guidelines for the protection of aquatic life is 0.033 mg/L. The proposed effluent discharge target for uranium exceeds the acute water quality guideline, indicating effluent may pose the risk of being acutely lethal to aquatic biota at end-of-pipe. While uranium is not a Schedule 4 substance with prescribed concentration limits under the Metal and Diamond Mining Effluent Regulations (MDMER), the MDMER requires the characterization of uranium concentrations in effluent under Schedule 5, and requires that all mine effluent released from final discharge points be non-acutely lethal.</p> <p>Under Schedule 5 Section 9(d) of the MDMER, the Proponent will likely be required to conduct selenium fish tissue sampling if average annual concentrations of selenium in effluent equals or exceeds 5 ug/L.</p> | Discharges from the proposed Project will alter water quality in the immediate receiving area, and this may include some sublethal effects on aquatic biota, which must be minimized. It remains the Proponent's responsibility to adhere to the MDMER to ensure that effluent at the end-of-pipe from all final discharge points be non-acutely lethal and meet requirements for prescribed deleterious substances under Schedule 4 of the regulations. | Denison fully understands its obligations with respect to the MDMER and will comply with the MDMER end of pipe effluent discharge criteria. |
| AD-29 | CNSC | Section 8.3.3 Figures 8.3.5 etc. 8.5-4 | It does not appear that aquatic baseline sampling maps for Russell Lake have LAB 1 and 2 locations showing the baseline sampling locations within Russell Lake. (Figures 8.3.5). Please update the Figures throughout aquatic environment section to include of the baseline sampling studies/ locations within Russell Lake. | Please update maps and sections in EIS to reflect aquatic baseline studies that were completed. | Thank you for the advice comment. This will be addressed, as possible, once the EIS is updated following the conclusion of the information requirement (IR) process. |
| AD-30 | CNSC | EIS sections 8.4.3.2.4 Benthic Invertebrate Community and 8.4.7.6 Climate Change Considerations | <p>ECCC EEM guidance recommends the use of multiple reference areas as it offers the greatest statistical power to detect a meaningful difference between a reference area and an exposure area and can also give an indication of variability among reference areas. It is also important to incorporate multiple reference locations into the study design to aid in designing against spatial confounding factors.</p> <p>Section 3 of the Aquatic Environment Baseline Study Report details the similarities between benthic invertebrate communities by using the mean Bray-Curtis index between sampling locations and the</p> | Considering climate change may change the lake conditions from baseline conditions, and that there is already natural variability between lakes that will be used as reference lakes and exposure lakes, it could become difficult to show changes to sediment/benthic invertebrates are not due to project activities, therefore there is a recommendation to ensure the current baseline data is adequate, and to consider if additional data, and addition of additional reference stations, will be needed moving forward. | Changes in landscape influence and lake conditions are not limited to those brought about by climate change. The preparation of a study design under the MDMER EEM program strives to ensure that a single reference area or multiple reference areas are as representative of a control condition as possible. Best practice is to undertake an analysis of candidate reference areas using the existing baseline information and investigate their utility as controls prior to project development. A preliminary EEM study can be completed that will allow for a Before-After-Control-Impact study design, that will provide the ability to monitor change not only in |

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| | | | <p>median reference condition for the lake group size. It’s not clear in the EIS if there are any issues expected to be able to use this data to compare project effect locations to references sites into the future, as some sampling locations are currently not very similar to the reference sites.</p> <p>In addition, climate change could affect the sediment and benthic communities in the future. The EIS states “the frequency and magnitude of extreme precipitation events have the potential to change water levels and flows in the RSA, which may affect sediment transport, deposition, and therefore benthic invertebrate habitat. Changes to average and upper and lower bounds of ambient temperatures may also affect aquatic habitat, which in turn may affect benthic invertebrate communities. Climate change over the life of the Project (i.e., 35 to 40 years) will be monitored as part of the Project’s environmental monitoring programs, and influences on water quality, sediment quality, and benthic invertebrates will require adaptive management to mitigate any potential effects of the Project that may be exacerbated by climate-related changes on the aquatic environment”. It is recommended to ensure that appropriate number/location of reference sites are sampled to enable any changes to sediment or benthic invertebrate communities that may be due to climate changes, and not project effects, are able to be assessed.</p> | | <p>the exposure areas, but in the reference areas, thereby allowing for a reasonable assessment of potential mine related impacts.</p> |
| AD-31 | CNSC | Section 8.4.6.1, Residual Effects Characterization | <p>The EIS states “Local Indigenous communities have expressed direct concern with respect to mercury. Mercury has not been identified as a COPC for the Project as it is currently not present in the receiving environment (i.e., background condition) at detectable concentrations and will not be produced as part of the mine process; therefore, it will not be discharged to the aquatic environment. However, it is understood that potential nutrient enrichment-related effects are possible and can be linked to increases in mercury in the environment.” Based off concerns from Indigenous communities, and the fact that phosphate is a COPC in the effluent, and elevated concentrations of mercury were measured near the Kratchkowsky Lake bottom, adding methylmercury to the environment sampling plans may be beneficial.</p> | <p>Please consider adding methylmercury to the environment sampling plans (such as fish dorsal muscle) in order to confirm there are no unexpected effects of the project on levels, and to satisfy stakeholder concerns.</p> | <p>Refer to response to IR-100.</p> |
| AD-32 | CNSC | Section 9.1.8.3, Appendix 10-A (ERA) section 3.2.1.5 | <p>It appears there is no consistency between the assessment of soil quality in the ERA and the baseline soil sampling program presented in the EIS. The baseline program includes 10 soil permanent sampling locations (Appendix 9-B, section 2.5). Sampling at these locations is proposed to be continued during the Operation Phase, and monitoring data will be compiled and reported annually/periodically (EIS section 9.1.8.3).</p> | <p>Please clarify how baseline measured data on COPC concentrations in soil is considered in the current and future iterations of the ERA.</p> | <p>Baseline measured soil data were used in the ERA to characterize the existing environment. The IMPACT model was used to predict the Project contributions for the Project phases above baseline. The baseline soil concentrations used in the model are provided in Section 3.5.1 and Table 3-8 of Appendix A in Appendix 10-A (ERA).</p> |

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| | | | Conversely, the ERA estimates and predicts concentrations of COPC in soil based on atmospheric deposition. Furthermore, the location of ecological receptors in the ERA (Figure 5-2) is different from the permanent soil sampling plot locations (Appendix 9-B, Figure 2.5-1). It is unclear why measured baseline soil quality data were not discussed in the ERA and whether future monitoring data will be considered in the ERA to verify accuracy of predicted COPC concentrations | | The ERA will be revised according to the periodic review requirements in CSA N288.6-22 which will reflect ongoing data collected from monitoring programs. |
| AD-33 | CNSC | Section 9.3.3.1.2 | <p>Indigenous knowledge is summarized with regard to moose, including:</p> <ul style="list-style-type: none">• Calving sites close to the Wheeler River, with lots of muskeg in the area. A moose calving area is located in the Terrestrial RSA, southwest of the Project Area.• A wildlife corridor is used by moose, running between Cree Lake (outside and to the west of the Terrestrial RSA) and Russel Lake (in the southern portion of the Terrestrial RSA). <p>It is unclear how this information is incorporated into the residual effects assessment.</p> | Please clarify how Indigenous knowledge on moose calving sites and corridors in the RSA is incorporated into the residual effects assessment for the key indicator “moose”. | <p>The sites identified by IK were explicitly considered in the impact assessment as indicated by their identification as overlapping with the Terrestrial RSA as noted in the question. However, the areas were not expressly discussed in the residual effects assessment because there is no anticipated spatial overlap of those areas with direct or indirect Project effects.</p> <p>The Indigenous Knowledge provided by ERFN and SVS (2022) identifies a moose calving site (Feature 1001-08) ~ 2 km southwest, and a wildlife corridor ~6 km south of the Project Area (as depicted in Figure 4. Map B, page 16 of ERFN and SVS 2022). Both areas are within the Terrestrial RSA but outside the Wildlife LSA. The reference to “Calving sites close to the Wheeler River...” refers to a broad area that is 45 km east of the Project Area, well beyond interactions with the Project Area.</p> <p>The presence of the areas identified through IK was acknowledged in Section 9.3.3.1.2 (Information from Indigenous Knowledge, Local Knowledge, and Engagement) in Part II, Sec. 9 of the Draft EIS. The assessment (Sec. 9.3.4.2) considered alteration and/or habitat loss at the LSA and RSA scale. Section 9.3.4.2.1 (pg. 9-210) summarizes the effects on moose habitat as follows: “Habitat alteration through sensory disturbance effects (such as noise, dust deposition, and artificial light) is expected to result in reduced habitat quality and effectiveness near Project components and infrastructure reaching beyond the Project Area into the Wildlife LSA....”</p> <p>Further, Sec. 9.3.6.2.1 (Alteration and/or Loss of Habitat, pg. 9-230) identifies that an area within a 500 m radius of the Project Area will be influenced by the Project and likely make the habitat within that area less suitable for use by moose. Therefore, the effects of the Project on moose calving have been appropriately assessed and are expected to be contained within the Wildlife LSA. That affected area does not overlap with the moose calving site or the wildlife corridor identified by IK.</p> |
| AD-34 | CNSC | Appendix 9-B | Baseline studies for birds are restricted to short time frames in one year only, for example: | Please consider conducting surveys following CWS’s recommendations or provide an explanation as to how current | The data collected as part of the baseline studies for birds was focused on the habitat types and areas most likely to be disturbed as a result of the Project. Conducting additional baseline surveys for |

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| | | | <ul style="list-style-type: none">Breeding Songbird Point Count Call Survey (June 7 and 17, 2017)Aerial Waterfowl and Raptor Stick Nest Survey (June 15 and 16, 2017) <p>The Canadian Wildlife Service (2022) recommends:</p> <ul style="list-style-type: none">Consider the potential effects of projects on birds throughout the year and document the distribution and abundance of birds in all seasons. Some species may be under-represented in existing data bases due to temporally restricted periods of detectability.Explicitly target species at risk and other focal species.Conduct at least two years of field surveys as a national standard for major projects, so that temporal variability can be considered in future comparisons to baseline data. <p>Reference: Canadian Wildlife Service. 2022. Guidance Regarding Data Needed to Support Assessment of Project Effects on Birds. Environment and Climate Change Canada, Gatineau, Quebec. 80 p.</p> | baseline data for birds is sufficient to characterize the existing environment. | waterfowl, raptors, and breeding birds is not anticipated to result in changes to the assessment outcomes and predictions made as part of the effects assessment, which was habitat-based, for avian species. The assessment methods used a conservative approach with the assumption that following the implementation of site-specific mitigation measures, the proposed Project activities would have a residual effect on these species guilds regardless of species presence on site. However, to supplement the species data that were collected as part of the baseline field program, Denison is willing to acquire additional information on species presence in the RSA from existing sources, specifically from the Saskatchewan Breeding Bird Atlas (Birds Canada). However, collection and consideration of this information is not expected to affect the findings and/or conclusions stated in the draft EIS as the assessment was habitat-based to address all species. |
| AD-35 | CNSC | Section 10, IMPACT MODEL | Denison discusses details of the IMPACT model but has not provided scenario(s) used to facilitate review. | Please consider providing CNSC with the IMPACT model scenario file(s) in the spirit of regulatory cooperation. | The intent of Appendix A to Appendix 10-A is to provide the inputs used for the IMPACT model as well as all of the characteristics for human and ecological receptors. Where site-specific data were not used in the model it can be assumed that default values from CSA N288.1-20 were used in the IMPACT model. As such, Denison does not intend to provide the scenario files. |
| AD-36 | English River First Nation (ERFN) | Section 10.1.3.2, Traditional Foods Diet (p. 10-15) | The EIS States: "The ERFN is comprised of seven reserve lands across Saskatchewan" (p. 10-15) While this is accurately reflecting a source document, the source document is incorrect. | Please update to "The ERFN is comprised of seven historical settlements that have now grown into 19 different reserves across Saskatchewan" | Thank you for the advice comment. This will be addressed, as possible, once the EIS is updated following the conclusion of the information requirement (IR) process. |
| AD-37 | CNSC | Section 10.1.9, Human Health Summary and Appendix 10-A – 4.4.1 Risk Estimation | The Human Health section of the EIS, as well as the ERA, indicates that there is an exceedance for selenium for the fisher/trapper receptor, with the Project estimated to contribute to the majority of this exceedance (0.93 of the HQ). While the assessment is conservative by assuming an increase intake rate of fish solely sourced from Russel Lake, the precautionary principle should be considered to ensure in reality the HQ for selenium remains below 1, even under conservative assumptions. | Please conduct of effluent, water, and aquatic organism monitoring (as already suggested in EIS) to confirm HQ's are highly conservative in the EIS modelling and receptors remain protected. Should it be determined Se concentrations are increasing in the environment at such a rate as there may be in impact to the environment or human health, installation of a selenium removal circuit into the effluent treatment process should be considered. The proponent should ensure that the proposed wastewater treatment system design incorporates the capability for expansion or upgrades in alignment with the precautionary approach, pollution prevention, and continuous improvement. | Denison acknowledges that a robust effluent and environmental monitoring program will be developed to confirm all EIS modelling predictions. The ERA will be revised according to the periodic review requirements in CSA N288.6-22 which will reflect ongoing data collected from monitoring programs. |
| AD-38 | CNSC | Appendix 10-A (ERA) | It is unclear if measured or modelled COPC concentrations in blueberry were used in the calculations of human receptor dose. Similarly, it is unclear if measured or modelled COPC concentrations | Please clarify if measured or modelled COPC concentrations in blueberry / lichen were used in the calculations of human and ecological receptor dose. | Measured baseline lichen data were used in the ERA to characterize the existing environment. The IMPACT model was used to predict the Project contributions for the Project phases above baseline. |

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| | | | <p>in lichen and blueberry were used in the calculations of ecological receptor dose.</p> <p>CSA N288.6-22, Clause 7.3.6 states that “Measured concentrations of COPCs should be used, where possible, in the exposure assessment.” Please see the Clause for further information.</p> | | <p>Measured baseline blueberry data were used for model calibration to determine if there was good agreement between measured data and modelled data. The IMPACT model was used to predict both baseline and Project contributions for blueberries. The ERA will be revised according to the periodic review requirements in CSA N288.6-22 which will reflect ongoing data collected from monitoring programs.</p> |
| AD-39 | CNSC | Appendix 10-A (ERA), Table 2-2 | <p>Table 2-2: Estimated Home Ranges of Selected Terrestrial Ecological Receptors</p> <p>Based on the reference McLoughlin et al. (2016), the Home Range for Woodland Caribou is indicated as “Expected = 80 km2” which represents the mean range sizes pooled over the two study years for calving/post-calving. The indicated Minimum (67 km2) and Maximum (267 km2), however, do not relate to the calving/post-calving stage, which is not clearly stated in Table 2-2. In contrast, these values are actually mean range size values for autumn/rut and early winter, respectively, as described in the source document on Page 83 (McLoughlin et al., 2016). It should be noted that in terms of true minimum and maximum, the source document states that individual home ranges, based on up to two years of GPS locations, varied in size from 16.2 km2 to 1363.9 km2 (Page 82 of McLoughlin et al., 2016).</p> <p>Reference: McLoughlin et al. 2016. Population dynamics and critical habitat of woodland caribou in the Saskatchewan Boreal Shield. Interim Project Report, 2013–2016. Department of Biology, University of Saskatchewan, Saskatoon. 162 pp. Available online at http://mcloughlinlab.ca/lab/wp-content/uploads/2019/06/2013-2016-SK-Boreal-Shield-Caribou-Project-Interim-Report-Nov-18-2016.pdf</p> | Please provide clear details on the source of the home range values listed in Table 2-2. | <p>Denison acknowledges the comment and will add clarification in Table 2-2 of Appendix A in Appendix 10-A that the minimum represents the autumn/rut and the maximum represents the early winter.</p> |
| AD-40 | CNSC | Appendix 10-A (ERA) section 3.2.1.5 | <p>Although the soil type selected in the ERA for modeling of atmospheric deposition to soil is sandy soil, organic soils have been delineated and characterized (section 9.1.3.3 of the EIS) as valued component (i.e., “Organic Matter/Peat”). It is unclear if the soil quality modeling performed in the ERA is protective for soil types other than sandy soil.</p> | Please clarify if COPC modeling based on sandy soil is protective of organic/peaty soil and provide justification. | <p>The majority of the soil in the Project Area and LSA is considered sandy soil. Section 9.1.3.2 of the EIS states "Mineral soils are associated with upland sites and (in all likelihood) anthropogenically disturbed land that, together, correspond with >99% of the Project Area and 91.5% of the LSA (Figure 9.1-8). The predominate mineral soils within the RSA have been classified as Sandy Dystric Brunisols (Smith et al. 2011)." Organic matter/peat was included as a VC in the EIS because of the concern regarding drying and losing biological function through groundwater interactions, and not in terms of assessment of soil quality. Additionally, Section 9.1.3.3 of the EIS acknowledges that organic soils is limited in the Project Area. As such, this comment is considered not applicable.</p> |
| AD-41 | CNSC | Appendix 10-A (ERA), Table 5-5 | <p>Table 5-5: Complete Exposure Pathways for All Selected Ecological Receptors to be Assessed using the IMPACT Model</p> | Please add the pathway “direct contact in water” to Table 5-5 and revise all calculations accordingly. | <p>Table 5-5 will be revised to state “direct contact in water” for phytoplankton. No calculation changes are needed.</p> |

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ³ | Context and Rationale | Advice to the Proponent | Denison Response |
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| | | | The exposure pathway for phytoplankton is stated as “direct contact in sediment”, however, phytoplankton live suspended in the water column. It is acknowledged that in the IMPACT modelling report, phytoplankton is described with an occupancy factor of 1 in water (Table 2-5). | | |
| AD-42 | CNSC | Appendix 10-A (ERA), Table B.12 | <p>Table B.12: Sample Calculation – Adult Recreational Fisher/Hunter (McGowan Lake) Dose and Risk Calculations for Selenium</p> <p>The source for the Terrestrial Plant Ingestion Dose for Labrador tea and blueberry is stated as “Table C.5”, however, this table could not be located.</p> | Please provide the referred-to Table C.5 or an alternate source of information for the Terrestrial Plant Ingestion Dose for Labrador tea and blueberry. | Thank you for the advice comment. This will be addressed, as possible, once the EIS is updated following the conclusion of the information requirement (IR) process. |
| AD-43 | CNSC | Appendix 10-A (ERA), Environmental Risk Assessment for Wheeler River Technical Support Document | <p>The ERA is prepared by Ecometrix and submitted to Denison Mines. It is unclear if the ERA submitted has been reviewed and accepted by the proponent (Denison Mines).</p> <p>CSA N286-12 clause 9.5.5 specifies that “the selected supplier’s technical documents that are required to be submitted shall be reviewed and accepted”.</p> <p>Meeting these CSA N286-12 requirements will ensure that the proponent has control of the purchased services as a future licensee applicant.</p> | Provide clarifications if ERA documents have been reviewed and accepted by the proponent. | See response to IR-202 which indicates that Denison reviewed and accepted the ERA. This text will be added to Appendix 10-A. |
| AD-44 | CNSC | Section 11 | It is not clear whether all of the interested Indigenous Nations and communities were engaged on the results and findings of the Heritage Resources Impact Assessments (HHRIA) or just ERFN? | CNSC staff would appreciate an update on any engagement activities that have taken place with regards to any of the HHRIAs for the Project, or any site or thing that is of historical, archaeological, paleontological or architectural significance as requested by other Indigenous Nations and communities to date. | <p>Denison confirms that the results of the Project-related HRIAs were discussed with ERFN, as they expressed interest in further understanding the nature of the work undertaken.</p> <p>The Saskatchewan Ministry of Parks, Culture and Sport, Heritage Conservation Branch (HCB) administers The Heritage Property Act. Regulatory approval as per section 63 of The Heritage Property Act (GS 80) was granted for the Project for the two separate HRIAs (HCB File No. 16-2102, December 14, 2017 and HCB File No. 19-933 February 12th, 2020).</p> <p>The results of the HRIAs were included and formed part of the draft EIS. Comments made by Indigenous communities on this section of the EIS will therefore be responded to accordingly by Denison, where appropriate.</p> <p>Additionally, as noted in Section 11.3.2, “The Heritage Resource Management Plan (HRMP) was informed by engagement with ERFN, who recommended that the HRMP should include a mechanism to involve Indigenous communities where appropriate (21-EN-ERFN-591.1; 21-EN-ERFN-591.2) (see Appendix 11-B).”</p> |

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ³ | Context and Rationale | Advice to the Proponent | Denison Response |
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| | | | | | The mechanism to involve Indigenous communities has been included in the HRMP and allows for general notification to Indigenous communities should an artefact be found, which provides flexibility to engage all appropriate Indigenous nations accordingly. |
| AD-45 | CNSC | Section 11.1.4.5.2. Perceived Suitability/Safe Use of Resources (p. 11-59) | <p>The EIS States: “Section 2.6.1 in Section 2 describes the extensive review of mining methods that led to the decision to adopt the ISR mining method.” (p. 11-59).</p> <p>This reference is not correct, as this section does not contain a review of the mining methods.</p> | Please update this to reflect the appropriate section. | Thank you for the advice comment. This will be addressed, as possible, once the EIS is updated following the conclusion of the information requirement (IR) process. |
| AD-46 | TC | Section 14.6.7.2 | <p>Transport Canada would like to clarify that although the proponent may use a third party to assist in developing emergency response assistance plans (ERAPs), it is the proponent’s responsibility to submit the ERAP application(s) to Transport Canada, per Section 7(1) of the <i>Transportation of Dangerous Goods Act, 1992</i> as follows:</p> <p>Emergency response assistance plan</p> <p>7 (1) No person shall import, offer for transport, handle or transport dangerous goods in a quantity or concentration that is specified by regulation — or that is within a range of quantities or concentrations that is specified by regulation — unless the person has an emergency response assistance plan that is approved under this section before</p> <p>(a) importing the dangerous goods;</p> <p>(b) offering the dangerous goods for transport; or</p> <p>(c) handling or transporting the dangerous goods, in the case where no other person is required to have an emergency response assistance plan under paragraph (a) or (b) in respect of that handling or transporting.</p> | <p>*This advice pertains to the regulatory phase.*</p> <p>Transport Canada notes that the sentence highlighted in yellow below is incorrect and should be revised or removed. While a contractor could assist the proponent to develop the ERAP(s), it is the responsibility of the proponent to apply to Transport Canada for approval of the plan(s).</p> <p>14.6.7.2 Design and Mitigation Considerations</p> <p>Principal traffic risk mitigation measures include:</p> <ul style="list-style-type: none">• traffic control measures such as speed limits;• travel management plans;• spill and emergency response planning; and• driver training. <p>Additionally, Denison considered several provisions to make sure that the effects of a terrestrial release of hazardous materials are as low as practicable. In addition to transportation mitigations listed for Scenarios 1 and 2, the following provisions were considered.</p> <ul style="list-style-type: none">• The <i>Transportation of Dangerous Goods Act, 1992</i> (Government of Canada 2019) outlines the requirements for entities that transport dangerous goods to establish emergency response assistance plans. These plans list specialized personnel and equipment that are required for responding to an incident. It is expected that a contractor responsible for the transportation of uranium concentrate, fuel, and hazardous chemicals would develop these plans. | Acknowledged. Section 14 will be updated in the final EIS to clearly state that while a contractor could assist Denison to develop the ERAP(s), it is Denison’s responsibility to apply to Transport Canada for approval of the plan(s). |
| AD-47 | Health Canada (HC) | Appendix 14-A (p. 8-9) | <p>Context: No emergency response plan has been provided within the draft EIS, which states that emergency response plans will be developed in the future (Section 14 Appendix 14-A, p.8-9).</p> <p>Rationale: For any emergency event, Health Canada considers the protection of human health as a primary consideration in the</p> | <p>It is recommended that Denison develop an emergency response plan in consultation with potentially affected communities and stakeholders that includes, but is not limited to, the following:</p> <p>1. All relevant contact information of the communities, especially related to km 160 of Hwy 914, which is the location of a cultural</p> | <p>Denison acknowledges the comment and thanks Health Canada for the recommendations as to the development of its Emergency Response Plan.</p> <p>As noted in the draft EIS, Denison has committed to the development of an Emergency Preparedness and Response</p> |

| Ref. # | Department | Reference to EIS, appendices, or supporting documentation ³ | Context and Rationale | Advice to the Proponent | Denison Response |
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| | | | <p>development of emergency preparedness and response plans. This includes monitoring for human health impacts and the provision of health-related guidance. Further, this will be a requirement of the licensing process.</p> <p>The proponent should ensure that the emergency response plans consider the protection of all relevant potential human receptors that could be impacted by an onsite or project-related off-site accident involving the release of chemical and/or radiological substances.</p> | <p>camp that has been established by the English River First Nation and km 67 of Hwy 914 that is a gathering location for the Kineepik Metis Local associated with the Northern Village of Pinehouse.</p> <p>2. Description of the mechanisms for communication with communities in case of an emergency.</p> <p>3. Description of the partnership with and the training of local communities and local responders (see Section 14 Appendix 14-B, p.1).</p> <p>4. Description of mutual aid agreements with neighboring industries/municipalities, where appropriate.</p> | <p>Program as a component of its Environmental Management System (EMS). The objectives of the program are generically consistent with the recommendations that have been provided and Denison, as it has demonstrated to date, is committed to meaningful engagement with communities of interest and will solicit input and advice during all aspects of program development.</p> <p>For reference it is noted that as it concerns its EMS framework documentation hierarchy it is expected that three levels of documentation will be developed – Programs, Plans and Procedures. The emergency preparedness and response documentation will follow this hierarchy and input from interested parties will be solicited during all phase of program/plan/procedure development. Denison intends to develop this documentation as it advances through the licensing phase of Project realization.</p> |
| AD-48 | ECCC | Appendix 16-C, Summary of Monitoring and Follow-up Programs | Appendix 16-C does not include consideration of any monitoring and follow-up programs regarding GHGs. | ECCC recommends that the Proponent consider developing a GHG follow-up program to measure and compare actual GHG emissions against the draft EIS estimates, including reporting the Project’s actual emissions and updating the emissions estimates as needed. | Denison anticipates being subject to ECCC’s reporting requirements for emitters over 10,000 tonnes CO2e and the information is collected under section 26 of the Canadian Environmental Protection Act. This was noted in the draft EIS, Section 2.5 Greenhouse Gas Emissions. |
| AD-49 | ECCC | Appendix 16-A Summary of Residual Effects Appendix 16-B Summary of Cumulative Effects | ECCC notes that GHG mitigation measures have not been considered for the Project. Furthermore, the Project’s lifetime is expected to extend into 2050 and beyond. Consistent with the information requirements of the SACC, and aligning with Canada’s commitment to achieve net-zero GHG emissions by 2050, the Proponent should provide a credible plan that describes how the Project will achieve net-zero emissions by 2050. | <p>ECCC recommends that the draft EIS include an assessment of potential GHG mitigation measures throughout all phases of the Project. This could include a Best Available Technologies / Best Environmental Practices (BAT/BEP) Determination, as described in Section 3.2 of the Draft Technical Guide.</p> <p>ECCC also recommends that the Proponent provide a credible Net-Zero Plan on how to achieve the target of 0 kt CO2 eq/year, for the year 2050 and beyond, following the guidance of the SACC and the Draft Technical Guide.</p> | <p>GHGs were not included as a VC or KI in the draft EIS and as such, there are no specific GHG-related mitigation measures in Appendix 16. However, many of the mitigation measures for the VC Air Quality related to combustion products would also be associated with a reduction in the Project’s Scope 1 emissions. As noted in the draft EIS, Section 2.5, at this stage in the Project Denison will look for opportunities to optimize energy management and improve the energy intensity of the Project where practical. Also see response for AD-19 (second paragraph).</p> <p>Denison will consider the option of preparing a climate resiliency assessment with consideration to best available technologies / environmental practices (BAT/BEP) as well as a net-zero plan as the Project advances. Section 2.5 of the EIS provides a summary of the anticipated GHG releases and a comparison to the nation- and province-wide GHG emissions. The project is expected to contribute less than 0.0043% to the nation-wide annual average. Given this very low contribution, the project is not expected to impact Canada’s ability to meet its climate-related objectives and targets.</p> |

Wheeler River Joint IR Technical Meetings – FIRT and Denison

June 2024 (Round 3 Submission)

Objective of Meetings:

The meeting aimed to provide an opportunity for Denison to pose questions and for the Federal Independent Review Team (FIRT) to provide clarifications. Emphasis was placed on addressing the information requirements (IR) subject to discussion, focusing on information gaps, requirements/regulations essential for determining significant adverse effects.

Meeting #1: Wheeler River IR Meetings (IR-100, IR-190 and IR-198-R1)

Presentation: edoc: 7299864

Date: June 5, 2024 2-3:15PM

Attendees:

- In-person: CNSC: Jes Way, Wish Yen; Denison and consultants: Janna Switzer, Carolanne Inglis-McQuay, Brian Fraser
- Virtual: CNSC: Said Hamlat, Samantha Longo; HC: Paul Partridge, Cassidy Dutchak, Ninon Lyrette, Luc Pelletier, Rosalie Awad and Guillaume Colas; ECCC: Marcus Edino, Heather Konopski, Ian Parsons, Robert Nissen; Denison and consultants: Sarah Benson, Pamela Bennett, Jason Dietrich, Rina Parker, Brianne England

IR-100

- Wheeler would not be contributing mercury to the environment, but concern is with existing mercury in the environment.
- Denison's intent is not to use SK guidelines for fish consumption, will be using HC guidance
- HC's best practice is to consider mercury for Indigenous foods, as they are worried that there may be risks in consumption for Nations and communities. It would be to Denison's benefit to have baseline conditions that can be compared to if there are elevated levels identified during monitoring.
 - HC understands Denison's commitment to monitor mercury in country foods, and that no anticipated mercury increases for the project. But there is a more elaborate relationship with nutrient loading and methylmercury
 - Mercury not being carried forward is the basis of the comment – reviewer has no understanding of the basis of this information. HC is trying to better understand potential risk and asking to model baseline conditions – understanding baseline conditions needed to be able to assess, and have this clearly documented to substantiate conclusions.
 - Usual practice to include mercury, since there are fish and fish consumers, precautionary approach, in case there is a potential disturbance of sediment.
 - Denison noted that this has not come up from Nations as a concern.
 - Validating will be done through ERFN monitoring program.
- IR Response needs more details around the potential risks, monitoring results and how assessments could be used to ensure risks are mitigated.
- HC would want to see commitments from Denison to meet CSA standards if appropriate in the ERA under adaptive management.

- Country foods monitoring program needs to have a mechanism for triggers which will use a back-calculated value instead of the Province of Saskatchewan's values.
- If confirm baseline conditions, there is commitment that going forward with project, no matter what data says, will need to run through ERA in the future.
- Have a baseline and should be no increase, if don't see changes, no need to undertake further assessment.

IR-190

- Denison did not identify NO₂ as a COPC, and thus did not carry it through for quantitative assessment
 - 2a. HC appreciates that Denison will remove references to the outdated 1970 guidelines.
 - 2b. editorial changes, needed, these will be made.
 - 2c. Industry best practice for non-threshold air pollutants is to carry it forward to risk assessment.
 - HC asked what criteria is being using to exclude NO₂ as a COPC – studies point to higher levels of concentrations. HC would typically expect use of the most conservative guideline – because it's short term exceedance, no annual effects, lots of conservative assumptions.
 - HC currently finds the rationale for excluding NO₂ as a COPC is not strong enough and the risk assessment isn't detailed enough. HC is looking for information and best practices from Denison to describe the risks around NO₂ as a COPC. Describe the risk, provide discussions around the uncertainty, proposed policies around activities that would generate NO₂ and how Denison plans to mitigate risks. Include potential risks for workers who are off-duty and characterize the risk with a storyline.
 - Response should describe all conservatism used to come to the conclusions. HC is looking for Denison to "show their work"
 - Proposal by Denison to include qualitative discussion to better justify reasoning for excluding, acknowledge short term exceedance and exposures.
 - HC looking for Denison to better show their work – beef up discussions on risk characterizations, calculations and results are essential.
 - HC advocates for mitigations such as Tier 4 engines or monitoring.
 - Sam advises Denison review the [CSA 288.6:22 standard](#) and to ensure the "Shall" statements are considered. Any exceedances in CAAQS might require a quantitative assessment and this compliance could be moved to the ERA review at the licensing phase.
 - HC would like to review the quantitative assessment for NO₂ at the EA phase, not the licensing phase.
- Edits following SME review of minutes:
 - HC would add that it emphasized that the CAAQS should not be used as pollute up to levels and that health effects can occur at all levels of exposure.
 - The discussion on proactive measures to reduce NO₂ emissions appears to be missing from these notes (e.g., use of Tier 4 engines, regular maintenance and repair of engines, anti-idling policies, monitoring, etc.). HC would request inclusion of a bullet to document this discussion point.

- HC is unclear about use of the term “secondary” in the Action Items for IR-190: *“Final EIS will be edited text to remove reference to 1970s criteria and clarify the discussion of “secondary” screening of NO₂ and rationale to not carry NO₂ forward in the risk assessment.”* HC would suggest that CNSC provide further clarification or remove the word “secondary”.

| IR # | Summary of Discussion | Action / Next Steps |
|-----------|---|--|
| IR-100 | <p>Denison clarified to HC that in the Round 2 response to IR-190-R1, Denison did not propose to use Government of Saskatchewan fish consumption guidelines.</p> <p>In response to this IR, Denison will clarify the information/commitments/plan already provided on IR-212 (country food monitoring framework) and edit commitment 8-44 to reflect adaptive management on how country food monitoring data influences ERA updates (which are regularly done through the licence requirements per CNSC oversight and N288.6).</p> | <p>Denison’s response will outline the commitment in the EIS to the overall development of trigger levels through the country food monitoring program. They do not plan to calculate the trigger levels for the purpose of the IR but would describe how it would be calculated and used. Same generic adaptive management cycle for all aspects of monitoring and follow up cycle.</p> <p>Denison to provide clarification through an interim IR response for SME Review. For review by HC and CNSC.</p> |
| IR-190 | <p>There was agreement to some aspect of the discussion (remove 1970s reference) but lack of agreement on approach to exceedance of NO₂ criteria.</p> <p>Denison OK to provide further detail but would continue to screen out, as opposed to screening in and carrying forward in risk assessment as “best practice”, as suggested by HC. Denison does not agree with HC’s suggested approach as there is no requirement or criteria for a 1 hour NO₂, HQ exceedance and it is a less preferred way to communicate the actual risk to public, Indigenous communities, and workers.</p> <p>CNSC’s ERA representative (Said) agreed that Denison’s proposed approach sounded reasonable.</p> | <p>Final EIS will be edited text to remove reference to 1970s criteria and clarify the discussion of “secondary” screening of NO₂ and rationale to not carry NO₂ forward in the risk assessment. The discussion could include HQ values to satisfy HC info needs within the IR but not within the final EIS.</p> <p>Denison plans to provide a response using the approach outlined in the meeting in place of the SME (HC) ask to determine the Hazard Quotient (HQ).</p> <p>Action – Jes to validate with Said (complete) – Said and Jeffrey Indicated that they were comfortable with the path forward and to review the clarification through IR response.</p> <p>Denison to provide clarification through an interim IR response for SME Review. For review by HC and CNSC.</p> |
| IR-190 R1 | Not directly discussed, but closely associated with parent IR (IR-190 above) | <p>This IR was conditionally accepted. To be carried over to licensing.</p> <p>As part of licensing, Denison will clarify the conditions under which a switch from passive to continuous monitoring would be warranted (e.g., if the 30-d measured NO₂ concentration, after conversion to a 1-h concentration, approaches or exceeds the 1-h CAAQS value.</p> |
| IR-198-R1 | Not discussed directly, but this IR is closely related to IR-100 | This IR was conditionally accepted, pending commitment. |

Meeting #2: Wheeler River IR Meetings (IR-107, IR-110 and IR-113)

Presentation: e-doc: 7299865

Date: June 5, 2024 3:15-4:15PM

Attendees:

- In-person: CNSC: Nana Kwamena, Jes Way, Wish Yen, Jeffrey Lam; Denison and consultants: Janna Switzer, Carolanne Inglis-McQuay, Brian Fraser
- Virtual: Said Hamlat, Samantha Longo, Daniel Sauvé, ECCC: Marcus Edino, Heather Konopski, Trish Auser, Ian Parsons; Denison and consultants: Sarah Benson, Pamela Bennett, Jason Dietrich, Rina Parker, Brianne England

IR-107

- Denison offered to share the analysis conducted by comparing all lakes in the LSA with Whitefish Lake. The analysis compares percentage changes between the geometric mean of all lakes and Whitefish Lake.
 - It was noted that all raw baseline data is provided in A-1 of Appendix 8-D, so instead of re-sharing, CNSC would re-share information in EIS documentation
 - **Action:** CNSC to share out the links for the draft EIS submissions which will include supplemental technical documents for this IR (Draft EIS - Appendix 8-D - Appendix A-1). **(Completed).** Should anyone else need it:
 - File Link: <https://denisonmines.egnyte.com/fl/27VG5YKWPY/TRANSFER>
 - Password: be2AvBVRjAMa
- To resolve the IR, CNSC requested that Denison provide the conservatism perspective that was shared during the technical meeting as part of the submission for review. Denison's current approach of data pooling has resulted in a loss of resolution. Denison has indicated that the inputs used in models are in the draft EIS.
- Low sample size:
 - Looking at table 1, to characterize seasonal conditions would require enough data to develop baseline statistics to allow for comparison of seasonal conditions. Not seeing how data supports being able to characterize at this point.
 - Not a lot of samples per season for that particular site, hard to access in the middle of winter due to weather conditions and safety (samples have been taken in early and late parts of the year and not directly in winter – pooling data over this time)
 - One of CNSC's regulatory requirements to show baseline demonstrates seasonal characterization. No winter sample is a gap.
 - Denison are committed to do more as have more people at the site, where possible. Won't be able to get all locations over winter, but by pooling data and having good reasonable availability, confidence that representative enough.
- Pooled data:
 - Denison pooled the data for the different lakes - because it's consistent with locality and parameters, were able to use this and actually use geometric mean of information as a water quality for COPCs of interest.
 - ECCC: concerns with pooled data and geometric mean, less conservative approaches. By pooling, it eliminates differences between lakes (understand similar, but will need to be

making comparisons against baseline quality conditions, so will need to have baseline characterization for each of the lakes).

- Pooling of data = losing more resolution than if using water body by water body basis
 - statistical analysis shows water bodies more or less the same and have adequate conservatism in the assessment
- Denison noted that used a conservative approach in terms of inputs to the model, acknowledge that modeling will need to be re-done in the licensing phase, as will have to meet regulations in order to discharge, and options within mitigation realm to mitigate and minimize impacts; these will be levels that have to be pulled and will be worked through in the permitting process.
- Denison proposes a commitment to resolve this through the permitting process as a commitment to provide additional information as 1-2 years of water quality data can't be shared in the next 3 months. Denison commits to provide the requested baseline information which will be collected as part of the pre-construction monitoring to bolster the data. Should there be differences to the current conclusions of the draft EIS, Denison will work with regulators to remodel and reassess.
- **Action:** SMEs to review shared data, and CNSC-ECCC can take this discussion offline.

IR-110

- Denison will revise the language of the commitment to ensure that the diffuser will be designed to meet the predictions in the draft EIS. (Denison feels this is redundant as the EIS is meant to bound the Project).

IR-113

- Denison hopes that the commitment to update analysis and predictions incorporating new data collected during the licensing for operation period would be acceptable.
- Not discussed - for discussion on June 14.

| IR # | Summary of Discussion | Action / Next Steps |
|--------|---|--|
| IR-107 | <p>Denison's understanding is that this IR is resolved. Denison will provide the action / next steps information.</p> <p>New information (WQ data) will be incorporated into the application for the licence to operate application, along with new effluent quality predictions.</p> | <p>The IR considers 4 actions:</p> <ol style="list-style-type: none"> 1. Provide raw baseline data (perhaps in an appendix). <i>Data is already on record in the EIS - CNSC to share links with ECCC.</i> 2. Provide summary statistics for baseline datasets, which at a minimum should include: mean, standard deviation, 95th percentiles, minimum, maximum, and number of samples. Present summary statistics by season (i.e., freshet, summer, fall and under-ice), and include comparisons to relevant water quality guidelines. <i>Data is already on record in the EIS - CNSC to share links with ECCC.</i> 3. Identify potential gaps in baseline datasets, and indicate how data gaps will be addressed. Describe the planned baseline monitoring to be conducted including, but not limited to, addressing any data gaps. <i>Denison can provide as narrative in response to IR. No changes to the final EIS.</i> 4. Demonstrate that the combined existing baseline data and planned baseline monitoring will yield dataset(s) that provide robust water quality baseline characterization of seasonal conditions (i.e., freshet, summer, fall, under-ice during winter), including a range of flow conditions. <i>Denison can</i> |

| | | |
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| | | <p><i>provide analysis that supports this in an IR response. No changes to the final EIS.</i></p> <p>Denison to provide clarification through an interim IR response for SME Review. For review by ECCC and CNSC.</p> |
| IR-110 | Denison to clarify/reword existing commitment on diffuser design. | <p>Denison to clarify/reword existing commitment on diffuser design in Version 2 of the Commitments Register.</p> <p>Denison to provide clarification through an interim IR response for SME Review. For review by ECCC and CNSC.</p> |

Meeting #3: Wheeler River IR Meetings (IR-115, IR-115-R1, IR-124, IR-126, IR-194, IR-197)

Presentations: e-doc: 7299866 and 7299867

Date: June 6, 2024 11AM-12PM EST

Attendees:

- In-person: CNSC: Nana Kwamena, Jes Way, Konrad Gorzkowski; Denison and consultants: Janna Switzer, Brian Fraser
- Virtual: CNSC: Melissa Fabian Mendoza, Said Hamlat, Samantha Longo, Daniel Sauvé; ECCC: Marcus Edino, Heather Konopski, Duck Kim, Trish Auser, Ian Parsons, Elizabeth Ashby, Robert Nissen; Denison and consultants: Sarah Benson, Pamela Bennett, Jason Dietrich, Rina Parker, Carolanne Inglis-McQuay, Brianne England

IR-115 and IR-115-R1

- Denison requests CNSC as the regulating authority confirm the guidelines for the effluent discharge. Criteria should be narrowed down and defined based on federal/provincial licensing/permitting requirements. Denison will reassess if there are new CCME guidelines in the future.
- In providing conservative criteria for parameters – some examples that would be higher than provincial criteria, and some lower – justification for criteria should be provided:
 - Table outlines criteria, short term and long term – provide clarification on how criteria will be used.
 - Details will be determined and provided at point of licensing. If it does change when look at available guidelines and make choice, any changes to the conclusions should be shared.
 - Regardless of which are used, Denison have completed assessment based on selected criteria which is extremely conservative - when go to licensing and permitting, criteria will be based on licensing requirements.
- The response presents four screening criteria (two short-term and two long-term) for each parameter. ECCC requests clarification on which particular criteria will be used for screening each parameter, how these criteria will be applied, and the guidelines used for development of these criteria
 - When would they be used and why chosen?

IR-124 and IR-124-R1

- Are there specific areas within watersheds or lakes where sediments might accumulate more than other areas? Main intent of IR is to identify if this sort of scenario has been evaluated.
 - Has not been evaluated, can be confirmed over time through monitoring data, for purposes of representing the regional study area
- ECCC requests the details shared during the technical meeting and additional context be provided in writing for ECCC to review and assess. ECCC notes that the main intent of the IR is to identify whether deposition would accumulate in a specific area of the lake which could impact the environment or habitat more than others.
 - **Action:** Presentations to be provided (**complete**)
- Should the response for IR-124 be satisfactory, it should also resolve IR-124-R1

IR-126

- CNSC requests that Denison provide the methodology for BAFs and other published studies used to support this IR. Please consider the Mining Association of Canada's published guidance for selenium.
- SMEs want to understand potentially significant adverse effects:
 - What are the concentrations of selenium in benthic invertebrates?
 - Bioaccumulation factor is based on studies all over norther SK, developed using measured data at various other uranium mine sites. Looking at uptake over time.
 - Basing approach on monitoring data from years of accumulated data in norther SK water bodies. In response, can point out where in the appendix that has this information. It's in the impact value which has all information used. Appendix A to the ERA in Section 3.6.1.?
- Please share the uranium mine studies for SMEs to review – different methodology and would be good to review references and have background on it.
 - ECCC does not think the studies are required to help close off the IR, but will be required for the ERA review in terms of licensing and any information to substantiate Denison's methodology should be provided for the EA process.
 - **Action:** CNSC would expect that any references used to underpin the responses be included and provided as part of the responses to IR package. Denison to provide any references required to support response or assessment.
- Concerned about effluent discharge amount – volume of flow that that will discharge is significantly lower
- The BAFs, methodologies and monitoring information may be enough to close the IR.
- **Action:** Denison will discuss offline whether methodologies and monitoring data can be provided.

IR-197

- What additional information is ECCC is asking for? SME understanding that IR had specific CSA standard N288.6
- Atmospheric deposition is the standard used (see clause from N288.1), so Denison feels it is appropriate to use N288.1 here as opposed to N288.6
 - **Action:** Trish will talk to Duck.

- With regards to atmospheric deposition of mercury, there is none and Denison has no additional information to provide.
- Not expecting mercury deposition from mine, but request this be something included in follow up, to confirm that none.

| IR # | Summary of Discussion | Action / Next Steps |
|-----------|--|---|
| IR-115 | The theme of this discussion was to provide further clarity/rationale on the use of WQOs as two short term and two long term WQOs were shown. Denison can follow up with written response explanation of four criteria referenced and how they will be used. ECCC to review the conservatisms that were introduced in the EIS and specifically with respect to the near-field WQ model. | <p>Denison to provide further clarity/rationale on the use of WQOs as well as WQO hierarchy in an IR response. Rational will not affect the outcome of the EIS. Denison will confirm consistency in all the places the WQOs show up and are used in the EIS and TSDs.</p> <p>The response presents four criteria (two short-term and two long-term) for each parameter. Denison to clarify which particular criteria will be used for screening each parameter, how these criteria will be applied, and the guidelines used for development of these criteria.</p> <p>Denison to provide clarification through an interim IR response for SME Review. For review by ECCC and CNSC.</p> |
| IR-115 R1 | Discussed in same context as IR-115 | Same as outlined for IR-115 |
| IR-124 | <p>In this IR, ECCC is asking for information on the manner in which the sediment quality predictions were made.</p> <p>Denison clarified where this information is available in the EIS (mainly in Appendix A to Appendix 10-A). The sediment model represents deposition in the whole lake using partition equations. There is not a significant release of particulates; therefore, the dominant process is expected to be partitioning not particle settling – TSS in effluent is low (6 mg/L).</p> <p>Two models were utilized in the EIS for different purposes. The near-field model assessed different flow scenarios including low flow, and the IMPACT Model was used as the regional model for the risk assessment. The risk assessment focuses on the expected case. Conservative assumptions in both the near-field model and in the IMPACT model were outlined (refer to PowerPoint presentation).</p> | <p>As part of an IR response, Denison to provide further clarity on the manner in which the sediment quality predictions were made and discussion about the fact that we have not underpredicted effects.</p> <p>All lakes were considered depositional. The Kd values used describe the relationships between the constituent concentrations in water and sediment and are based on monitoring data collected over years in the Athabasca Basin (including in the Wheeler drainage). Also, the analysis considered both expected and upper bound cases and we think the sediment predictions provide suitable bounds for the analysis. The Wheeler River environmental monitoring program will be used to validate the predictions and if the data indicates that changes to the Kds are needed, it will be made through routine ERA updates.</p> <p>Denison to provide clarification through an interim IR response for SME Review. For review by ECCC and CNSC.</p> |
| IR-124 R1 | Discussed in same context as IR-124 | |

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| IR-126 | <p>Denison and CNSC to discuss offline, Denison may follow up with references to studies that led to development of northern Saskatchewan bioaccumulation factor. Written follow up explanations in responses to points 1 and 3 will be provided.</p> | <p>As part of this IR response, Denison to provide further clarity on the method used, some updated calculations and information on bioaccumulation factors for selenium. This includes text on how the selenium BAFs were derived for the fish species modelled. The BAF was derived using monitoring data (water and fish tissue data) from other uranium mines in northern Saskatchewan. The BAF includes uptake via the food chain (water to algae and algae to invertebrate, and invertebrate to fish), but it is assessed as one number looking at the transfer from water to fish. Using the monitoring fish tissue data to derive the BAF inherently includes the food chain components. This is standard risk assessment practice and is consistent with guidance in CSA N288.6.</p> <p>Denison will calculate both the fish whole body and fish egg ovary concentrations to compare against the ECCC guidelines using the conversion factors in US EPA in an IR response. As indicated by the reviewer – all are below the guideline.</p> <p>Denison to provide clarification through an interim IR response for SME Review. For review by ECCC and CNSC.</p> <p>Denison to provide references to CNSC that underpin the responses to this topic, and what was developed.</p> |
| IR-194 | Accepted and moved to licensing. | This IR was conditionally accepted. Pending commitment, and to be carried over to licensing. |
| IR-197 | <p>CSA N288 guidance documents are used in an integrated manner and there was confusion from ECCC on reference to the relevant CSA guidelines as though there was an error found. Denison is confident the standards have been used appropriately. In Denison's opinion, this IR was beyond the scope of IRs at this stage of the project review. There is no reason why a mercury-to-air-to-water calculation would be needed for ECCC to advise on the EA conclusions.</p> | <p>In Denison's opinion, this IR was beyond the scope of IRs at this stage of the project review. The rationale for why a mercury-to-air-to-water calculation would be needed for ECCC to advise on the EA conclusions is unclear. No change to the final EIS will be made.</p> <p>Denison's position is that this IR should be closed without further back and forth. However, if needed, Denison can provide clarifications (presented in the meeting PowerPoint presentation) as an IR response (CNSC to advise if this is required).</p> <p>Action: Unresolved. ECCC to consider presentation details and for further offline discussion between ECCC and CNSC.</p> |

Meeting #4: Wheeler River IR Meetings: SARA and Migratory Birds (IR-134-R1, IR142-159-167-R1, IR-149, IR-149-R1A, 149-R1B, IR-157, IR-170 and IR-174)

Presentation: e-doc: 7299862

Date: June 6, 2024 3-3:50PM EST

Attendees:

- In-person: CNSC: Nana Kwamena, Jes Way; Denison and consultants: Janna Switzer, Brian Fraser
- Virtual: Melissa Fabian Mendoza, Said Hamlat, Verena Sesin; CNSC: Marcus Edino, Heather Konopski, Kristin Mozel; Denison and consultants: Sarah Benson, Pamela Bennett, Brianne England, Carolanne Inglis-McQuay

IR-134, IR-142-159-167-R1, IR-149-R1A, IR-170

- Denison shared an example of a table providing information on species specific sweeps; would like to provide concise summaries
- ECCC indicated this is exactly what was being requested. Table entries with what is being considered for each of the different species at risk

IR-149 and 157

- ECCC has been working collaboratively with the province on understanding how the provincial offset requirements for Boreal Caribou meet the objectives of the Federal Recovery Strategy:
 - As part of the SARA s.11 agreement with Saskatchewan, the province has committed to developing an offsetting tool, which will need to be reviewed by ECCC. However, we have not yet completed a formal review.
 - There is nothing in the s.11 agreement to say that ECCC must approve or support the SK calculator.
 - Not as simple as Denison meeting province's offsetting requirements
 - Denison: Offset commitment to meet the range plan of the province, while province needs to meet recovery strategy of ECCC,
 - Province's calculator hasn't been reviewed by ECCC, and ECCC are looking for assurance that offset calculator meeting federal requirements
- ECCC interest and jurisdiction falls under section 79 of the SARA act, also indigenous interest in species, which is subject to CEAA, 2012.
- In general, recovery strategy related to biophysical features. Even if population is stable, if one bad fire year, could be over the disturbance threshold.

IR-149-R1B

- Denison mentioned that minimal air traffic is expected; Denison looking for specific guidance needed to resolve this IR
 - From ECCC's perspective, the main concern is frequency and timing of flights. If it's 1 or 5, this makes a big difference in disruption to caribou.
 - Lots of potential calving habitat that is in proximity to the project. If there are known calving grounds – what are mitigations? If calving is observed in areas previously not known for calving, what actions will be taken?
 - Looking for mitigations during calving – no fly zones/times or re-routing of flight paths during sensitive periods.

- Mitigation measures are of concern from ECCC caribou biologists – Denison notes that there are no known calving zones in the area.
- Denison asserted that they have information from province of Saskatchewan that there are no concerns regarding calving grounds in proximity to the project and mitigations aren't needed. ECCC requests that Denison provide this information.
- Indigenous knowledge from the EIS indicated that caribou calve near the Wheeler River, but there was no locational data presented. ECCC requested that Denison provide greater detail on the Indigenous knowledge of caribou calving, such as proximity to the project (if unable to give specific details due to confidentiality concerns).

IR-174

- Denison walked through responses to the IR points 1 to 5
- 2:
 - From ECCC - map scale is too large. Looking for something that is more focused on project footprint, in order to better demonstrate proximity (a smaller scale map); should demonstrate known habitats and habitat suitability
 - ECCC noted that mapping of suitable habitat will be required for determining pre-construction survey locations, so this mapping can be used for multiple purposes.
 - Denison indicated that they could do this, but the roosting area would be a focus (map would have no new information)
- 3. From ECCC - If map demonstrates known habitats and habitat suitability, can be tied into #2
- 4. From ECCC - As noted in when discussing previous topic, this would suffice
- 5. Denison - EA commitment to collect additional baseline data. ECCC would accept a commitment to collect additional data between now and pre-clearing, as want to ensure have the data for that assessment.

| IR # | Summary of Discussion | Action / Next Steps |
|-------------------|---|--|
| IR-134-R1 | Information requested in these IRs has been provided in various places in the EIS and IR responses; however, Denison can provide more concise summaries to support the resolution of these IRs. An example for bats was reviewed with ECCC during the meeting; the reviewer agreed this summary would close out this IR if it can be provided for all SAR. Denison agreed to prepare similar tables for the remaining SAR and provide them to ECCC. | Denison to provide pre-clearing summary tables for each SAR in the area for ECCC's review, as part of an IR response. Denison to provide clarification through an interim IR response for SME Review. For review by ECCC and CNSC. |
| IR-142-159-167-R1 | See notes for IR-134-R1; a number of IRs were discussed together under the theme of pre-clearance sweeps. | |
| IR-149 | Denison's understanding is that by meeting the Provincial offset requirements, the company will be meeting the objectives of the recovery strategy since the Province is responsible for caribou management. Further certainty is needed before the language | Denison's understanding is that by meeting the Provincial offset requirements, as part of the Saskatchewan range planning, the company will be meeting the objectives of the recovery strategy since the Province is responsible for caribou management. |

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| | provided in ECCC's proposed EA commitment can be translated into Denison's commitment register. | Action: Unresolved. Further discussion is required on this topic by CNSC and ECCC. |
| IR-149 R1A | See notes for IR-134-R1; a number of IRs were discussed together under the theme of pre-clearance sweeps. | |
| IR-149 R1B | Primary CWS concern is for disturbance related to calving. It is Denison's opinion that this comment should not be an IR at this stage of the review; the EIS concluded there were no significant effects to caribou with the application of mitigation measures which were outlined in the EIS. While some additional information can be provided (see action / next step column), Denison reiterates that the EIS was completed with the appropriate level of detail expected at this stage of the Project. | <p>Denison can provide the following in an IR response:</p> <ul style="list-style-type: none"> • Anticipated aircraft traffic at the Project airstrip is expected to be minimal, at approximately five flights per week during Operation (this was noted in the EIS; opportunities to optimize the flight schedule will be completed by Denison as the Project advances). • Mitigation measures likely to be incorporated into the operation of the airstrip, with respect to air traffic, would include, as safety allows, maintaining as direct approach and departure flight paths as possible, and obtaining appropriate altitudes, and leaving the LSA and RSA, as quickly as is safely reasonable. • Flight paths can be adjusted based on the location of caribou observations, as it safe and practical to do so. <p>Denison to provide clarification through an interim IR response for SME Review. For review by ECCC and CNSC.</p> <p>Note from ECCC: ECCC disagrees with the proponent's conclusions. Any impact to critical habitat is considered a significant impact that will require offsetting. The entire project area (including areas that have been previously impacted) contain the biophysical features required for caribou recovery. Even though the project footprint is small, and the caribou population is stable in SK1, the impact is still significant.</p> |
| IR-157 | See notes for IR-149 | |
| IR-170 | See notes for IR-134-R1; a number of IRs were discussed together under the theme of pre-clearance sweeps. | |
| IR-174 | Clarification of the legend in Figure 2-9 was provided (refer to PowerPoint slides). No hibernacula (i.e., caves, mines, buildings with stable and specific temperatures per COSEWIC 2013) are expected in the Project Area. Bat maternal roost potential habitat can be provided in a map form, using existing baseline data, existing ecosite data, and literature data. | In an IR response, Denison will provide an updated version of Appendix 9-F Figure 2-9 Bat Species Observed within the Wildlife Study Areas to 1) zoom in on the Project Area, and 2) un-shade the Project Area. Bat pre-clearance sweep details will be provided as part of IR-134-R1. A roost potential map will be developed as part of this IR response, using existing |

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| | | baseline data, existing ecosite data, and literature data. Denison to provide clarification through an interim IR response for SME Review. For review by ECCC and CNSC. |
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Meeting #5: Technical IR Discussions on Wheeler River EA Project (IR-89 and IR-89-R1)

Presentation: e-doc: 7299863

Date: June 6, 2024 4-5PM EST

Attendees:

- In-person: CNSC: Nana Kwamena, Jes Way; Denison and consultants: Janna Switzer, Brian Fraser
- Virtual: Melissa Fabian Mendoza, Said Hamlat, , Quinn Zheng, Marcus Edino, Heather Konopski, Duck Kim, Jordan Hollman; Denison and consultants: Sarah Benson, Pamela Bennett, Brianne England

IR-89, IR-89-R1

- The decilified zone is an important pathway between the ore-zone and Whitefish Lake; would expect a conservative value - an order of magnitude higher in a sensitivity analysis
- ECCC is requesting that Denison complete traditional sensitivity analysis by increasing parameters to demonstrate the robustness of the model and provide an understanding of what could occur in an extreme (unrealistic) scenario, whereas Denison has conducted simulations. Differences in professional opinion were shared:
 - ECCC noted that when look at simulations, determining probable cases that would occur. When look at sensitivity analysis, looking for sensitivity - not a calibrated data set. If increase sensitivity, how does model react to an increase in the sensitivity of parameter? It isn't expected that this will match field observed data, and it isn't considered as a probable scenario. View as a sensitivity analysis, not a worst case scenario.
 - Denison noted that they have modeled what they expect to occur at site and have evaluated probable uncertainty, bounded by observational data that have collected - what is potentially probably at the site. Do not want to produce scenarios that could be construed as representative of what might occur in documentation that will be reviewed by the public. Ran scenarios that they considered realistic, and CNSC has mechanisms to refine through the licensing process (at this stage, sensitivity analysis is a nice to have).
- Denison acknowledged that that do not provide a very fulsome rationale for the change in the median K value in the EIS, and that there is information that is erroneously included, as well as inconsistencies in the values, as a range of values were not updated
- Denison has corrected the geomean and ECCC will review to determine if it's acceptable.

| IR # | Summary of Discussion | Action / Next Steps |
|--------------|---|--|
| IR-89 | Minor updates to the revised draft EIS were presented and will be corrected in the final EIS (refer to PowerPoint slides). A summary of uncertainty | IR response will be developed to address this IR, which outlines minor revisions to information presented in the revised draft EIS (and as described in the PowerPoint presentation). The response will also |

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| | <p>scenarios tested for geomean K value in desilicified zone (DSZ) were presented.</p> <p>ECCC: Desilicified zone is an important feature in the contaminant transport pathway from the mining zone to the receiving surface water body. ECCC expect Denison to do another sensitivity analysis in terms of K for the desilicified zone to understand the “safety margin” in the current modeling results.</p> <p>Denison summarized the sensitivity analysis they have done in terms of K values for the desilicified zone, and argued that further sensitivity analysis might be able to provide benefit (something nice to have but not a must).</p> | <p>include reference to the existing follow-up commitment related to the DSZ (commitment 7-20 in Version 1 of the Commitments Register).</p> <p>Denison to provide clarification through an interim IR response for SME Review. For review by ECCC and CNSC. Further discussion required between CNSC and ECCC.</p> <p>Notes from Quinn: In the online meeting with Denison, they proposed that they will update the groundwater model before decommissioning when more information would be available about the site geology, particularly the desilicified zone. Considering the sensitivity analysis Denison have conducted so far, this seems an acceptable path forward.</p> |
| IR-89 R1 | See note for IR-89 above | |

Meeting #6: Wheeler River IR Meetings PMP and Climate Change (IR-103, IR-113,

Presentation: e-doc: 7306089

Date: June 14, 2024 1:30-2PM EST

Attendees:

- Denison: Brian Fraser, Brianne England, Janna Switzer, Pamela Bennett, Sarah Benson, Jason Dietrick
- CNSC: Jessica Way, Tesfaye Tarekegn, Melissa Fabian Mendoza, Rain Noakes
- ECCC: Marcus Edino, Trish Auser, Catalin Obreja, Emma Watson, Ian Parsons, Paula Siwik

IR-103

- Denison developed Civil Earthworks Criteria and a Stormwater Management Plan (IR-12).
- The need for a sensitivity analysis will affect the determination of significant adverse effects.
- The distinction between contaminated/uncontaminated areas and contact/non-contact water.
- The Intensity-Duration-Frequency (IDF) with climate considerations (89mm) is used to design conveyance infrastructure of non-contact water.
- Adaptive management and continual improvement will occur throughout the life of the Project.
- The Decommissioning Plan will consider future climate scenarios for landform design and cover infiltration rates.

IR-113

- Denison disagrees that a quantitative climate change assessment is required for the EIS, based on the short period (10yrs. Operations + 5yrs. Decommissioning), future precipitation predictions indicate an increase in the potential assimilative capacity within the receiving environment, the design basis Probable Maximum Precipitation (PMP) bounds projected annual precipitation under high carbon scenario, effluent discharge monitored (Metal & Diamond Mining Effluent Regulations Schedule 4 & 5), discharge limited seasonally/periodically under low flow (flow

proportioned of fixed dilution discharge), adaptive management to adjust discharge during climate-induced changes in flow.

- Denison does not yet have information on how the different precipitation scenarios would affect water quality predictions, limits information would have during EA to look at effects. SMEs would see this as something that would be done in the EA, as it informs how water quality model responds to low and high precipitation scenarios, and understanding water quality, important to understand for effects, and feeds into mitigations. If treatment is needed, if management of additional water is needed, there is a benefit to understanding if mitigations are adequate.
- **Action:** CNSC/ECCC to look back at what was provided in first two rounds of information (Appendix 6-C and 8-C) - have looked at future climate scenario. In response to round one response of IR
- Sensitivity analysis hasn't specifically been provided – ECCC sees utility in work that has been done here, but don't see that meets the same need and understanding range of water quality that could occur under a low and high precipitation scenario. It's quite essential information to understand at the EA stage.
 - Denison feels that that have looked at practical scenarios and have bound significantly
 - SMEs note that sensitivity analysis could be used to reduce uncertainty on how water quality would behave under precipitation extremes. Data already has aspects that make it not as conservative, as were raised in other meetings on water quality, so there is already uncertainty. Important to look at how the model would react to how sensitive it is to precipitation extremes.
 - Denison suggested also see presentation from IR-115-R1 – Denison can put it all together so have full picture – **Action:** for SMEs to consider this information
- Denison suggests a sensitivity analysis on water quality predictions for low/high precipitation scenarios (including climate change induced) can be completed during operational licensing, as per REGDOC-2.9.2.

| IR # | Summary of Discussion | Action / Next Steps |
|--------|---|---|
| IR-103 | This IR is conditionally accepted. ECCC asked per the IR that Denison commit to providing the confidence intervals related to the IDF (1 in 100 year 24-hour rainfall) and demonstrate climate change resilience of the project (conduct climate risk and resilience assessment) during licensing. Denison explained that it has incorporated future climate (2020-2050 period) in the IDF to derive the 1 in 100 year 24 hour storm event for management of non-contact water. This is above the IDF curve based on current climate (79.9 mm). As noted, ECCC would like to see confidence intervals around a 1:100yr 24 hour IDF curve. Overall project climate change resilience was presented in Section 15 of the EIS. | For future IDF that considers climate change, Denison will provide language for the commitment register to evaluate the the uncertainty in projections of IDF derived 1:100 24 hour events as part of the licensing process. This IR was conditionally accepted. Pending commitment, and to be carried over to licensing. |
| IR-113 | During the EA, ECCC would like to see a sensitivity analysis on water quality predictions (site and receiving environment) for low and high precipitation scenarios, including the potential influences of climate change. Denison believes it has adequately considered expected changes in conditions that may be associated | If required, Denison can provide a summary of the rationale on this topic provided to date, along with a plan for mitigation measures for effluent release during low flow periods. |

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| | <p>with climate change in a narrative manner and provided rationale as to why quantitative (model) analyses are not necessarily required. Denison suggests that sensitivity analysis on water quality predictions for low and high precipitation scenarios, including the potential influences of climate change could be completed as part of operational licensing and as applicable to REGDOC-2.9.2, and/or alternatively REGDOC 2.9.1.</p> <p>CNSC has indicated that the issue should be taken offline for discussion between CNSC and Denison.</p> | <p>Action: Unresolved. Further discussion is required on this topic by CNSC and ECCC.</p> |
| IR-113 R1 | <p>Not discussed directly, but this IR is closely related to IR-113.</p> | <p>This IR is being carried over to licensing.</p> |

Meeting #7: Wheeler River IR Meetings: Water Quality Topics (IR-18, IR-101, IR-108, IR-108-R1, IR-114, IR-193, IR-195)

Presentations: e-doc: 7306092 and 7306102

Date: June 14, 2024 2-2:45PM EST

Attendees:

- Denison: Brian Fraser, Brianne England, Janna Switzer, Pamela Bennett, Sarah Benson, Rina Parker, Jason Dietrich
- CNSC: Jessica Way, Melissa Fabian Mendoza, Rain Noakes, Jeffrey Lam
- ECCC: Marcus Edino, Sarah Forte, Ian Parsons, Paula Siwik

IR-18

- Item #1
 - The requested parameters (pH, temperature, hardness, alkalinity, conductivity) were added to Table 2.2-1 and Appendix 8-E.
 - Denison expected to correct the proposed effluent conductivity added to Table 2.2-1 and Appendix 8-E.
 - Predicted conductivity is impossible with Total Dissolved Solids (TDS) reported in Table 2.2-1.
 - ECCC: concerns around TDS not because changes impact the outcomes, asking for the changes so that can confirm themselves.
 - Will provide this information to look at prior to conclusion of this EIS technical review.
 - Denison will provide additional information for conductivity and TDS as part of operational licensing.
- Item #3
 - Addressed in IR-108, IR114, and IR-115.
- Item #4
 - Denison is to follow REGDOC-2.9.2 guidance to develop effluent discharge targets. CNSC to engage with ECCC when necessary.

- Denison is committed to periodic pre-construction sampling to strengthen environmental data and will update the analysis and predictions incorporating any new data collected during the operational licensing process; no changes to the EIS are expected.

IR-101

- Item #2: Denison to justify taking wetland measurements upstream and downstream rather than directly in the wetland.
- Item #3: Denison will provide sediment quality impacts for the requested wetland assessment.
- K_d (soil-water partition coefficient) values presented in table 3-6 of the ERA and have been checked against the W_r measurement data (figure 3-2 and 3-3 of the ERA).
 - Commitments on page 8, proposed resolution: K_d values give a good suggestion of what would be reasonable impacts on the receiving environment.
- Denison clarified that the wetlands are not cut off (likely good exchange) from the main basin of the lake and, therefore, assumes that the lake environment is as likely to be depositional as the nearshore wetland habitat.
- Denison committed to collecting additional pre-construction baseline information within wetlands for water and sediment quality.
- Denison proposes that the EEM study (committed to for IR-126) could include an investigation of the difference in water and sediment quality near and offshore.
- **Action:** ECCC needs to confirm with colleagues to determine if what Denison shared will be adequate.

IR-108 & IR-108-R1

- Denison will update Tables 8.2-2 and 8.2-3 to include all Contaminants of Potential Concern (COPC) that require effluent characterization and receiving environment monitoring under the MDMER.
 - The list of parameters in this comment for the round 3 response also included boron, dissolved phosphorous and strontium, which do not require monitoring under the MDMER. These would have to be updated as well.
- Denison will update Tables 8.2-2 and 8.2-3 to include missing/corrected water quality guidance thresholds and information on values used to derive COPC thresholds (dependent on general parameters).

IR-114

- Item #1: Update all tables to include missing data for mercury, aluminum, Total Suspended Solids (TSS), iron, thallium, manganese, nitrate, and phosphorous.
- Item #3: Ensure that all water quality thresholds are derived from baseline receiving environment concentrations and that water quality guidelines protect aquatic biota.
- Denison stated that screening was completed using the most stringent guidelines. The Near-field water quality models were re-run using updated acute and chronic benchmarks; no parameters of concern were identified.

IR-193

- Acute and chronic water quality threshold request – in ERA can acknowledge that won't be able to release above acute guidelines, but intent is not to update ERA with acute guidelines.

- Denison indicated that they will add unionized ammonia, mercury and phosphorous to ERA Table 3-1. They then get screened out so it isn't necessary to look at them further. This corresponds to the last bullet in their slide on the topic.
- **Action:** ECCC will need to consult on this language.
 - ECCC consulted with colleagues and determined that this proposal is adequate.

IR-195

- Values in updated ERA are the correct values. One small change not reflected in IR, chloride and sulphate concentrations in predicted effluent quality went down. Values in updated EIS are core values.
 - Predicted chloride and sulfate concentrations were reduced due to additional testing by Denison, were identified as being able to be lowered through bench testing process. Chloride originally based on accurate guideline.
 - Denison committed to providing a short written explanation as to why (effluent quality, decreased sulfate, and chloride) the values in Tables IR195-1 and IR195-2 have changed in between the draft EIS and IR response.

| IR # | Summary of Discussion | Action / Next Steps |
|--------|---|--|
| IR-18 | As per the discussion on related IRs (IR-107 and IR-115), new information including updated WQ data and effluent quality predictions (which will include TDS and conductivity) will be incorporated into the application for the licence to operate and ERA updates at that time. Updates to Table 2.2-1 and Appendix 8-, can be made in the final EIS and included as an IR response now; however, these changes do not change the conclusions of the EIS. | <p>Denison will provide updated Section 8 tables in an IR response. Additionally, Denison will provide information to support that the clarifications/revisions indicate do not in fact change the conclusions of the EIS.</p> <p>Denison also understands its obligations and reaffirms them as it concerns REGDOC 2.9.2 (discharge criteria) and will follow the process laid out by CNSC.</p> <p>Denison to provide clarification through an interim IR response for SME Review. For review by ECCC and CNSC.</p> |
| IR-101 | Denison confirmed ECCC is specifically asking about wetlands downstream of the effluent release point. Denison clarified that these wetlands are more accurately described as littoral areas (i.e., they are not cut-off from the main lake) of the downstream receivers and not independent wetland complexes. Sediment quality predictions in the lakes were made by applying a partition coefficient, Kd, to describe partitioning of constituents between water and sediment. The Kd values were developed from local data from the RSA and apply equally to nearshore (and the wetland/littoral areas) and offshore habitats downstream of effluent release. Additionally, Denison has committed to the collection of additional baseline information within the nearshore (wetlands) for water quality and sediment quality prior to construction as part of operational licensing (commitment 8-46) and to | <p>Action for ECCC to discuss internally and review information already available to them (in revised draft EIS and in IR responses). ECCC reviewer will consider the information presented to date and confirm with colleagues whether the information is adequate. Denison to provide wetland-related commitments for 1) preliminary EEM (provided with responses to IR-111 and IR-126) and 2) pre-operational wetland sampling (existing commitment 8-46) in an IR response.</p> <p>Action: Unresolved. Further discussion is required on this topic by CNSC and ECCC.</p> |

| | | |
|------------------|--|--|
| | complete a pre-construction preliminary EEM for the site. | |
| IR-108 | Discussion is supportive of including MDMER Schedule 4 effluent characterization parameters and correcting WQOs in Tables 8.2-2 and 8.2-3. | EIS Tables 8.2-2 and 8.2-3 will be updated and provided as part of an IR response. Denison to provide clarification through an interim IR response for SME Review. For review by ECCC and CNSC. |
| IR-108 R1 | See notes on IR-108 | |
| IR-114 | Denison clarified that the screening was based on the most stringent of the four guidelines/criteria. No additional parameters from the revised draft EIS have been identified as being of concern. | Denison will provide additional/corrected information in a revised IR response. Denison to provide clarification through an interim IR response for SME Review. For review by ECCC and CNSC. |
| IR-193 | The ERA is focused on chronic effects, consistent with N288.6. Denison can update Appendix 10-A to include unionized ammonia, mercury, and phosphorus in the Table, but note this is not going through the ERA because they are below the screening values. Denison can provide this updated Appendix 10-A table in the IR response. | An updated screening table will be provided which includes the requested COPCs (Table 3-1 in Appendix 10-A). The COPCs will be shown as screened out and not carried forward through the ERA. Denison to provide clarification through an interim IR response for SME Review. For review by ECCC and CNSC. |
| IR-195 | Clarification of discrepancies between numbers in IR table compared to what was presented in the revised draft EIS was provided by Denison. In an IR response, Denison can explain why the numbers changed / new information from bench testing related to SO4 and Cl. | Denison will prepare an IR response will include clarifications and minor updates to Table 3-3 of Appendix 10-A, and specially an explanation as to why values for SO4 and Cl had been updated. Denison to provide clarification through an interim IR response for SME Review. For review by ECCC and CNSC. |

Meeting #8: Wheeler River IR Meetings (IR-12 and IR-12-R1)

Presentation: e-doc: 7306104

Date: June 14, 2024 3 to 3:30PM EST

Attendees:

- Denison: Brian Fraser, Brianne England, Janna Switzer, Pamela Bennett, Sarah Benson, Xavier LuDac, Jason Dietrick, Rina Parker, Zachary Hart
- CNSC: Jessica Way, Konrad Gorzkowski, Jeffrey Lam, Melissa Fabian Mendoza, Rain Noakes
- ECCC: Marcus Edino, Reg Ejeckam, Sarah Forte, Ian Parsons, Paula Siwik, Catalin Obreja

Summary:

IR-12

- Denison believes that the water management design information in the revised draft EIS is appropriate for the EA and this project stage and fit-for-purpose to support the assessment of potential effects.
- Additional details on water management and runoff infrastructure engineering design will be provided as part of licensing and permitting.
- Design strategy concept (site water divided into two streams):
 - "Contact water" – potentially contaminated water to be managed through site water infrastructure and conveyed to the Industrial Wastewater Treatment Plant (IWWTP).
 - "Non-contact" water would not be treated in the IWWTP.
 - The only mitigation proposed would be for sediment control. Any other contaminants would be small spills and would be addressed by the spill plans.
- 493mm PMP used for potentially contaminated areas with contact water.
- 89mm 1:100 for non-contaminated areas with non-contact water.
- ECCC asked about use of glycol at the airstrip. Denison responded that it would be used in a specific area where the runoff would be collected.

IR-12-R1A (DENISON RESPONSE)

- Water treatment flows and effluent discharge would not vary between normal operations and 24-hour PMP.
- Non-contact water is not routed through the IWWTP.
- The wellfield runoff pond has been designed to accommodate the PMP.

| IR # | Summary of Discussion | Action / Next Steps |
|-------|---|---|
| IR-12 | <p>Denison presented the water management design concept and overall design basis. This includes contact and non-contact water, based on the characteristics of the water in relation to mine-related wastes. Recognizing that information on water management is scattered throughout the EIS and in responses to various IRs, Denison offered to provide, as part of an IR response, consolidated information in the form of a site water management plan commensurate with the stage of the Project. The plan will collate information presented to date and provide updated information that has become available since the design has progressed. The plan would consider/discuss/include:</p> <ul style="list-style-type: none">• Design strategy and basis (criteria)• An updated site drainage map• Estimates of volumes of water to be managed in the contact and non-contact management areas• Discussion of potential COPCs in the contact and non-contact management areas;• Description of mitigation measures to manage potential COPCs in the contact and non-contact management areas | <p>Denison will provide, as part of an IR response, consolidated information in the form of a site water management plan commensurate with the stage of the Project.</p> <p>Denison to provide clarification through an interim IR response for SME Review. For review by ECCC and CNSC.</p> |

| | | |
|--------------|--|--|
| | <ul style="list-style-type: none"> Proposed monitoring | |
| IR-12 R1A | Denison explained that non-contact water will not be captured and treated; as such, there would be no influence of precipitation (normal v. PMP event) on water treatment and effluent release rates. Water management features in the contact water area (ISR wellfield and processing plant area) are designed to the PMP. | <p>This will be clarified in the IR response and proposed site water management plan.</p> <p>Denison to provide clarification through an interim IR response for SME Review. For review by ECCC and CNSC.</p> |



Discussion of Round 3 IR-89 and IR-89-R1 Comments

Elizabeth Haack, Ph.D, P.Chem. (AB) and
Paul Martin, M.Sc., P.Eng. (ON, SK)

June 6, 2024

Synopsis of IR-89 and IR-89-R1 Comments and Responses

- Round 2 – Response (February 2024)
 - Detailed response, including additional scenario with higher K value (1.4×10^{-4} m/s) in the Desilicified zone (DSZ) provided as Attachment
 - Acknowledged: rationale for change in median measured K value for the DSZ not well explained (IR-89 or AD-66)
- Round 3 – Context, Rationale and IR (May 2024)
 - Test a K value in the DSZ with a value at least an order of magnitude higher than the highest field K values
 - Clarify why the geomean K value for the DSZ was modified and provide any supporting evidence.

| ATTACHMENT IR-89-R1 | |
|---|--|
| Original IR Number | IR-89 |
| Follow Up IR Number | IR-89-R1 |
| Dept. | ECCC |
| Project effects link | Fish and fish habitat |
| Reference to EIS, appendices, or supporting documentation | Appendix 7-C, Numerical Modelling: Post- Decommissioning Evaluation, Section 2.3.1.4, Desilicified Zone IR-89 Response from Denison |
| Context and Rationale (Original IR) | <p>Context: The Proponent states that the range of hydraulic conductivities considered in sensitivity analysis was limited to values that fit within a calibration constrained uncertainty analysis of the model.</p> <p>Considering that the Desilicified Zone is of particular interest because it is the main pathway for the COPC to reach Whitefish lake, and that hydraulic conductivities are not entirely understood, ECCC recommends that a larger range of hydraulic conductivities be simulated to understand potential effects on the aquatic environment.</p> <p>The Proponent clarified the details of the calibration-constrained uncertainty analysis that was used for parameter bounding within the model, with hydraulic conductivity sensitivity bounds determined based on model calibration values that were supported by the available physical data.</p> <p>Rationale: ECCC agrees that calibration constrained uncertainty analysis using hydraulic head field data is useful to determine probable upper limits of K values. However, there is always some degree of uncertainty in groundwater data and models. Sources of such uncertainty may include errors, lack of complete and representative field data to determine key parameters, or any number of heterogeneities associated with groundwater systems over large scales. Such uncertainties will always exist and can be accounted for by conducting a sensitivity analysis that accounts for the lack of physical data in the Desilicified Zone by running modelling scenarios using parameters that are outside of the calibration constrained values.</p> |
| Information Requirement (Original IR) | Expand the sensitivity analysis of hydraulic conductivity outside of calibration constrained parameters to account for the lack of physical data in the Desilicified Zone |

Calculation of median K value for the Desilicified Zone

Geology and Hydrogeology Baseline Report, Appendix C to Appendix 7-A of the Draft EIS

Table C-1 Summary of Hydraulic Testing Data and Conductivity Values

| Well Name | Hydrostratigraphic Unit | Lithologic Unit | Estimated K (m/s) | Comment | Type of Hydraulic Test | Reference | Direction | Depth to Screen/ Packer (m) | |
|-----------|-------------------------|------------------------------|-------------------|------------------------|------------------------|----------------|-----------|-----------------------------|--------|
| | | | | | | | | Top | Bottom |
| WR-555 | Desilicified Zone | MFb | 1.00E-06 | Did packer seal? | Packer test | Golder, 2014 | Vertical | 213.7 | 256.5 |
| WR-555 | | MFb | 1.00E-05 | | Packer test | Golder, 2014 | Vertical | 255.9 | 298.5 |
| GWR-014 | | MFc | 8.70E-06 | | Packer test | Scibek, 2019 | Vertical | 149.0 | 158.0 |
| WR-555 | | MFa | 2.00E-05 | | Packer test | Golder, 2014 | Vertical | 281.7 | 363.3 |
| GWR-047 | | MFb | 2.70E-06 | | Pumping test | Petrotek, 2021 | Vertical | 279.0 | 282.2 |
| GWR-048 | | MFa | 2.70E-06 | | Pumping test | Petrotek, 2021 | Vertical | 379.0 | 382.0 |
| WR-405 | Lower Sandstone Aquifer | MFa | 3.00E-05 | | Packer test | SRK, 2017 | Vertical | 356.4 | 379.6 |
| GWR-008 | | MFa | 1.30E-05 | | Packer test | Scibek, 2019 | Oriented | 369.0 | 380.0 |
| GWR-025 | | MFa | 6.60E-06 | Packer stayed inflated | Packer test | Scibek, 2019 | Vertical | 374.0 | 380.0 |
| GWR-033 | | MFa | 4.00E-06 | Pumping well | Pseudo Pump Test | Appendix D | Vertical | 345.6 | 351.6 |
| GWR-048 | | MFa | 2.70E-06 | | Pumping test | Petrotek, 2021 | Vertical | 379.0 | 382.0 |
| WR-555 | | MFa, Barrier Zones, Ore zone | 2.00E-06 | | Packer test | Golder, 2014 | Vertical | 365.5 | 409.5 |
| WR-594 | | MFa | 2.50E-07 | | Open Hole | SRK, 2015 | Oriented | 451.2 | 489.0 |
| WR-601 | | MFa and Basement | 1.30E-06 | | Packer test | SRK, 2015 | Oriented | 376.2 | 822.0 |



Calculated geomean K value for Desilicified Zone = 4.8×10^{-6} m/s



Calculated geomean value for Desilicified Zone erroneously including measured value in the LSA at WR-405



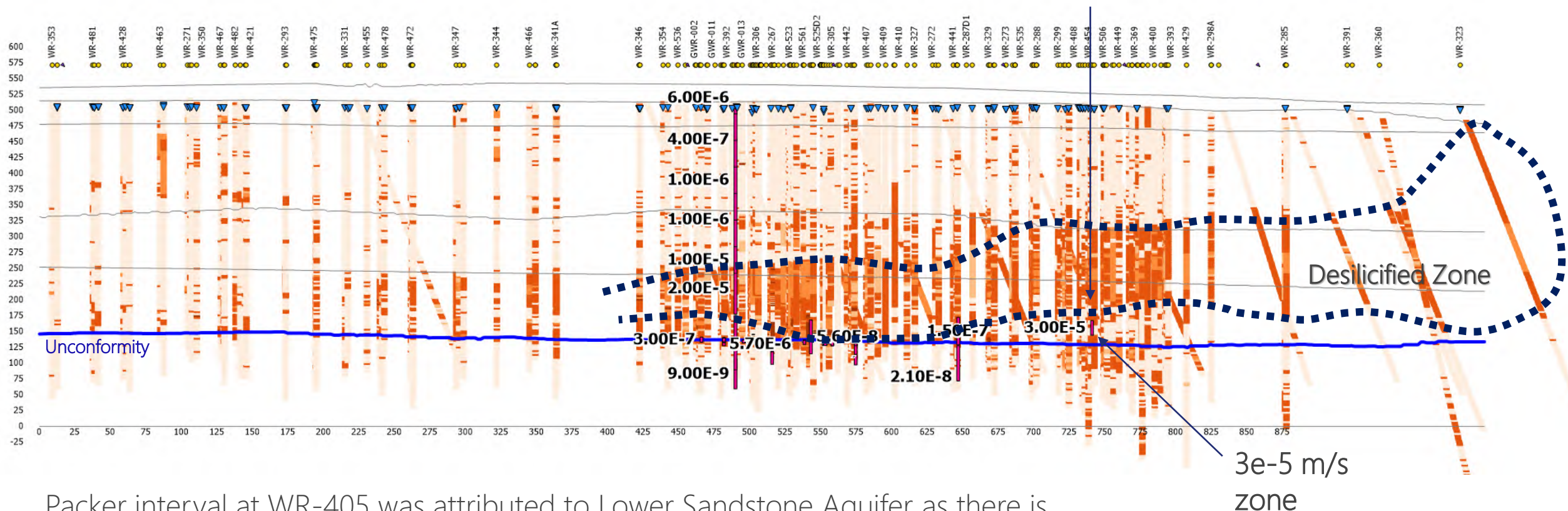
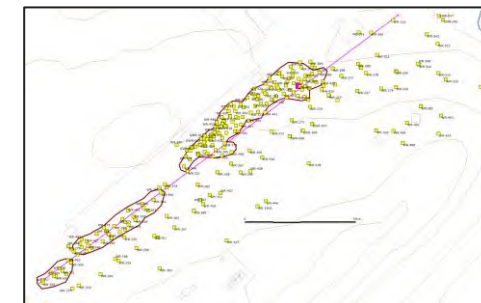
Results from the pumping test are most reliable (0.56 x the calculated geomean value)

Friability

SW

WR-405

NE



Packer interval at WR-405 was attributed to Lower Sandstone Aquifer as there is lower friability within the packer interval than is present in the DSZ

Acknowledged: (Ecometrix) Updates to Draft EIS inconsistent with respect to geomean value and, specifically, the range of values included in the geomean value calculation

Table 7.3-2: Summary of Hydrostratigraphic Unit Properties

| Hydrostratigraphic Units | Field-Based Hydraulic Conductivity (m/s) | | Effective Porosity (%) | Storage ² |
|---|--|-------------------------|------------------------|-------------------------|
| | Range | Geomean ¹ | | |
| Overburden Aquifer/Aquitard | 3 x 10 ⁻⁶ and 2 x 10 ⁻⁴ | - | 25% (sand); 18% (till) | 20% (Sy) |
| Upper Sandstone Aquifer | 4 x 10 ⁻⁷ to 1 x 10 ⁻⁴ | 3.7 x 10 ⁻⁶ | 1 to 5% | 1x10 ⁻⁵ (Ss) |
| Intermediate Bedrock Aquitard | 1 x 10 ⁻¹⁰ to 3.8 x 10 ⁻⁶ | 8.4 x 10 ⁻⁹ | 1 to 10% | |
| Desilicified Zone | 1 x 10 ⁻⁶ to 3 x 10 ⁻⁵ | 6.04 x 10 ⁻⁶ | | |
| Lower Sandstone Aquifer | 7.8 x 10 ⁻⁸ to 3 x 10 ⁻⁵ | 2.2 x 10 ⁻⁶ | | |
| Upper and Lower Barrier Zone Aquitard (clay cap and sulphide-cemented rock) | Hydraulic tests have not been completed on these units as they are relatively thin in comparison to overlying/underlying units. ³ | | 1 to 10% | 1x10 ⁻⁶ (Ss) |
| Ore Zone Aquifer | | | | |
| Basement Aquitard | 1.1 x 10 ⁻¹¹ to 1.1 x 10 ⁻⁵ | 4.8 x 10 ⁻⁹ | | |

Notes

- 1 A geomean value was not calculated for the Overburden Aquifer/Aquitard or the Upper and Lower Barrier zone as only two measurements were available for each unit.
- 2 Sy values expressed as a percent of total volume. Ss values expressed in units of 1/m.
- 3 Screened intervals of the wells often intercept the ore zone and upper or lower barrier zones. Elevated hydraulic conductivity values were interpreted to reflect the ore zone aquifer and lower values reflect the barrier zone aquitard.

Correction needs to be made to the range reported to specify that the maximum tested hydraulic conductivity value was 2.0×10^{-5} (m/s).

Summary of Uncertainty Scenarios Tested for Geomean K value in Desilicified Zone

| K Value Measured (m/s) | K Value Assumed in Model (Base Case; m/s) | K Value applied in Sensitivity Analysis (2022 Draft EIS; m/s) | IR (2 nd Round; Feb 2024) | Statement |
|--|---|---|--|--|
| 1×10^{-6} to 2×10^{-5} Geomean = 4.8×10^{-6} | 5×10^{-6} | Uncertainty Scenario 5: 3.7×10^{-5} | | Scenario 5 was selected to represent parameter combinations that resulted in greater groundwater flow to Whitefish Lake (compared to base case). Value used is 2 (1.85) x higher than any measured value, and 7.4 x higher than base case calibration |
| | | | IR-55, Alternative Calibration 1.4×10^{-4} m/s | 28 x higher than base case 50 x higher than pumping tests (most reliable measure) |

Modelling work is sufficiently bounding for EIS.

Under all uncertainty scenarios tested, EIS conclusions hold


Table IR-89-R1-1: Peak Groundwater Concentrations Reaching Whitefish Lake: Alternative Scenarios Consistent with Observed Conditions (all concentrations in mg/L)

| COPC | Groundwater Quality Screening Criteria | EIS Base Case | 1. IR-55 Alternative Calibration (K _{ISA} = 1.0E-7 m/s; K _{OSZ} = 1.4E-4 m/s) | 2. IR-70 High Ore Zone Hydraulic Conductivity Post Decommissioning (K _{OSZ} = 5.0E-5 m/s) | 3a. IR-71 20% Lower Groundwater Recharge | 3b. IR-71 20% Higher Groundwater Recharge | 4. IR 78 & 88 Lower Effective Porosity Paleoweathered Zone (1%) | 5. IR-96 Lower Transverse Dispersivity (α _{TV} = α _{TH} = 1.0m) | Comment |
|------------------------|--|---------------|---|--|--|---|---|---|--|
| Al | 0.05 | 3.0E-02 | 3.0E-02 | 3.0E-02 | 4.1E-02 | 3.9E-02 | 3.7E-02 | 4.3E-02 | Naturally near GQSC, Peak @ 750 yrs. |
| As | 0.005 | 3.2E-04 | 3.1E-04 | 3.2E-04 | 3.2E-04 | 3.2E-04 | 3.4E-04 | 3.3E-04 | Naturally near GQSC, Peak @ 2000-3000 yrs. |
| Ba | -- | 3.9E-02 | 3.5E-02 | 3.9E-02 | | | 3.9E-02 | | Background |
| Ca | -- | 7.0 | 4.5 | 7.8 | 7.2 | 6.9 | 6.6 | 12 | Peak @ 400 yrs. |
| Cd | 4.0x10 ⁻⁵ | 1.1E-05 | 1.0E-05 | 1.1E-05 | 1.1E-05 | 1.1E-05 | 1.2E-05 | 1.1E-05 | Peak @ 500-3000 yrs. |
| Cl | 120 | 9.9 | 7.1 | 10.9 | 10.1 | 9.8 | 9.5 | 14.6 | Peak @ 400 yrs. |
| Co | 7.8x10 ⁻⁴ | 4.2E-04 | 4.2E-04 | 4.3E-04 | 4.2E-04 | 4.2E-04 | 4.5E-04 | 4.5E-04 | Late time peak |
| Cr | 8.9x10 ⁻³ | 5.3E-04 | 5.2E-04 | 5.3E-04 | | | 5.3E-04 | | Peak @ 500 yrs. |
| Cu | 2.0x10 ⁻³ | 7.0E-04 | 7.0E-04 | 6.9E-04 | | | 7.8E-04 | | Late time peak |
| F | -- | 6.1E-02 | 6.0E-02 | 6.1E-02 | | | 6.2E-02 | | Late time peak |
| Fe | 0.3 | 1.9 | 0.66 | 2.4 | 2.0 | 1.9 | 2.0 | 4.4 | Peak @ 400 yrs. |
| K | -- | 3.1 | 3.2 | 3.1 | 3.1 | 3.0 | 2.9 | 3.4 | Background |
| Mg | -- | 2.8 | 2.8 | 2.8 | 2.8 | 2.7 | 2.7 | 3.9 | Background |
| Mn | 0.23 | 0.28 | 0.22 | 0.28 | | | 0.28 | | Peak @ 400 yrs. |
| Mo | 31 | 3.1E-03 | 7.3E-04 | 9.2E-04 | | | 8.6E-04 | | Peak @ 400 yrs. |
| Na | -- | 5.1 | 4.5 | 5.4 | 5.2 | 5.0 | 6.4 | 7.6 | Peak @ 400 yrs. |
| Ni | 2.5x10 ⁻² | 1.9E-03 | 1.9E-03 | 1.9E-03 | 1.9E-03 | 1.9E-03 | 1.9E-03 | 2.0E-03 | Background |
| P | -- | 7.4E-02 | 5.8E-02 | 7.4E-02 | 1.2E-04 | 1.2E-04 | 9.4E-02 | 1.3E-04 | Peak @ 500 yrs. |
| Pb | 1.0x10 ⁻³ | 1.2E-04 | 1.2E-04 | 1.2E-04 | | | 1.2E-04 | | Background |
| Ra | 3.0x10 ⁻⁹ | 2.3E-09 | 1.8E-09 | 2.1E-09 | | | 2.6E-09 | | Peak @ 400 years and at late time |
| SO ₄ | 128 | 13 | 3.5 | 16 | 13 | 12 | 13 | 30 | Peak @ 400 yrs. |
| Se | 2.0x10 ⁻³ | 8.4E-04 | 8.2E-04 | 8.4E-04 | 8.4E-04 | 8.3E-04 | 8.4E-04 | 8.7E-04 | Peak @ 400-800 yrs. |
| Sr | 2.5 | 1.2E-01 | 7.7E-02 | 1.4E-01 | | | 1.2E-01 | | Peak @ 400 yrs. |
| Th | 1.24x10 ⁻⁴ | 3.2E-08 | 3.0E-08 | 3.1E-08 | | | 3.7E-08 | | Background |
| U | 0.015 | 5.4E-04 | 5.3E-04 | 5.4E-04 | 5.5E-04 | 5.5E-04 | 1.3E-03 | 6.0E-04 | Late time peak |
| V | 0.12 | 6.6E-03 | 1.0E-04 | 1.3E-04 | | | 1.3E-04 | | Peak @ 400 yrs. |
| Zn | 0.011 | 4.7E-03 | 4.6E-03 | 4.8E-03 | | | 5.1E-03 | | Late time peak |
| Simulated Time (years) | | 8720 | 7600 | 6400 | 5600 | 10000 | 10000 | 10000 | |

Note: two editorial updates to Scenario 1 were made on June 6, 2024 to facilitate round 3 IR discussions: 1) K value was corrected (from 4.0x10⁻⁵ m/s to 1.4x10⁻⁴ m/s) and 2) Mn was unbolded because it does not exceed the screening criteria



Thank You



Discussion of Round 3 IR-100, IR-190, IR-198-R1 Comments

Rina Parker, M.A.Sc., P.Eng.

June 5, 2024

IR-100 Mercury in Fish

| IR-100 (ROUND 3, May 31, 2024) | Discussion |
|--|---|
| <p>This IR remains not accepted. It is unclear what threshold concentration(s) of mercury in fish would trigger further assessment of potential health risks.</p> <p>The response to IR-100 includes a commitment to monitor mercury concentrations in fish, and to assess potential health risks if concentrations are greater than that used to derive the Government of Saskatchewan (GoS) guidelines for fish consumption (last updated in 2015). However, using this concentration as a threshold would not be protective of human health if the local population consumes greater quantities than the published consumption guideline.</p> <p>Please provide the following information:</p> <ol style="list-style-type: none">1. Discuss how the fish consumption rates from average and high traditional foods consumer groups (Section 10-A, Table 4-4: Annual Food Intakes for Components of the Human Receptor's Diet) relate to the GoS fish consumption limits for general and sensitive populations.2. Justify the use of GoS guidelines for fish consumption for mercury monitoring in fish and as a trigger for possible management actions. | <p>To clarify, Denison has not committed to using the Government of Saskatchewan guidelines for fish consumption and identified in the Round 2 IR response "Denison agrees to use Health Canada's 2007 provisional tolerable daily intake (pTDI) values of 0.20 µg/kg bw/day for young children and women of childbearing age for future assessments, or the relevant updated value at that time."</p> <p>Denison outlined in the response to IR-212 a conceptual trigger-response mechanism related to interpreting results from country foods sampled, which would also apply to mercury.</p> <ul style="list-style-type: none">- Compare fish tissue concentrations for mercury against measured fish tissue concentrations from the Wheeler River baseline program.- If an increasing trend relative to baseline is observed, verify result, investigate potential cause of increasing trend- Determine if change from baseline is significant and greater than trigger value |

Mercury

- The results of the Wheeler River baseline fish tissue sampling program showed measured fish tissue concentrations near the Project in the range of 0.01 to 0.48 mg/kg
- From ERA (Appendix 10-A, Table 4-4)
 - Fish consumption (average consumer): 26.65 kg/yr (0.07 kg/d)
 - Fish consumption (high consumer): 183.44 kg/yr (0.5 kg/d)
- Will develop trigger value as part of country foods monitoring program development.

IR-190 CAAQS for NO₂

| IR-190 (ROUND 3, May 31, 2024) | Discussion |
|---|--|
| <p>The response to IR-190 acknowledges the predicted exceedances of the CAAQS for NO₂. However, the revised information does not appear to have been carried through to all the health risk assessment documents.</p> <p>HC notes that the new CAAQS for NO₂ also recognizes that there is no population health threshold for human health effects; therefore, any increase in exposure will result in an incremental population risk (Environment Canada and Health Canada, 2012; CCME, 2000). In other words, NO₂ is considered a non-threshold substance, meaning that health effects may occur at any level of exposure. Therefore, guideline values should not be construed as limits to which polluting up to is allowed.</p> <p>Please provide the following information:</p> <ol style="list-style-type: none"> 1. Present modelled concentrations at the nearest human receptor site (i.e., Risk 2 - seasonal resident at McGowan Lake) in Tables 3-9, 3-10 and 3-11). 2. Correct/update Section 3.2.1.3.1: <i>Nitrogen Dioxide</i>, of Revised DRAFT EIS Appendix 10-A (February 2024), as follows: <ol style="list-style-type: none"> a. Remove references to the 1970's National Ambient Air Quality Objectives (NAAQOs) for NO₂. These objectives are no longer relevant and do <u>not</u> support the exclusion of NO₂ from further consideration as a COPC (Ref. AD-67); b. Acknowledge that modelled results exceed the 1-h NO₂ CAAQSs at the <i>camp workers location</i> and <i>fence line</i> during all project phases; and, c. Consider NO₂ a COPC for further quantitative assessment and characterize the potential health risk related to 1-h exposure to NO₂. 3. Characterize potential health risks from 1-h exposure to NO₂ using HC's guidance. Alternatively, use the updated 2021 WHO Global Air Quality Guidelines for annual and 24-h NO₂ exposures when calculating hazard quotients. 4. Discuss how the proposed mitigation measures to minimize residual effects of the Project on air quality, as identified in Section 16.1.1 of the Revised DRAFT EIS (January 2024), address the health risks identified in Chapter 10. Also specify whether any additional air quality monitoring and/or mitigation measures are proposed specifically to address human health risks. | <ol style="list-style-type: none"> 1. See tables on next slide – this can be added to the ERA tables 2. The following updates will be made as requested. <ol style="list-style-type: none"> a) References to the 1970's National Ambient Air Quality Objectives (NAAQOs) for NO₂ will be removed. b) ERA acknowledges exceedances of 1-h NO₂ CAAQSs at the <i>camp workers location</i> and <i>fence line</i> during all project phases (editorial edits will be made as suggested in the IR response) c) It is not planned to add NO₂ as a COPC for further quantitative assessment. There are no exceedances of long-term CAAQS. The model has a number of conservative assumptions associated with it <ol style="list-style-type: none"> a) Assumption that diesel generators will be used; however, it is anticipated that power will be obtained from the provincial grid. b) Assumption that emission sources operate concurrently at their individual maximum rates of production to estimate the worst-case emission rates 3. Since NO₂ is not identified as a COPC hazard quotients are not calculated. Note that there are no 24 hour or annual exceedances of NO₂ guidelines. 4. As identified in IR-190-R1 NO₂ monitoring is planned during all Phases of the Project. Monitoring will include passive sampling and will follow an adaptive management process to identify if more frequent monitoring is needed. |

NO₂ Concentrations and Exceedances

| Location | Name | NO ₂ 1 hr ug/m ³ | | | NO ₂ annual ug/m ³ | | |
|----------------------------------|-------|--|-----------|-----------------|--|-----------|-----------------|
| | | Construction | Operation | Decommissioning | Construction | Operation | Decommissioning |
| On-Site Ecological Location | Risk1 | 124.32 | 116.30 | 120.86 | 8.34 | 4.41 | 7.08 |
| Trapper (LA1) - McGowan Lake | Risk2 | 42.97 | 40.18 | 41.64 | 4.65 | 3.97 | 4.60 |
| Camp Worker | Risk3 | 180.95 | 274.83 | 355.07 | 17.1 | 11.3 | 16.4 |
| Seasonal Resident (Russell Lake) | Risk4 | 22.9 | 24.0 | 22.7 | 4.0 | 3.8 | 4.0 |
| Reference Receptor (LA-7) | Risk5 | 40.2 | 43.2 | 39.0 | 4.2 | 3.9 | 4.2 |
| | CAAQS | 79.0 | 79.0 | 79.0 | 23.0 | 23.0 | 23.0 |

Note: Blue shading indicates exceedance of CAAQS

| Location | Name | NO ₂ 1 hr Frequency of Exceedance | | |
|----------------------------------|-------|--|-----------|-----------------|
| | | Construction | Operation | Decommissioning |
| On-Site Ecological Location | Risk1 | 0.5% | 0.4% | 0.4% |
| Trapper (LA1) - McGowan Lake | Risk2 | - | - | - |
| Camp Worker | Risk3 | 3.4% | 4.6% | 5.6% |
| Seasonal Resident (Russell Lake) | Risk4 | - | - | - |
| Reference Receptor (LA-7) | Risk5 | - | - | - |

IR-198-R1 Monitoring Lead and Mercury

| IR-198-R1 (ROUND 3, May 31, 2024) | Discussion |
|--|-----------------------------------|
| <p>Note To Denison: This IR is being conditionally accepted. If Denison commits to monitoring lead and mercury in country foods, as well as including these in any further assessment conducted to determine their potential risk to human health from consumption of country foods, this IR can be resolved.</p> <p>This commitment would include:</p> <ol style="list-style-type: none">1. Establishing/confirming baseline concentrations of Hg in water, sediment, and fish tissues before construction;2. Regular monitoring during construction, operation and post-closure; and,3. Undertaking an HHRA should monitoring results exceed established/confirmed baseline levels, to inform decisions on adaptive management and mitigation measures. <p>The Proposed rationale text for posting: Denison has captured their commitment related to monitoring lead and mercury in country foods, as well as including arsenic, cadmium, lead, and mercury in any further assessment conducted to determine their potential risk to human health from consumption of country foods.</p> <p>This commitment includes (would include):</p> <ol style="list-style-type: none">1. Establishing/confirming baseline concentrations of Hg in water, sediment, and fish tissues before construction; 3[sic].2. Regular monitoring during construction, operation and post-closure; and,3. Undertaking an HHRA should monitoring results exceed established/confirmed baseline levels, to inform decisions on adaptive management and mitigation measures <p>This IR has been accepted for the purposes of the current EA process, and the aforementioned issues will be further assessed as part of licensing technical reviews, prior to the granting of a license.</p> | <p>This IR has been accepted.</p> |



Thank You



Discussion of Round 3 IR-107 and IR-113 Comments

Jason Dietrich, M.Sc., Rina Parker, M.A.Sc., P.Eng.
Brian Fraser, M.Sc.

June 5, 2024

IR-107 Round Three Comments

| IR (ROUND 3, May 31, 2024) | Status -May 31, 2024 |
|--|----------------------|
| <p>Before this IR is accepted, the Proponent is requested to provide the statistical correlation analysis to confirm that data is correlated.</p> <p>Additionally, the four expectations set out in the rationale for status have not been adequately responded to. The Proponent should incorporate the following information into the EIS and ERA:</p> <ol style="list-style-type: none">1) Provide raw baseline data (perhaps in an appendix).2) Provide summary statistics for baseline datasets, which at a minimum should include: mean, standard deviation, 95th percentiles, minimum, maximum, and number of samples. Present summary statistics by season (i.e., freshet, summer, fall and under-ice), and include comparisons to relevant water quality guidelines.3) Identify potential gaps in baseline datasets, and indicate how data gaps will be addressed. Describe the planned baseline monitoring to be conducted including, but not limited to, addressing any data gaps.4) Demonstrate that the combined existing baseline data and planned baseline monitoring will yield dataset(s) that provide robust water quality baseline characterization of seasonal conditions (i.e., freshet, summer, fall, under-ice during winter), including a range of flow conditions. <p>The Proponent should also incorporate the additional baseline data collected into the analysis and conclusions of the finalized EIS and ERA.</p> <p>Concerning the other aspects of the IR, these responses are accepted based on Denison's commitment to conduct periodic sampling prior to construction to strengthen existing environmental data. CNSC staff will review this information to ensure EA predictions remain valid and recommend collecting samples in the fall to spring timeframe, as samples from these seasons is sparse in the current dataset.</p> | <p>Not Accepted</p> |

IR-107 Statistical analysis to confirm data is correlated or similar

1. Analysis was conducted by comparing all Lakes in LSA vs. LA-5 and compared the percent (%) change between the geometric mean of all lakes and LA-5.
2. The results of this analysis indicated consistency between lakes with the percent difference less than 10% for the majority of COPCs and less than 12% for all COPCs.
3. Additional information will be provided as part of this IR for review

IR-107 additional expectations

1. Provide raw baseline data (perhaps in an appendix).
 2. Provide summary statistics for baseline datasets, which at a minimum should include: mean, standard deviation, 95th percentiles, minimum, maximum, and number of samples. Present summary statistics by season (i.e., freshet, summer, fall and under-ice), and include comparisons to relevant water quality guidelines.
- All raw baseline data was provided in Appendix A-1 of Appendix 8-D of the EIS.
 - Appendix A-1 of Appendix 8-D included the following: mean, SD, 75th percentile, 95th percentile, minimum, maximum, sample size (n) and screening against criteria by date.

IR-107 additional expectations

3. Identify potential gaps in baseline datasets, and indicate how data gaps will be addressed. Describe the planned baseline monitoring to be conducted including, but not limited to, addressing any data gaps.
4. Demonstrate that the combined existing baseline data and planned baseline monitoring will yield dataset(s) that provide robust water quality baseline characterization of seasonal conditions (i.e., freshet, summer, fall, under-ice during winter), including a range of flow conditions.

Denison feels strongly that the baseline water quality data collected are suitable for the purposes of the EIS and the application of additional conservatism in the use of the data provide a conservative (i.e., protective) framework for evaluating potential effects.

Denison has committed to periodic sampling prior to construction to strengthen existing environmental data.

Denison will commit to update the analysis and predictions incorporating any new data collected during the licencing process, but there is not expectation that here would be any change to the EIS conclusions.

IR-107 additional expectations

Wheeler River Project
Baseline Aquatic Environment Study

Table A-1
Baseline Water Quality Data

Appendix A

| Parameter | | Bicarbonate | Carbonate | Chloride | Hydroxide | P. Alkalinity | pH | Specific Conductivity | Sum of Ions | Total Alkalinity | Hardness | Ammonia as N | Nitrate | Total Kjeldahl Nitrogen | Mercury | Total Organic Carbon |
|--|-------------|-------------|-----------|----------|-------------|---------------|---------|-----------------------|-------------|------------------|----------|--------------|---------|-------------------------|-----------|----------------------|
| Unit | | mg/L | mg/L | mg/L | mg/L | mg/L | units | µ S/cm | | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L | mg/L |
| Water Quality Benchmarks | SEOG/SWQO | | | | | | | | | | | 0.103 | 13.29 | | | |
| | CCME CWQG | | | 120 | | | 6.5 - 9 | | | | | | | | 0.000026 | |
| | Reference | | | CWQG | | | CWQG | | | | | SEOG | SEOG | | CWQG | |
| Baseline Water Quality Characteristics | Count | 142 | 142 | 142 | 142 | 142 | 142 | 142 | 142 | 142 | 142 | 142 | 103 | 142 | 142 | 142 |
| | #DL | 0 | 142 | 7 | 142 | 142 | 0 | 0 | 0 | 0 | 0 | 95 | 88 | 1 | 138 | 0 |
| | Min | 1 | <1 | <0.1 | <1 | <1 | 5.7 | 8 | 5 | 1.0 | 3 | <0.01 | <0.04 | <0.05 | <0.000001 | 1.4 |
| | Mean | 8.5 | 1 | 0.37 | 1.014084607 | 1.084607042 | 6.8 | 18 | 14 | 7.1 | 5.3 | 0.033 | 0.11 | 0.27 | 8.4E-06 | 2.8 |
| | 75th | 10 | 1 | 0.50 | 1 | 1 | 7.0 | 20 | 16 | 8.3 | 6.0 | 0.013 | 0.09 | 0.3 | 0.00001 | 3.1 |
| | 95th | 20 | 1 | 0.70 | 1 | 1 | 7.1 | 26 | 28 | 16 | 7.0 | 0.068 | 0.44 | 0.44 | 0.00001 | 5.255 |
| | Max | 46 | 1 | 0.90 | 2 | 7 | 7.2 | 47 | 51 | 38 | 13 | 1.2 | 0.66 | 1.6 | 0.000068 | 8.4 |
| | Geomean | 6.7 | 1 | 0.32 | 1.009810446 | 1.027786217 | 6.7 | 17 | 12 | 5.8 | 5.2 | 0.015 | 0.067 | 0.25 | 5.9E-06 | 2.7 |
| | SD | 6.3 | 0 | 0.18 | 0.118256572 | 0.709539435 | 0.26 | 5.5 | 7.0 | 5.1 | 1.4 | 0.13 | 0.15 | 0.16 | 6.2E-06 | 1.1 |
| | Location | Sample Date | | | | | | | | | | | | | | |
| LA-1 | 08-Jun-2011 | 2 | <1 | 0.4 | <1 | <1 | 6.94 | 17 | 5.0 | 2.0 | 5.0 | <0.01 | <0.04 | 0.25 | <0.00001 | 2.5 |
| | 12-Aug-2012 | 5 | <1 | 0.4 | <1 | <1 | 6.52 | 17 | 10 | 4.0 | 6.0 | <0.01 | | 0.31 | <0.00001 | 2.6 |
| LA-1 | 29-Mar-2014 | 12 | <1 | 0.5 | <1 | <1 | 6.63 | 24 | 18 | 10 | 6.0 | 0.09 | 0.49 | 0.17 | <0.00001 | 2.3 |
| | 14-Sep-2016 | 10 | <1 | 0.4 | <1 | <1 | 6.79 | 19 | 14 | 8.0 | 5.0 | <0.01 | <0.04 | 0.38 | <0.00001 | 2.3 |
| LA-1 | 02-Jul-2018 | 8 | <1 | 0.4 | <1 | <1 | 6.71 | 9 | 12 | 7 | 4 | <0.01 | <0.04 | 0.33 | <0.000001 | 2.2 |
| | 16-Mar-2018 | 10 | <1 | 0.5 | <1 | <1 | 6.82 | 15 | 15 | 8 | 5 | 0.03 | 0.29 | 0.2 | 0.000004 | 2.3 |
| LA-1-Bottom | 02-Jul-2018 | 5 | <1 | 0.4 | <1 | <1 | 6.62 | 10 | 9 | 4 | 4 | <0.01 | <0.04 | 0.23 | 0.0000009 | 2 |
| | 16-Mar-2018 | 6 | <1 | 0.5 | <1 | <1 | 6.8 | 14 | 12 | 5 | 5 | 0.02 | 0.6 | 0.14 | 0.000007 | 2.2 |
| LA-2 | 08-Jun-2011 | 5 | <1 | 0.5 | <1 | <1 | 7.00 | 18 | 10 | 4.0 | 5.0 | <0.01 | <0.04 | 0.22 | <0.00001 | 2.5 |
| | 29-Mar-2014 | 15 | <1 | 0.7 | <1 | <1 | 6.9 | 25 | 22 | 12 | 7.0 | 0.04 | 0.63 | 0.15 | <0.00001 | 2.2 |
| LA-2 | 21-Sep-2016 | 11 | <1 | 0.7 | <1 | <1 | 7.19 | 22 | 16 | 9.0 | 5.0 | <0.01 | 0.05 | 0.22 | <0.00001 | 2.2 |
| LA-3 | 07-Jun-2011 | 4 | <1 | 0.7 | <1 | <1 | 6.95 | 20 | 9.0 | 3.0 | 5.0 | <0.01 | <0.04 | 0.27 | <0.00001 | 2.8 |
| | 29-Mar-2014 | 12 | <1 | 0.9 | <1 | <1 | 6.92 | 24 | 19 | 10 | 6.0 | 0.04 | 0.4 | 0.16 | <0.00001 | 2.3 |
| LA-3 | 21-Sep-2016 | 8 | <1 | 0.8 | <1 | <1 | 7.15 | 22 | 14 | 7.0 | 5.0 | <0.01 | 0.05 | 0.25 | <0.00001 | 2.3 |
| LA-4 | 29-Mar-2014 | 20 | <1 | 0.6 | <1 | <1 | 6.98 | 26 | 27 | 16 | 7.0 | 0.07 | 0.18 | 0.08 | <0.00001 | 1.5 |
| | 21-Sep-2016 | 15 | <1 | 0.6 | <1 | <1 | 7.19 | 24 | 21 | 12 | 5.0 | <0.01 | 0.05 | 0.24 | <0.00001 | 1.4 |
| LA-5 | 08-Aug-2012 | 4 | <1 | 0.3 | <1 | <1 | 6.57 | 16 | 8.0 | 3.0 | 5.0 | <0.01 | | 0.34 | <0.00001 | 4.3 |
| | 01-Apr-2014 | 16 | <1 | 0.4 | <1 | <1 | 7.01 | 22 | 22 | 13 | 6.0 | 0.05 | 0.26 | 0.14 | <0.00001 | 1.9 |
| LA-5 | 10-Sep-2016 | 8 | <1 | 0.3 | <1 | <1 | 6.95 | 19 | 12 | 7.0 | 5.0 | 0.07 | <0.04 | 0.19 | <0.00001 | 2.2 |
| LA-6 | 13-Aug-2012 | 5 | <1 | 0.3 | <1 | <1 | 6.55 | 16 | 10 | 4.0 | 5.0 | <0.01 | | 0.29 | <0.00001 | 2.9 |
| | 30-Mar-2014 | 46 | <1 | 0.3 | <1 | <1 | 5.71 | 21 | 51 | 38 | 5.0 | 0.05 | 0.31 | 0.24 | <0.00001 | 2.2 |
| LA-6 | 12-Sep-2016 | 4 | <1 | 0.4 | <1 | <1 | 6.71 | 18 | 8.0 | 3.0 | 5.0 | 0.04 | <0.04 | 0.43 | <0.00001 | 2.3 |
| | 02-Jul-2018 | 8 | <1 | 0.3 | <1 | <1 | 6.75 | 9 | 12 | 7 | 4 | <0.01 | <0.04 | 0.28 | <0.000001 | 2.2 |
| LA-6 | 17-Mar-2018 | 4 | <1 | 0.3 | <1 | <1 | 6.79 | 12 | 9 | 3 | 4 | 0.02 | 0.3 | 0.29 | 0.000007 | 2.2 |
| LA-7 | 08-Aug-2012 | 26 | <1 | 0.4 | <1 | <1 | 6.73 | 18 | 32 | 21 | 6.0 | <0.01 | | 0.34 | <0.00001 | 3.2 |
| | 29-Mar-2014 | 23 | <1 | 0.7 | <1 | <1 | 6.82 | 26 | 30 | 19 | 7.0 | 0.12 | 0.26 | 0.44 | <0.00001 | 2.0 |
| LA-7 | 10-Sep-2016 | 10 | <1 | 0.5 | <1 | <1 | 7.14 | 21 | 14 | 8.0 | 5.0 | 0.01 | <0.04 | 0.32 | <0.00001 | 2.4 |

IR-113 Round Three Comments

| IR (ROUND 3, May 31, 2024) | Status -May 31, 2024 |
|---|----------------------|
| <p>The Proponent should conduct a sensitivity analysis on water quality predictions for low and high precipitation scenarios, including the potential influences of climate change to assist in fulfilling the IR from the previous round.</p> <p>This information is required to assess the potential for significant adverse effects to the environment. If additional baseline information is required, it should be sourced or otherwise collected.</p> | <p>Not Accepted</p> |

IR-113

Denison disagrees that a qualitative climate change assessment is required at this time for the purposes of the EIS because:

- 1) The duration of the project (15 years) is of short duration within the context of climate change thereby making it unlikely that large scale changes in precipitation and temperature will occur.
- 2) The design basis PMP is robust and inclusive of projected total annual precipitation under a high carbon scenario.
- 3) Effluent discharge will be monitored as per the MDMER Schedules 4 and 5;
- 4) Under scenarios of low flow condition, discharge can be limited seasonally or periodically and specific to the assimilative capacity of the receiver (flow proportioned of fixed dilution discharge);
- 5) Adaptive management and adjustment to discharge timing and volume as needed over time to meet criteria based on climate induced changes in flow.

IR-113

Denison suggests that a sensitivity analysis on water quality predictions for low and high precipitation scenarios, including the potential influences of climate change can be completed as part of licensing and as applicable to REGDOC-2.9.2.

This would be consistent with the approach of further analysis conducted as part of licensing and following collection of additional water quality data to support such modelling.



Thank You



Discussion of Round 3 IR-115 and IR-115-R1 Comments

Jason Dietrich, M.Sc.

Brian Fraser, M.Sc.

June 6, 2024

IR-115 / 115-R1 Round Three Comments

| IR (ROUND 3, May 31, 2024) | Status -May 31, 2024 |
|--|----------------------------|
| <p>The Proponent has not fully responded to the previous round's IR. For items one and two, some of the information provided on contaminants of potential concern (COPCs) and the background concentrations of hardness in the receiving environment is not sufficiently conservative. Item three requested rationale that all selected water quality thresholds (i.e., screening criteria) are at levels protective of aquatic life, which was not provided.</p> <p>The updated Table 8.2-8 provides two short-term and two long-term screening criteria for each parameter. The screening criteria reflect calculated screening criteria for both background hardness and project-induced hardness, however, it is unclear which criteria the Proponent intends to apply in their assessment since four separate criteria are provided (see IR-114).</p> <p>The information presented in Table 8.2-8 indicates there are no background water quality exceedances of guidelines. However, it is noted that several screening criteria do not reflect the most conservative guidelines, which is not consistent with the approach described in Appendix 10-A (Environmental Risk Assessment). For some examples, the short-term screening criteria value of 500 mg/L for nitrate is much higher than the BC MOE nitrate guideline of 32.8 mg/L., the long-term criteria for un-ionized ammonia of 6.87 mg/L is much higher than the CCME guideline of 0.019 mg/L and the MDMER limit, and the long-term phosphorus screening criteria represent a trigger range that is two to three trophic levels above background, which is much higher than the CCME guidance framework recommends. The Proponent should review and update Table 8.2-8 to provide conservative screening criteria for all parameters, and include a consideration of the CCME, FEQG, SEQG, and BC MOE when selecting the screening criteria. Screening criteria selection should be informed by the most conservative guidelines. Cases where the Proponent does not propose to apply the most conservative screening criteria should be accompanied with a discussion and rationale for the selection. The Proponent should also specifically state which criteria will be used in screening, how these criteria will be or are applied, how the EA conclusions are informed by the criteria, and whether any EA conclusions are altered by changes to screening criteria.</p> | <p>Not Accepted</p> |

IR-115-R1 – However, it is noted that several screening criteria do not reflect the most conservative guidelines, which is not consistent with the approach described in Appendix 10-A (Environmental Risk Assessment).

The approach taken in the ERA and EIS was as follows:

1. Is there a Saskatchewan provincial screening criteria available?
2. Is there a federal screening criteria available?
3. Use the most stringent of either of these two for the assessment
4. Where there is not screening criteria either federally or provincially, use an available criteria from another jurisdiction.

The most stringent criteria in any jurisdiction was not deemed reasonable for the purposes of the EIS nor was this the intention of the methods described in Appendix 10-A or the ERA. This can be corrected to reflect the hierarchy above.

IR-115-R1 – Item three requested rationale that all selected water quality thresholds (i.e., screening criteria) are at levels protective of aquatic life, which was not provided

1. We used the criteria protective of aquatic life. These criteria are typically derived to be protective of the all life stages of all species.
2. The nearfield analysis was conducted with high conservatism
 - Average effluent rate of 36.5 m³/hr and continuous flow – this is an unlikely scenario
 - The water quality analysis was conducted for each of the low flow scenarios (i.e., 7Q10 low flow, monthly low flow, and monthly average flow) for the receiving water environment
 - Ninety-fifth percentile (95%) concentrations of constituents at baseline condition were used in modelling potential effects.
 - Based on pilot tests completed for the IWWTP to date, sulphate, chromium, molybdenum, TSS, and selenium have been identified as having potential management needs. However, for each of these parameters, the estimated discharge concentrations provided were conservative in nature with a contingency factor of 2 to 3 times.

IR-115-R1 – four separate criteria are provided (see IR-114).

The updated Table 8.2-8 provides two short-term and two long-term screening criteria for each parameter. The screening criteria reflect calculated screening criteria for both background hardness and project-induced hardness.

For the majority of parameters, the prediction is that effluent will be below long-term criteria at the background screening criteria except for sulphate, chromium and molybdenum (Nearfield model)

Parameters whose available assimilative capacity exceed short term criteria listed in Table 8.2-10 for both sets of screening criteria (background and induced) include chloride, TSS, arsenic, cadmium, copper, manganese, uranium, and zinc. (Nearfield model)

IR-115-R1 – four separate criteria are provided (see IR-114).

But Denison has committed to the following mitigation and must meet REGDOC 2.9.2


- Develop site-specific effluent treatment to treat COPCs to appropriate release limits in accordance with provincial standards and licence/permit conditions.
- Discharge effluent under a scenario that will meet provincial and federal discharge criteria as identified through permitting. Scenarios may include:
 - – discharging at a fixed rate while maintaining an appropriate minimum dilution ratio (i.e., discharge when able to meet the required dilution ratio and cease discharge during periods when unable to meet the necessary dilution ratio);
 - – discharging under a variable waste load allocation (i.e., discharge an appropriate effluent volume based on flow in the receiver to maintain minimum dilution ratio); and
 - – managing discharge via a hybrid of these (i.e., discharge effluent at a fixed rate to maintain the required dilution ratio, but the fixed rate can be varied on a seasonal basis based on flow).

We feel strongly that analysis and screening is adequate for the purposes of the EIS and the application of additional conservatism in the use of the data provide a conservative (i.e., protective) framework for evaluating potential effects.

Denison has committed to periodic sampling prior to construction to strengthen existing environmental data and will commit to update the analysis and predictions incorporating any new data collected during the licencing process, but there is no expectation that there would be any change to the EIS conclusions.



Thank You



Discussion of Round 3 IR-124, IR-124-R1, IR-126, IR-197 Comments

Rina Parker, M.A.Sc., P.Eng.

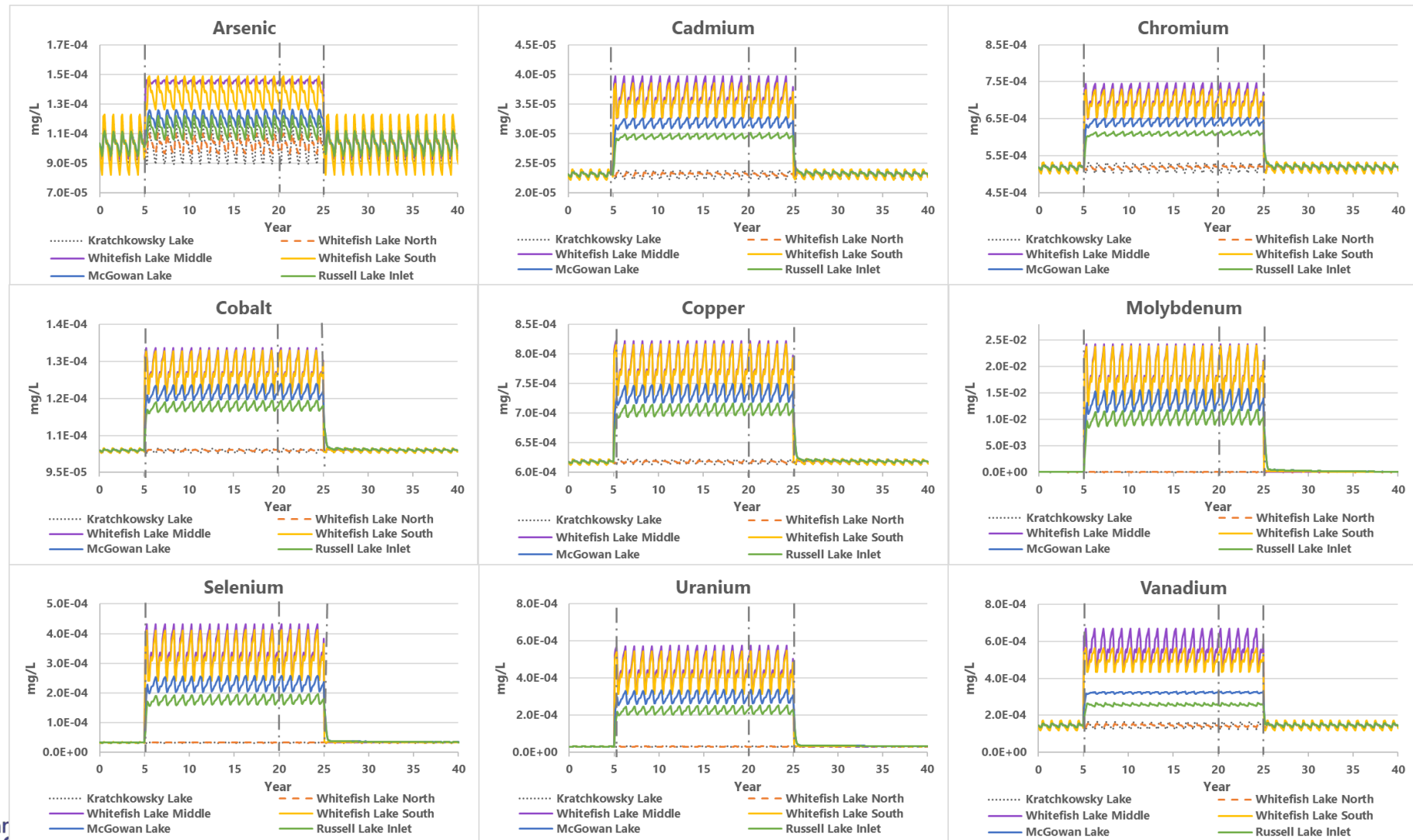
June 6, 2024

IR-124 Surface Water and Sediment Modelling

| IR-124 (ROUND 3, May 31, 2024) | Discussion |
|--|--|
| <p>The Proponent has not fully responded to the previous round's IR.</p> <p>The modeling of surface water and sediment COPC's described in Appendix 10-A show results for the receiving waterbodies, but it is not clear how the results for the COPC concentrations for water quality and sediment quality calculated for each of the water bodies, shown in Figure 6-1 and 6-2 respectively, are being interpreted. The Proponent has not explained if these modeled values are based on the worst-case scenarios that account for environmental variables such as seasonal changes in hydrology and chemistry or if they have only accounted for changes in operational effluent discharge scenarios to consider the upper bound discharge rates. Additionally, it is unclear whether depositional areas for sediment were identified based on hydrological data. Additional information is also needed regarding baseline exceedances of sediment COPC thresholds and the associated risk assessment of mine operations on the receiving water body.</p> <p>The Proponent should consider maximum COPC scenarios for the receiving water bodies in baseline assessments and the risk assessment, including seasonal variability and sediment depositional areas to determine whether the baseline assessment and risk assessment fully considered the effects of the operations of the proposed mine. The Proponent should provide supplemental information to aid in determining if the environmental model has considered environmental variability such as seasonal changes in water levels, flows and sedimentation. The Proponent should also demonstrate that the model has considered a reasonable expected worst case scenario, such as a 100 year return.</p> <p>This IR is addressing quality of inputs (ex. baseline data, conservatism of scenarios modelled, environmental variability, etc.) in to modelling. This information is required to assess the conservatism of modelling the bounding conditions and potential for significant adverse effects to the environment.</p> | <ul style="list-style-type: none">• Figure 6-1 and Figure 6-2 in Appendix 10-A are referring to the sensitivity analysis which specifically looks at the difference between expected and upper bound effluent discharge rates. All other parameters are unchanged from the expected case.• Appendix A to the ERA is called " Wheeler River Project IMPACT Model" provides detailed information on the equations used, assumptions made and inputs used in the IMPACT model• The IMPACT Model considers monthly fluctuations in flows in all waterbodies. This is described in Section 3.1 of Appendix A. |

Modelled Water Concentrations during Project Phases

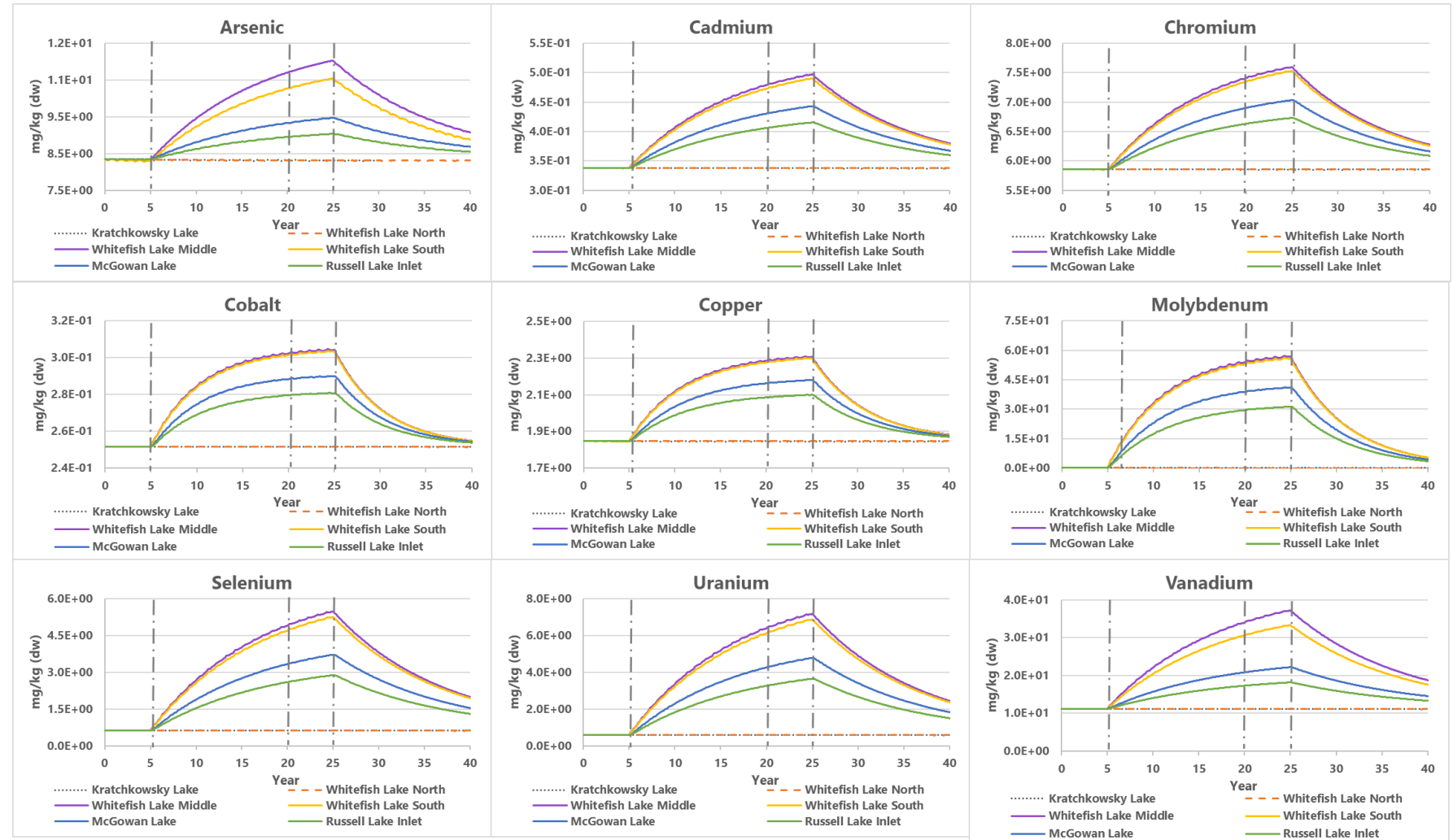
Figure 3-2 in
Appendix 10-A



Modelled Sediment Concentrations during Project Phases

Figure 3-3 in
Appendix 10-A

The sediment model represents deposition in the whole lake using partition equations. There is not a significant release of particulates; therefore, the dominant process is expected to be partitioning not particle settling – TSS in effluent is low (6 mg/L).



Near-field Model and IMPACT Model

- Two models were utilized for different purposes. The near-field model assessed different flow scenarios including low flow, and the IMPACT Model was used as the regional model for the risk assessment. The risk assessment focuses on the expected case.
- There are numerous conservative assumptions in the near-field model
 - The water quality analysis was conducted for each of the low flow scenarios (i.e., 7Q10 low flow, monthly low flow, and monthly average flow) for the receiving water environment
 - Ninety-fifth percentile (95th %) concentrations of constituents at baseline condition were used in modelling potential effects.
 - Average effluent rate of 36.5 m³/hr and continuous flow – this is an unlikely scenario
 - Effluent quality is conservative, as many based on pilot tests completed for the IWWTP to date with a contingency factor of 1 to 3 times incorporated for conservatism.

Near-field Model and IMPACT Model

- There are numerous conservative assumptions in the IMPACT model
 - Ecological receptor assumptions: home ranges are selected based on expected home range during sensitive life stages, 100% residency assumptions for wildlife to capture risk from exposure from life stage of interest.
 - Human receptor assumptions: traditional foods diet is conservative and reflects both average and high consumers. The amount of traditional food obtained from the Project area is conservative based on current understanding of land use.
 - The results shown in the ERA represents the maximum dose/risk receptors would receive over the Project phases
 - Toxicity reference values uses incorporate safety and uncertainty factors

IR-124-R1 Surface Water and Sediment Modelling

| IR-124-R1 (ROUND 3, May 31, 2024) | Discussion |
|---|--|
| <p>The Proponent has not fully responded to the previous round's IR. The modeling of surface water and sediment COPC's described in Appendix 10-A, Figure 6-1 and 6-2 respectively shows results for the receiving waterbodies. However, it is unclear if these modeled values are based on the worst-case scenarios that account for environmental variables such as seasonal changes in hydrology and chemistry, or if they have only accounted for changes in operational effluent discharge scenarios to consider the upper bound discharge rates. The Proponent's responses regarding baseline exceedances of COPC thresholds in the receiving waterbodies require additional information regarding environmental variability, including but not limited to seasonal changes in water levels, flows and sedimentation, in order to determine whether the model has considered environmental variability. The Proponent should also demonstrate that the model has fully considered a reasonably expected worst case scenario, such as a 100-year return period for the above variables.</p> <p>The Proponent should include a consideration of the maximum COPC scenario for the receiving water bodies in baseline assessments and the risk assessment, including seasonal variability and sediment depositional areas, to consider the effects of the operations of the proposed mine.</p> | <p>To clarify, the environmental risk assessment considers both seasonal variability including changes in monthly flows as well as consideration of sediment deposition in the whole lake.</p> |

IR-126 Selenium

| IR-126 (ROUND 3, May 31, 2024) | Discussion |
|--|---|
| <p>The Proponent did not compare their predictions for fish tissue selenium to the FEQGs in the ERA as requested. Furthermore, in their response the Proponent does not use available species-specific moisture content and conversion factors available for northern pike and lake whitefish when converting muscle selenium concentrations to whole-body selenium concentrations. This means that the Proponent's prediction likely underestimates the selenium tissue concentrations in the fish. Consequently, the hazard quotients reported are lower than expected. Additionally, the method used by the Proponent to predict selenium concentrations in northern pike and lake whitefish does not appear to include dietary uptake and bioaccumulation of selenium, only direct contact with pore water and overlying water is considered (Table 5-5 in Appendix 10A; Section 2.2.2 of Appendix A to Appendix 10-A). Selenium uptake through the aquatic food web has been shown to result in bioaccumulation of selenium in aquatic-dependent wildlife and resulting in reproductive impairments and malformations (ECCC 2022). Dietary sources of selenium would typically be expected to be the main contribution to tissue concentrations of selenium compared to selenium uptake from water. In most situations, the conversion of inorganic selenium to organic selenium through uptake from water into periphyton/algae is the rate limiting step of selenium bioaccumulation into higher level organisms including benthic invertebrates and fish. This step is affected by many environmental parameters (e.g. temperature, substrate, lentic/lotic environment). Considering that the effluent discharge contains 42 ug/L selenium, consideration of dietary selenium is warranted.</p> <p>The Proponent should update the final EIS with the following information:</p> <ol style="list-style-type: none"> 1. Update the ERA with the assessment of selenium concentrations in fish tissue to include a comparison of selenium fish tissue concentrations to ECCC FEQG guidelines for either fish whole body tissue (6.7 ug/g dry weight) or fish egg/ovary tissue (14.7 ug/g dry weight) <u>using</u> species-specific moisture content and muscle : whole body and/or egg-ovary : muscle conversion factors (see Tables B-1b, Table B-3, Table B-4, and Table B-5 in US EPA (2021)). 2. Update the ERA for the assessment of selenium concentrations in fish tissue using a method that considers dietary uptake and bioaccumulation in order to determine predicted fish tissue concentrations of selenium in northern pike and lake whitefish. This is recommended to be done over all Project phases for both the Expected Case and sensitivity scenarios. 3. Provide predicted fish tissue selenium concentrations that include the range of variability of data used to develop the tissue selenium predictions. Only one output value without a confidence interval is provided for each location and species (see Table B.5 in Appendix B of Appendix 10-A). | <ol style="list-style-type: none"> 1. Round 2 IR response provided a comparison against the ECCC FEQG by converting the muscle tissue concentrations to whole-body tissue concentrations using generic conversion values. The dry weight to fresh weight conversion factor used was 0.25. Based on measured dry weight content in fish (northern pike and white sucker the dry weight content ranged from 0.24 to 0.26 which is consistent with literature values; therefore, there is no need to change. (see next slide for additional results). 2. The ERA has done what the reviewer is requesting. The ERA utilizes a bioaccumulation factor (BAF) model from water to tissue to conservatively reflect all the multi-media contributions to update. The BAFs are provided in Appendix A to the ERA in Section 3.6.1. 3. The fish tissue selenium concentrations represent the maximum concentration over the Project phases. This is the most conservative result. |

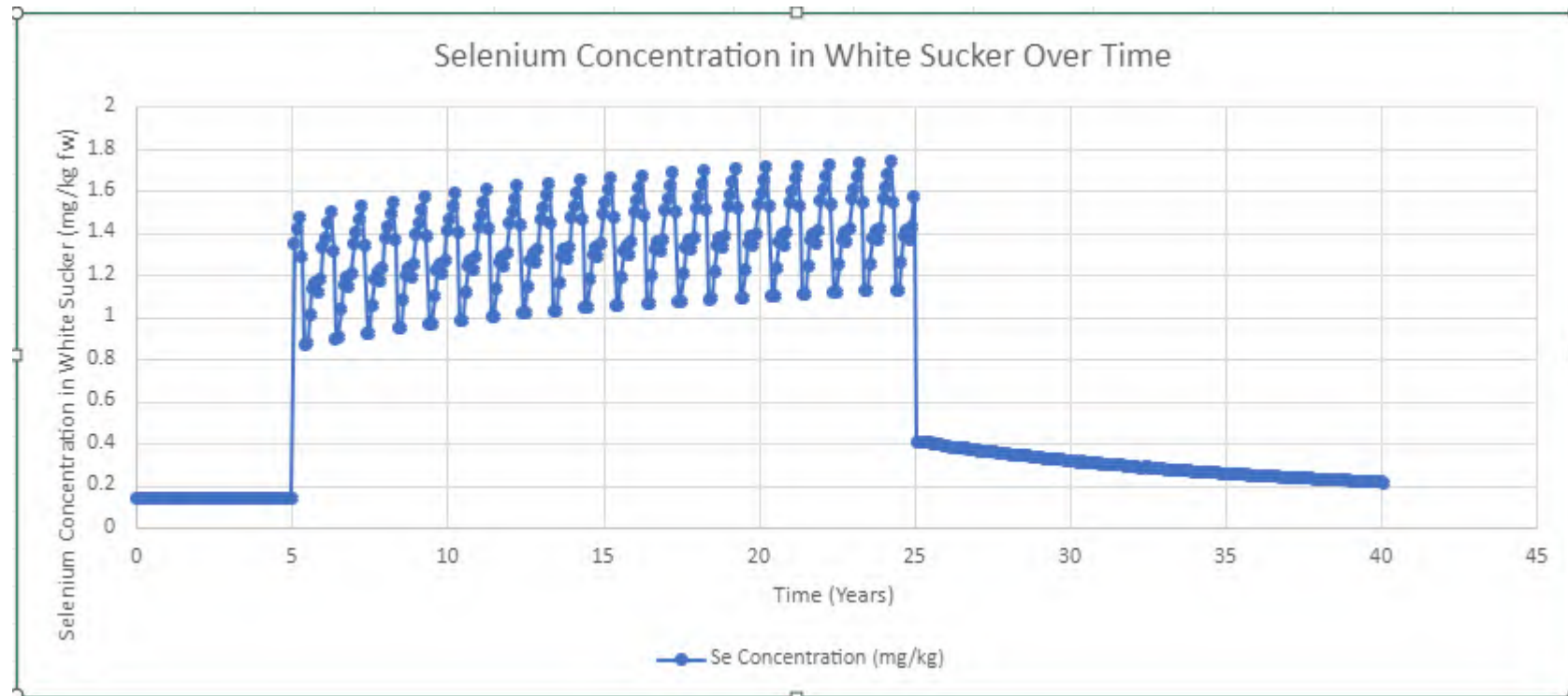
IR-126 Selenium

- White Sucker - Good agreement between literature and measured
 - Moisture Content (Table B-1b): 77.37
 - Moisture Content Baseline Data: 76.55%
 - Moisture Content CSA N288.1: 75%
- Table B-4 of US EPA (2021) provides muscle to whole-body correction factor for white sucker (1.34)

| | | | | IR-Response | Updated |
|-----------|----------|----------|----------|-------------|------------|
| Fish | | Muscle | Muscle | Whole Body | Whole Body |
| Species | Lake | ug/g fw | ug/g dw | ug/g dw | ug/g dw |
| W. Sucker | Ref | 1.46E-01 | 5.84E-01 | 4.60E-01 | 4.65E-01 |
| | WL North | 1.43E-01 | 5.72E-01 | 4.50E-01 | 4.55E-01 |
| | WL Mid | 1.74E+00 | 6.96E+00 | 5.48E+00 | 5.54E+00 |
| | WL South | 1.66E+00 | 6.64E+00 | 5.23E+00 | 5.28E+00 |
| | McGowan | 1.06E+00 | 4.24E+00 | 3.34E+00 | 3.37E+00 |
| | Russell | 8.06E-01 | 3.22E+00 | 2.54E+00 | 2.57E+00 |

Conclusion: There is minimal difference between previous assumptions and updated assumptions.
All results still below the ECCC FEQG of 6.7 µg/g dry weight

Selenium in White Sucker over Time (LA-5)



IR-197 Atmospheric Deposition

| IR-197 (ROUND 3, May 31, 2024) | Discussion |
|--|--|
| <p>The Proponent is not using the correct CSA standard to address this information requirement. The response refers to guidance from CSA N288.1 (i.e., <i>Guidelines for modelling radionuclide environmental transport, fate and exposure associated with the normal operation of nuclear facilities</i>), however, the information requirement specifies CSA N288.6, which is a different standard.</p> <p>In lieu of requesting information on atmospheric deposition of all contaminants of potential concern (COPC) to surface water and associated effects, the Proponent should:</p> <ol style="list-style-type: none"> 1. Provide an estimate of atmospheric deposition of mercury (all species) from Project-related emissions. Include a sensitivity analysis as well as expected seasonal variations in the deposition rate with an emphasis on accumulated deposition for the lake ice breakup period. 2. Update water quality mercury predictions (all species) for Whitefish Lake using scenario(s) that incorporate atmospheric deposition from Project-related emissions. Based on the findings, assess any Project-related effects to aquatic receptors from mercury (all species). Discuss potential effects on sediment quality. 3. Discuss how the response was informed by the CSA N288.6 standard (i.e., Environmental risk assessments at class I nuclear facilities and uranium mines and mills. CSA Group; February 2022). | <ol style="list-style-type: none"> 1. There are no Project-related emissions of mercury to air therefore the request to estimate atmospheric deposition of mercury from Project-related emissions is not applicable. The Round 2 IR response provided an example for uranium to show how atmospheric deposition to lakes is considered minor. 2. There are no Project-related emissions of mercury to air therefore the request to estimate atmospheric deposition of mercury from Project-related emissions is not applicable. 3. The CSA N288.6 standard provides guidance on conducting environmental risk assessment, but does not provide detailed guidance on fate and transport models. The CSA N288.6 standard refers to other documents for the details. This includes CSA N288.1. For example, Clause 1.4 of N288.6 states "An understanding of the fate and transport of contaminants in the environment is necessary for performing an ERA; however, a detailed discussion of fate and transport models is outside the scope of this Standard. The risk assessor should consult CSA N288.1 for information on these concepts. Examples of additional models are provided in Clause 6.3.7." The examples of models provided include N288.1 as well as the IMPACT model which implements the equations in N288.1. |



Thank You



Denison Mines Corp. Wheeler River Project

June 6, 2024

Terrestrial Environment

Round 3 Information Requirements (IRs)

Agenda

- Terrestrial Environment
- Remaining IRs
 - Species-specific information for pre-clearance sweeps
 - IR-134-R1: Bats
 - IR-149-R1A: caribou
 - IR-142, IR-159, IR-167-R1: SAR in general
 - IR-170: SAR, including nighthawk
 - Bats
 - IR-174
 - Caribou
 - Caribou offset commitment
 - IR-149, IR-157
 - Caribou mitigations related to Project flights
 - IR-149-R1B

Terrestrial Environment

Draft EIS Section 9.3 Ungulates, Furbearers, and Woodland Caribou and 9.4 Raptors, Migratory Breeding Birds, and Bird Species at Risk – *Habitat-based assessments*

• Ungulates, Furbearers, and Woodland Caribou

Key Indicators:

Moose
Wolverine, Pine Marten, Mink, Muskrat
Woodland Caribou

Direct habitat loss
Sensory disturbance
Collisions with project vehicles & equipment
Harvest and/or predation

Potential Effects Considered:

Amount of habitat that may be altered or lost relative to its availability in the Terrestrial RSA
Mortalities directly or indirectly attributable to the Project

• Raptors, Migratory Breeding Birds, & Bird Species at Risk

Key Indicators:

Bald Eagle, Osprey
Waterbirds and Waterfowl
Upland Game Birds
Migratory Songbirds
Common Nighthawk
Short-eared Owl
Yellow Rail
Rusty Blackbird
Olive-sided Flycatcher

Direct habitat loss
Sensory disturbance
Collisions with project vehicles & equipment
Incidental take of birds, nests, eggs

Potential Effects Considered:

Amount of habitat that may be altered or lost relative to its availability in the Terrestrial RSA
Mortalities directly or indirectly attributable to the Project



Terrestrial Environment Valued Components

- Terrain
- Soil
- Organic Matter/Peat
- Vegetation and Ecosystems
- Listed Plant Species
- Wetlands
- Ungulates
- Furbearers
- Woodland Caribou
- Raptors
- Migratory Breeding Birds
- Bird Species at Risk

Terrestrial Environment – Species at Risk (SAR)

Wildlife Valued Components, Key Indicators, and Measurable Parameters included in the Habitat-based Assessment

| Valued Component | Key Indicator | Measurable Parameter |
|----------------------|------------------------|--|
| Furbearers | Wolverine | Amount of habitat (km ²) (not necessarily occupied) that may be altered or lost relative to its availability in the Regional Study Area (RSA). |
| | | The number of wolverine mortalities directly or indirectly attributable to the Project. |
| Woodland Caribou | Woodland caribou | Amount of habitat (km ²) (not necessarily occupied) that may be altered or lost relative to its availability in the RSA. |
| | | The number of woodland caribou mortalities directly or indirectly attributable to the Project. |
| Bird Species at Risk | Common Nighthawk | Percentage of habitat for Common Nighthawk altered/lost directly or indirectly as a result of Project activities. The number of Common Nighthawk mortalities directly or indirectly attributable to the Project. |
| | Rusty Blackbird | Percentage of habitat for Rusty Blackbird altered/lost directly or indirectly as a result of Project activities. The number of rusty blackbird mortalities directly or indirectly attributable to the Project |
| | Olive-sided Flycatcher | Percentage of habitat for Olive-sided Flycatcher altered/lost directly or indirectly as a result of Project activities. The number of Olive-sided Flycatcher mortalities directly or indirectly attributable to the Project |
| | Short-eared Owl | Percentage of habitat for Short-eared Owl altered/lost directly or indirectly as a result of Project activities. The number of Short-eared Owl mortalities directly or indirectly attributable to the Project. |
| | Yellow Rail | Percentage of habitat for Yellow Rail altered/lost directly or indirectly as a result of Project activities. |
| | | The number of Yellow Rail mortalities directly or indirectly attributable to the Project. |

Terrestrial Environment – Species at Risk (SAR)

- Supplemental information generated during EIS review:
 - IR responses
 - Round 1 – submitted August 2023
 - Round 2 – submitted February 2024
 - Revised draft EIS new appendices:
 - Appendix 9-D Wildlife Species At Risk
 - Additional information for 9 SAR which were not included in the draft EIS as KIs.
 - The information provided in the SAR appendix includes a summary of the life history requirements, the expected Project effects, proposed mitigation measures, and anticipated residual effects on these listed species.
 - Appendix 9-E Caribou Management Framework
 - Appendix 9-F Supplemental Information Generated During the Draft EIS Review

Terrestrial Environment – Remaining IRs

Species-specific information for pre-clearance sweeps

IR-134-R1: Bats

IR-142, IR-159, IR-167-R1: SAR in general

IR-149-R1A: caribou

IR-170: SAR, including nighthawk

- Various IRs requesting details on how pre-clearance sweeps will be tailored to SAR
 - Denison's EIS has concluded there are no significant effects on wildlife and bird SAR.
 - Denison believes we have provided sufficient information in the EIS and IR responses for the federal government to make a determination as to the effect of the Project on SAR, within the approved scope of the Project and *CEAA 2012*.
 - Details related to management plans are under development to support CNSC licensing and provincial permitting.
 - We also note that ongoing SAR management is under Provincial jurisdiction.
 - Information requested in these IRs has been provided in various places in the EIS and IR responses; however, Denison can provide more concise summaries to support the resolution of these IRs (example on next slide)
 - We request the opportunity to meet and discuss draft details with ECCC directly in the next 1-2 weeks, prior to submitting a formal IR response

Terrestrial Environment – Remaining IRs

Species-specific information for pre-clearance sweeps

IR-134-R1: Bats

IR-142, IR-159, IR-167-R1: SAR in general

IR-149-R1A: caribou

IR-170: SAR, including nighthawk

| Species of Concern | Important Habitat and Needs | Survey Target Areas | Survey Technique | Timing | Information Source |
|--------------------------------------|--|---|---|-------------|---|
| Little Brown Myotis and Northern Bat | The presence of large snags, tree cavities, is an important attribute in old growth forest stands that provides maternity roosts and day roosts for northern myotis and little brown bats. Building are also used. | Treed areas with the largest diameter and/or older trees. Focus on older forest, or areas with large snags in younger forest within the project footprint (majority is regenerating forest 1-5m). | Daytime visual search of trees and potential roost sites. Systematic meandering search of areas to be cleared during active bat season. Focus on searching for roost features (snags, cracks, stumps, cavities, bark peeling) and bat sign (e.g., guano). | May to Sept | Broders et al. 2005; Garroway and Broders 2008; Park and Broders 2012; Ford et al. 2016; Randall et al. 2014; Resources Information Standards Committee (RISC). 2022. |
| | Foraging habitat in proximity to roosting sites is also an important factor in roost selection. | Treed areas in proximity to clearings, wetlands and open water. | | | |

Terrestrial Environment – Remaining IRs

Bats: IR-174

To close this IR, Denison must:

1. Clarify the legend of Figure 2-9 with respect to frequency of detection
 - Total number of passes and/or buzzes detected (Appendix 9-B Terrestrial Baseline).
2. Provide suitable bat SAR habitat information in the form of a map
 - Literature data, existing ecosite data, and existing bat survey data can be used to develop habitat maps, as part of the response to this IR.
 - We expect no hibernacula in the Project Area (i.e., caves, mines, buildings with stable and specific temperatures per COSEWIC 2013). Terrain is low relief due to flat-lying sandstone and almost continuous cover of sandy glacial deposits (i.e., surface is predominately sand textured); there are no mines or building in the Project Area.
3. Provide additional baseline data for bat SAR based on literature sources and justify applicability to the project
 - See point 2.
4. Provide a description of proposed methods for bat SAR field monitoring for review
 - Denison can summarize the proposed methods for discussion with ECCC in the next 1-2 weeks (see previous 2 slides).
5. Commit to an EA commitment to collect additional bat SAR field baseline data prior to disturbance
 - We believe the habitat-based information in Appendix 9-D (see *summary on next slide*), plus additional mapping as part of Point 2 above, is sufficient for the EA stage. If any EA commitments are being considered, they would be follow-up only and not be used for significance determination.

Appendix 9-D Table 4.1 (excerpt)

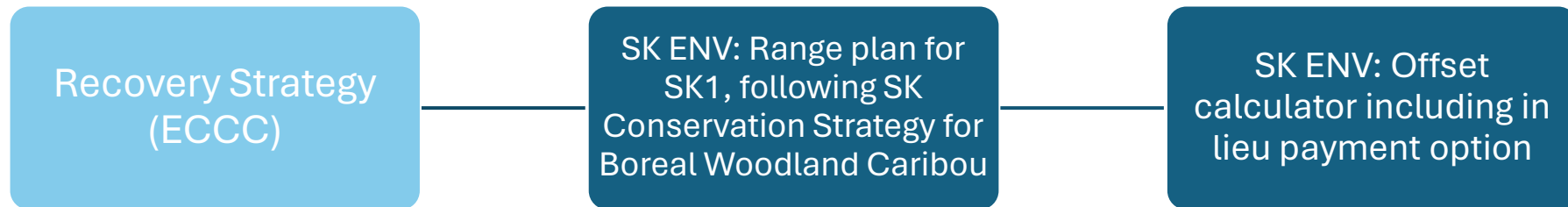
| Component | Wildlife SAR | Measurable Parameters | Project Activities Resulting in Primary Interactions | Project Phase | Species-Specific Mitigation Measures ¹ | Predicted Residual Effect | Significance |
|-------------------------|--|--|---|-----------------|---|--|---|
| Terrestrial Environment | Little brown myotis Northern myotis | Amount of habitat that is altered or lost relative to its availability in the Terrestrial RSA. | <ul style="list-style-type: none"> Development of access roads and air strip. Site preparation and earthworks; clearing, leveling and grading of the Project Area. On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | Construction | <ul style="list-style-type: none"> Vegetation clearing activities will occur outside of roosting periods, when practical. Pre- disturbance wildlife clearance surveys will be completed to identify site-specific habitat features such as maternal roosting sites and hibernacula used by bat species. If features are identified in the Project Footprint, appropriate setbacks and/or timing windows will be implemented in accordance with the SARGSS (SK MOE 2017 (that will also be defined in the Wildlife Management Plan). In the event a maternal roosting site is identified on the Project Footprint, exclusionary methods (e.g., installing a one-way bat exit) will be implemented following the summer maternity roost season. This installation would allow for bats to leave but not the ability to re-enter the roosting site. Locations of these site-specific habitat features used by bats will be communicated to appropriate Project personnel and the requirement to limit disturbance in these areas will be implemented. Specific exclusion methods will be added as mitigation measures (Section 9.4.5 of the final EIS) to prevent access to buildings and other infrastructure. | Alteration and/or loss of habitat: predicted to be low magnitude, local geographical extent, long-term duration, frequent, fully reversible. | Not Significant: the predicted residual effect of alteration and/or loss of habitat is not expected to alter the integrity of the habitat for bat species within the Terrestrial RSA to the point where it is not sustainable or available to contribute to ecological functions. |
| | | | <ul style="list-style-type: none"> On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | Operation | | | |
| | | | <ul style="list-style-type: none"> Demolition and disposal of non-salvageable surface infrastructure and materials. On-site and off-site operation of vehicles and transport of materials. Reclamation of disturbed areas. | Decommissioning | | | |
| | | Mortalities directly or indirectly attributable to the Project. | <ul style="list-style-type: none"> Development of access roads and air strip. Site preparation and earthworks; clearing, leveling and grading of the Project Area. On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | Construction | | Change in mortality: predicted to be low magnitude, local in geographical extent, long-term duration, infrequent, and fully reversible. | The predicted residual effect of change in mortality is not expected to alter the integrity of the regional populations of the bat species to the point where they are not sustainable or available to contribute to ecological functions |
| | | | <ul style="list-style-type: none"> On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | Operation | | | |
| | | | <ul style="list-style-type: none"> Demolition and disposal of non-salvageable surface infrastructure and materials. On-site and off-site operation of vehicles and transport of materials. Reclamation of disturbed areas. | Decommissioning | | | |

Terrestrial Environment – Remaining IRs

Caribou offset commitment: IR-149 and IR-157

- ECCC notes IRs are accepted if Denison commits to the following:
 - *Denison's offsetting plan will meet the objectives of the Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal population, in Canada*

Our understanding is that by meeting the Provincial offset requirements, we are meeting the objectives of the recovery strategy since the Province is responsible for caribou management.




Terrestrial Environment – Remaining IRs

Caribou offset commitment: IR-149 and IR-157

- Denison's EIS has concluded there are no significant effects on caribou.
- The caribou population in SK1 is stable and SK1 is not at the disturbance threshold, based on recent update from Saskatchewan Ministry of Environment (SK ENV 2023):
 - 53% disturbed, 47% undisturbed – i.e., SK1 conservation unit is currently below the disturbance threshold of 40% undisturbed habitat.
- Denison has committed to offsetting with SK ENV.
 - Denison will need approval through the province for offsetting and this must be accomplished through the provincial offsetting framework.
 - Our understanding is that if ECCC does not agree with ENV's offsetting plans, this is a federal-provincial government issue, not a proponent issue related to an EA under CEAA 2012.

Terrestrial Environment – Remaining IRs

Caribou mitigation: IR-149-R1B

| Round 2 IR | Denison's response | Round 3 IR |
|--|--|--|
| <p>1. Provide additional information on the timing and frequency of air traffic using the Project air strip.</p> <p>2. Provide specific mitigations related to impacts from air traffic, including mitigations related to frequency and timing of flights.</p> | <p>Please see response to IR-149.</p> <p>In addition, in direct response to IR-149-R1B the following is noted.</p> <p>The flight schedules have not yet been determined at this relatively early stage of planning for the Project.</p> <p>Mitigation measures likely to be incorporated into the operation of the airstrip, with respect to air traffic, would include, as safety allows, maintaining as direct approach and departure flight paths as possible, and obtaining appropriate altitudes, and leaving the LSA and RSA, as quickly as is safely reasonable.</p> <p> Denison Mines</p> | <p>Item two has been accepted as the Proponent has provided potential measures likely to be incorporated into operations of the airstrip, but item one remains outstanding. The information requested was not provided as the Proponent notes it is too early in the planning phase to provide this information. Once flight schedules have been determined, the Proponent should share them for review. If this cannot be provided at this time, the Proponent should provide information on the frequency and approximate timing of flights, as well as any periods of restricted activity planned for mitigation purposes.</p> <p>In addition, Denison is expected to provide details on specific mitigation measures to address sensory impacts to caribou, such as restricted activity periods to accommodate for the caribou calving season, or different flight paths.</p> <p>Please see the related follow up advice for IR-149-R1B in the Advice to the Proponent document.</p> |

Terrestrial Environment – Remaining IRs

Caribou mitigation: IR-149-R1B

- This comment should not be an IR at this stage of the review.
 - The EIS concluded there are no significant effects on caribou, which included the assessment of habitat alteration due to sensory disturbances, including the operation of an airstrip.
 - It is not reasonable, in Denison's view, that flight schedules have to be defined at this early stage of the Project.
- While some additional information can be provided (*see bullets below*), we reiterate that the EIS was completed with the appropriate level of detail expected at this stage of the Project.
 - Anticipated aircraft traffic at the Project airstrip is expected to be minimal, at approximately five flights per week during Operation.
 - Mitigation measures likely to be incorporated into the operation of the airstrip, with respect to air traffic, would include, as safety allows, maintaining as direct approach and departure flight paths as possible, and obtaining appropriate altitudes, and leaving the LSA and RSA, as quickly as is safely reasonable.
 - If ECCC has specific additional recommendations for mitigation measures, we would ask that they provide them for our consideration.

- Department: ECCC
- Project Effects Link: Change to an environmental component due to hazardous contaminants
- Reference to EIS, appendices, or supporting documentation: Section 2.2.3, Project Description

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, July 9, 2024) |
|--------------|----------------|---|--|--|--|---|---|--|
| IR-12 | - | <p>Context: There is not enough information provided within the draft EIS and site water infrastructure designs to determine if the infrastructure will sufficiently contain mine site contact and noncontact water runoff. It is unclear how water management will occur during all proposed Project stages at the Project airstrip, which is located away from the main Project site. No information has been provided regarding water that may come into contact with fuels and oils from machinery on the air strip, how and where that contaminated water will be treated, and how surface runoff around the airstrip will be managed. Additionally, it is unclear if contaminants from heavy machinery on roads have been considered during runoff collection plans throughout the mine Project site. Water management at the airstrip and roads can have impacts on surface water quality and sediment quality and contaminants (e.g., Hydrocarbons) from these sources should be considered in overall site water management plans.</p> <p>In Section 2.2.3.1 a site drainage plan for contact and non-contact water has been provided in Figure 2.2-17, and water balances have been provided for the different Project phases in Figures 2.2-14 to 2.2- 16. In Section 2.2.3.4 a volume of 30,000m3 for the process water pond is provided, and it is stated that the process water pond has the capacity to contain Probable Maximum Precipitation (PMP) event estimated to be 483.3mm while allowing for 1.0m of freeboard. However, there are no estimates on the total volume of water that may be drained from the overall site infrastructure (i.e., the well field, processing areas, etc.) during a 24-hr PMP event. Additionally, in Figure 2.2.17 culvert locations are provided, however there is no further information on culvert designs, flow ratings and capacity for PMP events.</p> <p>Rationale: In order to be able to understand site water management and flood risk potential, more information needs to be provided regarding the site water infrastructure designs and capture volumes during PMP events. This information will aid ECCC in understanding how contact and non-contact water will be conveyed throughout the site. Runoff from roads and the site airstrip will contain contaminants from vehicles, heavy machinery, aircrafts and de-icing practices. Additional information on the runoff collection systems and expected contaminant concentrations for the site airstrip and roads is needed to determine if the receiving environment and aquatic and terrestrial receptors are protected.</p> | <p>1. Provide information on how contact and non-contact water from the site airstrip will be managed. Include information on potential contaminant characterization and loadings and an assessment of risk to the environment.</p> <p>2. Provide further information on how potential contaminants in runoff from roads have been considered in the site water management. Include information on potential contaminant characterization and loadings and an assessment of risk to the environment.</p> <p>3. Provide estimated volumes of water to be drained from overall site infrastructure (such as the mine terrace, airstrip, camp area etc.), during a 24-hr PMP event.</p> <p>4. Provide additional information on culvert designs and conveyance capacity for PMP events.</p> | <p>1. and 2. Denison’s approach to site water management is keep non-contact water “clean” – that is, the management approach provides that non-contact water does not come into contact with site aspects that may impart constituents/contaminants of concern and that non-contact water mingles with contact water. Contact water is water expected at the wellfield and processing plant terrace (refer to runoff collection arrows shown in draft EIS Figure 2.2-17), and also includes leachate collected from landfills. As such, runoff from the airstrip and site roads is considered non-contact water and will not be actively managed. However, should a spill occur, the spill response plan will be followed. Details of Denison’s response plans will be developed to support licensing as part of the Waste Management and Emergency Management and Fire Protection programs. By following best practice and mitigation measures outlined in the EIS, Denison does not anticipate a need to continually manage water at the airstrip or along site roads as the water here will be clean, non-contact runoff. Examples of relevant mitigation measures include:</p> <ul style="list-style-type: none">• Project components including equipment and machinery will be regularly maintained and inspected to make sure they are in good working order.• Fuel storage and distribution infrastructure will be constructed in accordance with applicable legislation requirements.• Fuels will be stored in approved, above-ground, double-walled storage tank(s) equipped with secondary containment in accordance with provincial regulations and standards.• A wash bay will be available to clean items, equipment, and vehicles that may have been in contact with potential contaminants. <p>Refer to Section 14 of the draft EIS for the screening and evaluation of various accident and malfunction scenarios. Should unplanned events or conditions occur, it will be important for Denison to address and respond in an appropriate manner. Details of Denison's response plans will be developed to support licensing as part of the Waste Management and Emergency Management and Fire Protection programs. Additionally, should unexpected water pooling be observed at the airstrip or site roads during Operation, temporary water removal means such as vac trucks or sump pumps could be employed and the areas would be re-graded to minimize water accumulation.</p> <p>3. As indicated in the response to IR-12, points 1 and 2 above, Denison expects contact water requiring management is at the wellfield and processing plant terrace (refer to runoff collection arrows shown in draft EIS Figure 2.2-17). For this area, the volume of water expected during a 24-hour PMP of 493 mm is approximately 37,240 m3. The wellfield runoff pond has been sized appropriately (38,200 m3 with 1 m of freeboard) to contain this volume of water.</p> <p>4. Details related to culvert design and conveyance capacity are being developed as part of ongoing engineering activities. Culverts will be a designed with a sufficient size and length to convey water around the site during a PMP event.</p> | <p>This response has not been accepted, for the following reasons (numbers correspond with original IR):</p> <p>1-2. In Figure 2.2-17 (Site Drainage Plan with Flow Direction and Culvert Locations) of EIS, site drainage or water management layout is not included for the access road to the airport and the airport area although they constitute part of the Project site. Although surface run off from airstrip or site road are mainly expected to be clean or non-contact water, CNSC expects Denison to provide information on water management system to mitigate risk of flooding and erosion at the airport and the access road. In addition, the access road connecting the mining site with airport crosses two streams (Kratchkowsky Creek and Hart Creek) that flow into Whitefish Lake, CNSC staff expects Denison to ascertain that culverts or crossings will be designed in such a manner that the flood hazard does not increase. Therefore, CNSC staff request that Decision provide information on how the surface runoff generated at airstrip and airport access road would be managed.</p> <p>3. CNSC accepts estimated total volume of runoff from the wellfield area to Wellfield Pond however the PMP value of 489.3mm is obtained from 1999 study [A.1], based on historical rainfall data pre -1998, which appears to require updated PMP value.</p> <p>CNSC requests that Denison use a PMP value that is estimated using historical rainfall data that includes the most up to date meteorological data or provide justification on the validity of the current PMP.</p> <p>Further, the site infrastructure runoff water has not been considered in the water management infrastructure. Site water management planning should consider the capture of noncontact water to understand the potential effects of contaminants from non-contact water on the surrounding environment.</p> <p>Please also see follow-up IR-12-R1A and IR-12-R1B, related to this IR.</p> <p>Reference: [A.1] Atmospheric & Hydrologic Sciences Division – Atmospheric Environment Branch. 1999. Environment Canada Prairie & Northern Region – Point Probable Maximum Precipitation for the Prairie Provinces. Regina, Saskatchewan. Report No. AHSD – R99 – 01.</p> | <p>1-2. The water management design information presented in the draft EIS is considered appropriate at the EA stage and for this stage of the Project and fit-for-purpose to support the assessment of potential effects. The detailed design information on site water management infrastructure and runoff management requested in this IR and related IRs (i.e., IR-12-R1A and IR-12-R1B) will be provided to the CNSC and province as part of licensing and permitting.</p> <p>Nevertheless, and building on information provided previously, additional information and context regarding site water management and design concepts is provided as follows:</p> <ul style="list-style-type: none">• Conceptual site drainage maps spanning the full Project Area scale has been provided in Attachment IR-12 to this IR response table as context for the reviewer.• Design for the access roads and airstrip will in general be such that runoff will be encouraged through appropriate grading to drain away and not pond on or near the road or airstrip.• The overall vision for non-contact water along the access roads and airstrip is to use shallow ditching to dissipate the energy of runoff, to promote settling of suspended solids and allow the runoff to report to ground via natural grades that flow away from the infrastructure and into the natural drainage systems.• The condition of the airstrip and roads would be inspected and maintained routinely. For example, should unexpected water pooling be observed at the airstrip or site roads during Operation, temporary water removal means such as vac trucks or sump pumps could be employed, and the areas would be re-graded to minimize water accumulation.• Infrastructure features that are within 50 to 100 m (depending on grade) of waterbodies and that are associated with cleared land where there is no vegetated buffer may require additional erosion management / controls to ensure protection of the waterbodies from unmitigated suspended solids inputs. A map showing the distance of Project components to waterbodies is available in Attachment IR-12 as context for the reviewer. The map shows for example, that four waterbodies (waterbody numbers 1, 16, 23, and 86) are within 100 m of the Project footprint where potential erosion protection measures may be employed. The details of erosion control measures at these locations will be outlined in the Environmental Management System to support licensing.• Conceptually, minimizing changes in surface drainage patterns and watersheds is an important mitigation measure in the surface water quantity assessment. Collecting and managing non-contact water along roads and at the airstrip would result in a larger potential Project effect on surface water quantity associated with changes in surface drainage patterns and is not preferred.• As described in the draft EIS, the proposed crossings at Kratchkowsky Creek and Hart Creek are not culverts, but clear span bridges. Clear span bridges are designed to completely span a watercourse without interfering with the channel bed and banks.• As a reminder to ECCC that the road to the Project’s proposed airstrip follows an existing, decommissioned road, the Fox Lake Road.• The Project is located within the Wheeler Upland Landscape Area of the Athabasca Plain Ecoregion within | <p>Item one of the IR has been accepted, but a follow-up item of advice can be found within the Advice to the Proponent table [reference to come].</p> <p>There is outstanding information required to resolve item two. The Proponent did provide the requested proposed water management structures in Attachment IR-12; however, for the road to airstrip and the airstrip, the water management strategy does not include any containment structures or information about runoff quality.</p> <p>Contaminants may be contained in non-contact water from all site infrastructure, including the airstrip, roads, and the camp area. This information is required in order to make a determination on significant adverse effects, as it relates to potential impacts to water quality and fish, which are assessed as part of the EA process.</p> <p>The Proponent should confirm that the proposed water management structures, for the roads, camp pad, operation, substation and airstrip, will be included in the Final EIS. The Proponent should also describe how quality of runoff from infrastructure will be monitored, and what proposed mitigation and management measures will be taken if necessary.</p> <p><i>With regards to items three and four, these have been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> <p>Denison is expected to address the following:</p> <ol style="list-style-type: none">3. From FIRT’s Information Request Rationale (2023-12-05): CNSC requests that Denison use a PMP value that is estimated using historical rainfall data that includes the most up to date meteorological data or provide justification on the validity of the current PMP.4. From Denison submission of responses to IRs (2023-08-18): Details related to culvert design and conveyance capacity are being developed as part of ongoing engineering activities. Culverts will be a designed with a sufficient size and length to convey water around the site during a PMP event. | <p>Refer to Attachment IR-12, IR-12-R1A, and IR-112-R1B (Round 3) below.</p> |

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, July 9, 2024) |
|--------------|----------------|--|--------------------------|---|---|---|---|--|
| | | | | | | <p>the Boreal Shield Ecozone of Saskatchewan. The area is characterized by Brunisolic soils which are typically sandy, well-drained soil. Standing water is not a common occurrence and the well-drained characteristics of the region support the plans to divert non-contact water to ground, and as noted made surfaces would be graded to promote drainage and discourage pooling.</p> <ul style="list-style-type: none">• Please refer to our initial response to IR-12 (refer to Annex 1, IR-12 on page 6/419) for additional context on best practice and mitigation measures related to water management and also the scoping and evaluation of accident and malfunction scenarios in the draft EIS.• Importantly, the conceptual management scheme outlined above for non-contact water runoff is consistent with other roads and airstrips in the region – that is, runoff is not currently captured from other roads and airstrips in the region as envisioned by the review comment. This includes infrastructure associated with Saskatchewan Ministry of Highways and Infrastructure, existing uranium mines and mills, and communities including First Nation communities. It is not practical to do so and collection of non-contact water is not needed based on risk and moreover as noted above is to be avoided so as not to necessarily affect water quantity in local drainages and sub-drainages. <p>3. The reviewer is referred to the response to IR-103 for a discussion regarding the PMP and its suitability and relevance given available data and different methods of calculation included that provided by CSA guidance. Notwithstanding the information provided in response to IR-103 Denison is committed to revisiting this issued as per CNSC’s recommendations, as applicable, for the licensing phase of the Project. To reiterate, Denison believes it has fulfilled its information requirements for the EIS as outlined in the EA guidance provided by the province and federal government, including CEEA 2012, and that the FIRT has been provided with the appropriate level of detail on the water management topic for drawing conclusions on the EA process. Notwithstanding that, Denison recognizes that further information will be required as the Project moves past the EA and into the licensing and permitting phases. It is Denison's opinion that this comment is not an IR related to the EIS. A request for clarification or additional information on a detailed design aspect would need to be responded to by the Denison as part of the licensing process; however, this level of detail is not necessary for drawing conclusions on the EA process.</p> | | |
| <i>n/a</i> | IR-12-R1A | <p>Context: Runoff water from site infrastructure such as the airstrip and roads may be categorized as non-contact water because it does not come into contact with contaminants of potential concern (COPCs) directly from mining operations infrastructure. However, it still has the potential to contain deleterious substances from mine-related activities such as operation of vehicles, including heavy machinery and aircraft, spills, fire management practices, and snow removal practices. The Metal and Diamond Mining Effluent Regulations (MDMER) pursuant to the Fisheries Act requires all mine effluent and seepage from the mine site that contains deleterious substances be discharged through a final discharge point. This includes deleterious substances in non-contact water from all site infrastructure including the airstrip, roads, and camp area.</p> <p>Rationale: All mine effluent and seepage that contains deleterious substances must be discharged through a final discharge point.</p> | <i>n/a</i> | <i>n/a</i> | <p>1. Update site water management plans to include management of potentially deleterious substances contained in non-contact water from all site infrastructure.</p> <p>2. Provide updated estimates of water volumes to be drained and managed from overall site infrastructure (including runoff from roads, airstrip, camp area, etc.) during the different Project phases. Include updated information on water treatment flows, capacity and effluent discharge during normal operations, and a 24-hr Probable Maximum Precipitation (PMP) Event.</p> | <p>1 and 2. Denison understands the prohibition related to deleterious substances under Section 36 of the Fisheries Act and Denison affirms its commitment to ensuring no such events occur. However, in the context of this IR, we interpret ECCC is connecting the concept of deleterious substances under MDMER (those constituents identified in Part 1(3) i.e., arsenic; copper; cyanide; lead; nickel; zinc; suspended solids; radium 226; and un-ionized ammonia.) with the general concept of deleterious substance per the Fisheries Act. Mine effluent associated with MDMER defined deleterious substances will be discharged through a final discharge point to Whitefish Lake, and this has been reflected in the water management information presented in the draft EIS, including Section 2.2.3. The IR is suggesting Denison collects runoff water from the airstrip and roads with the rationale that this is needed in order to collect potential contact water associated with hydrocarbons spills (the text in rationale notes: This includes site non-contact water which has the potential to contain deleterious substances such as those released from vehicles, machinery, aircrafts, spills, and de-icing practices). As indicated in the draft EIS and in our initial response to IR-12 (refer to Annex 1, IR-12 on</p> | <p>The Proponent has not adequately answered either part of the IR.</p> <p>An updated site water management plan that includes the management of all water that has been in contact with project infrastructure and updated estimates of water volumes to be drained and managed from overall site infrastructure (including runoff from roads, airstrip, camp area, etc.) are required to understand the potential effects of contaminants on the surrounding environment. The Proponent should include updated information on water treatment, flows, capacity and effluent discharge during normal operations, and a 24-hr Probable Maximum Precipitation (PMP) Event.</p> | <p>Refer to Attachment IR-12, IR-12-R1A, and IR-112-R1B below.</p> |

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, July 9, 2024) |
|--------------|----------------|---|--------------------------|---|--|--|----------------------------|---|
| | | <p>This includes site non-contact water which has the potential to contain deleterious substances such as those released from vehicles, machinery, aircrafts, spills, and de-icing practices. The Proponent has not included how non-contact water runoff from site infrastructure will be captured within site water management planning. To understand the potential effects of contaminants from non-contact water on the surrounding environment, site water management planning needs to be updated to include the capture of non-contact water.</p> | | | | <p>page 6/419), should a spill occur, the spill response plan will be followed. The details of Denison's response plans will be developed to support licensing as part of the Waste Management and Emergency Management and Fire Protection programs. Importantly, hydrocarbons are not mine waste-related deleterious substances perm MDMER definition. Collecting and treating non-contact runoff throughout the life of the Project would mean Denison collects an extremely large volume of clean water to protect against infrequent hydrocarbon spills which will be cleaned up in the appropriately scaled process (spill response), in terms of cost and risk to the environment. No other roads or airstrips in the region (including those associated with uranium mine and mill operations) requires the collection and treatment of runoff water from infrastructure such as roads and airstrips. It is not practical to do so and based on risk, the collection of non-contact water is not required.</p> <p>The road or trail to the airstrip is currently an unmaintained road: the decommissioned Fox Lake Road. For road upgrades and airstrip construction, Denison will be using material from the borrow area. Borrow pit area selection was based on geotechnical program completed in 2021 which did not identify any potential for ARD/ML. Further works are ongoing part of engineering activities and with confirmation of characterization through assays of representative samples. As such, the material used to upgrade roads and construct the airstrip will not be a source of metals or ARD.</p> <p>Denison will implement erosion control measures at infrastructure locations within 50 to 100 m of a waterbody (refer to response to IR-12 above and to Attachment IR-12, Figure IR-12-5: Distance from Project Footprint to Waterbodies) where required (i.e., at locations where there is no vegetated buffer adjacent to the waterbodies).</p> <p>In consideration of the above, Denison maintains that the runoff at the airstrip and roads are non-contact water. The water management mandate for the Wheeler River Project is to keep clean water clean and minimize the total volume of water requiring management, treatment, and discharge. In the draft and revised draft EIS, Denison has evaluated potential Project effects on surface drainage in Section 8.1, as part of the Project-surface water quantity interaction of Project overprinting of drainage areas. As noted in the draft EIS, Section 8.4.1.4.2.1, this assessment was appropriately focused on areas of active water collection. It was noted that the road and airstrip were not considered to affect hydrology materially. Both may potentially redirect some flow and have a small influence on the timing of concentration of runoff and infiltration rates; however, in general, they are anticipated to have a very small influence and are not expected to change runoff volumes at assessment nodes.</p> | | |
| | IR-12-R1B | <p>Context: The Proponent has clarified that there is no infrastructure in place for management of non-contact water from site infrastructure that may contain COPCs, including but not limited to roads, the airstrip, and the campground.</p> <p>Rationale: To understand the potential effects of contaminants from non-contact water on the surrounding environment, site water management planning needs to be updated to include the type of infrastructure and its location for the capture of non-contact water</p> | n/a | n/a | Provide a map marking the locations of proposed surface drainage structures for runoff collection including collection ditches, culverts, diversion ditches, perimeter berms, collection ponds and other similar structures. | <p>It is Denison's opinion that this comment is not an IR related to the EIS. A request for clarification or additional information on a detailed design aspect would need to be responded to by Denison as part of the permitting and licensing process; however, this level of detail is not necessary for drawing conclusions on the EA process. In the draft and revised draft EIS, Denison has evaluated potential Project effects on surface drainage in Section 8.1, as part of the Project-surface water quantity interaction of Project overprinting of drainage areas. As noted in the draft EIS, Section 8.4.1.4.2.1, this assessment was appropriately focused on areas of active water collection. It was noted that the road and airstrip were not considered to affect hydrology materially. Both may potentially redirect some flow and have a small influence on the timing of concentration of runoff and infiltration rates; however, in general, they are anticipated to have a very small influence and are not expected to change runoff volumes at assessment nodes.</p> <p>Notwithstanding the above, Denson has provided the reviewer with additional, conceptual site drainage maps in Attachment IR-12, Figures IR-12-1, IR-12-2, IR-12-3, and IR-12-4; these are supplemental to the site drainage map provided in the draft EIS Figure 2.2-17.</p> | n/a (accepted) | Refer to Attachment IR-12, IR-12-R1A, and IR-112-R1B below. |

ATTACHMENT IR-12 (included in Round 2 submission)

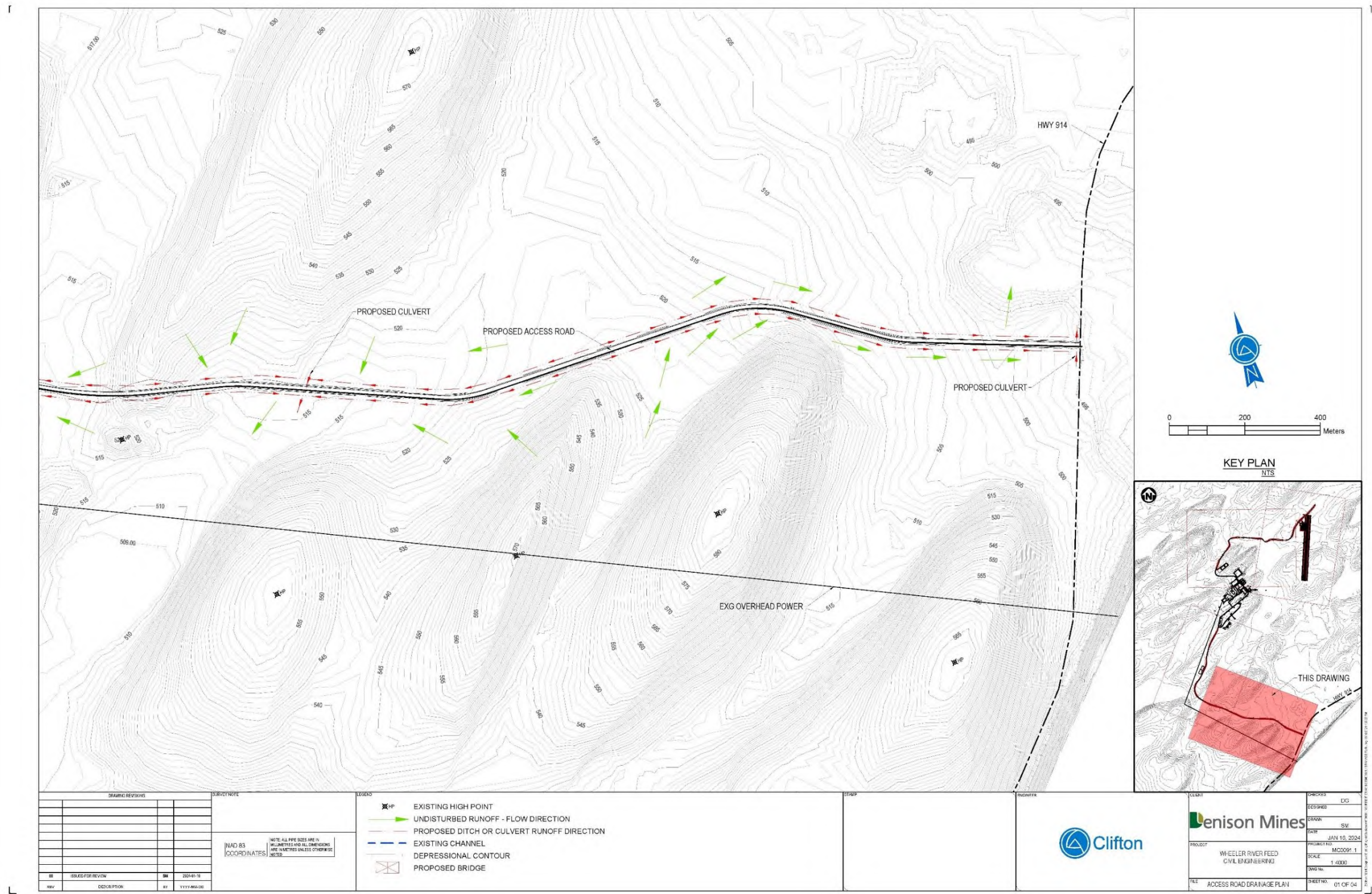


Figure IR-12- 1: Conceptual Site Drainage – Access Road (segment 1 of 2)

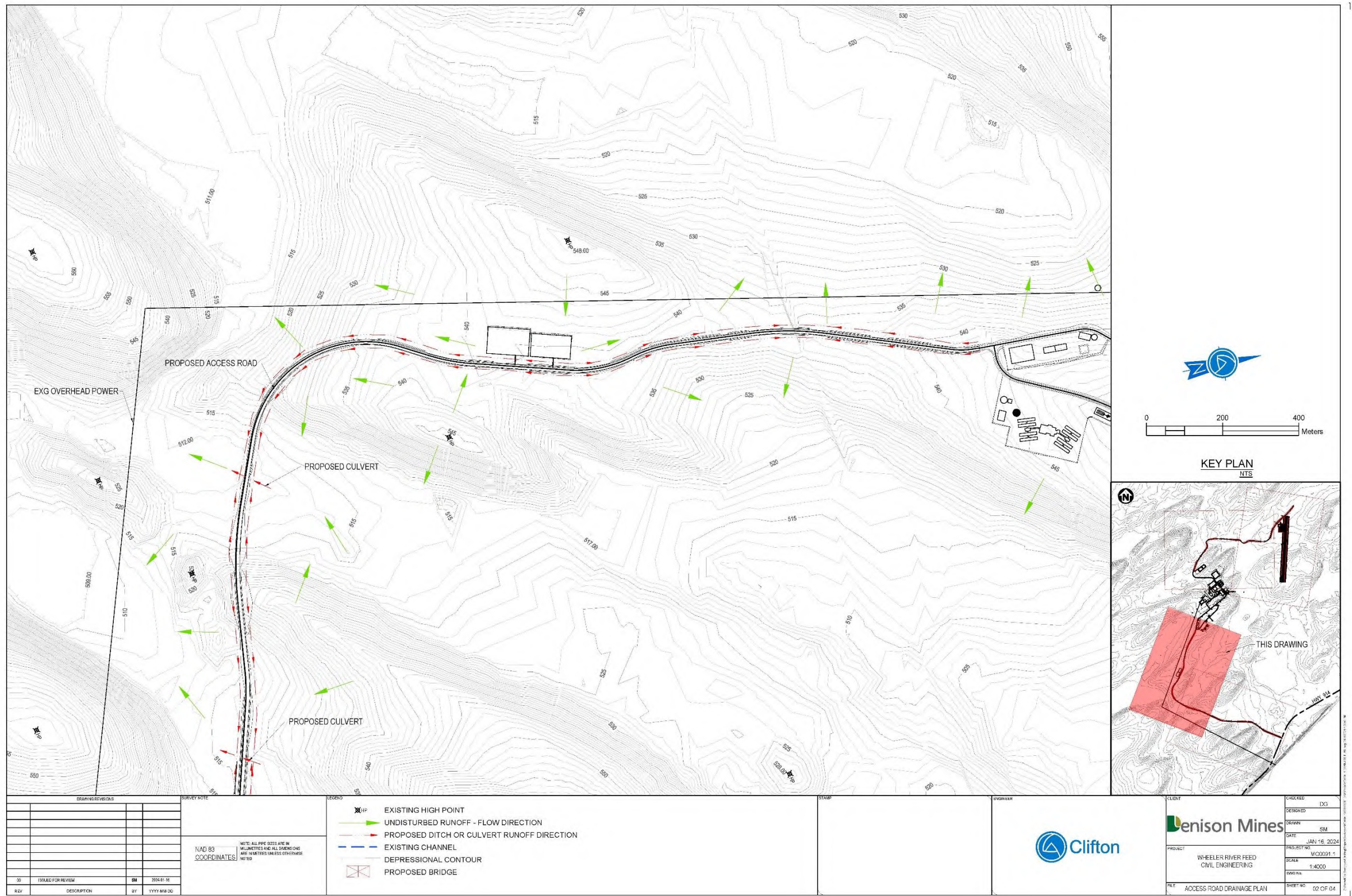


Figure IR-12- 2: Conceptual Site Drainage – Access Road (segment 2 of 2)

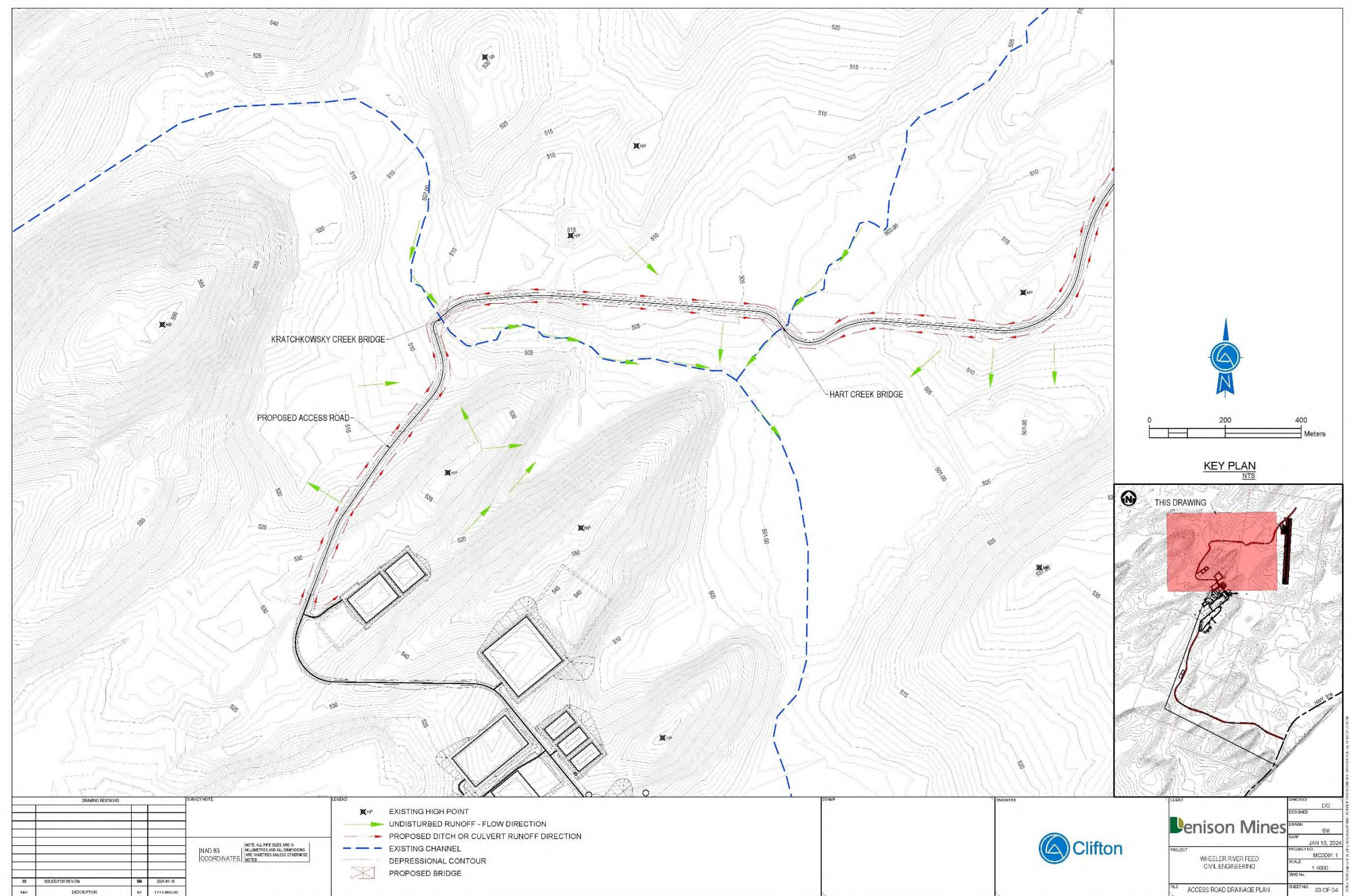


Figure IR-12- 3: Conceptual Site Drainage – Road to Airstrip

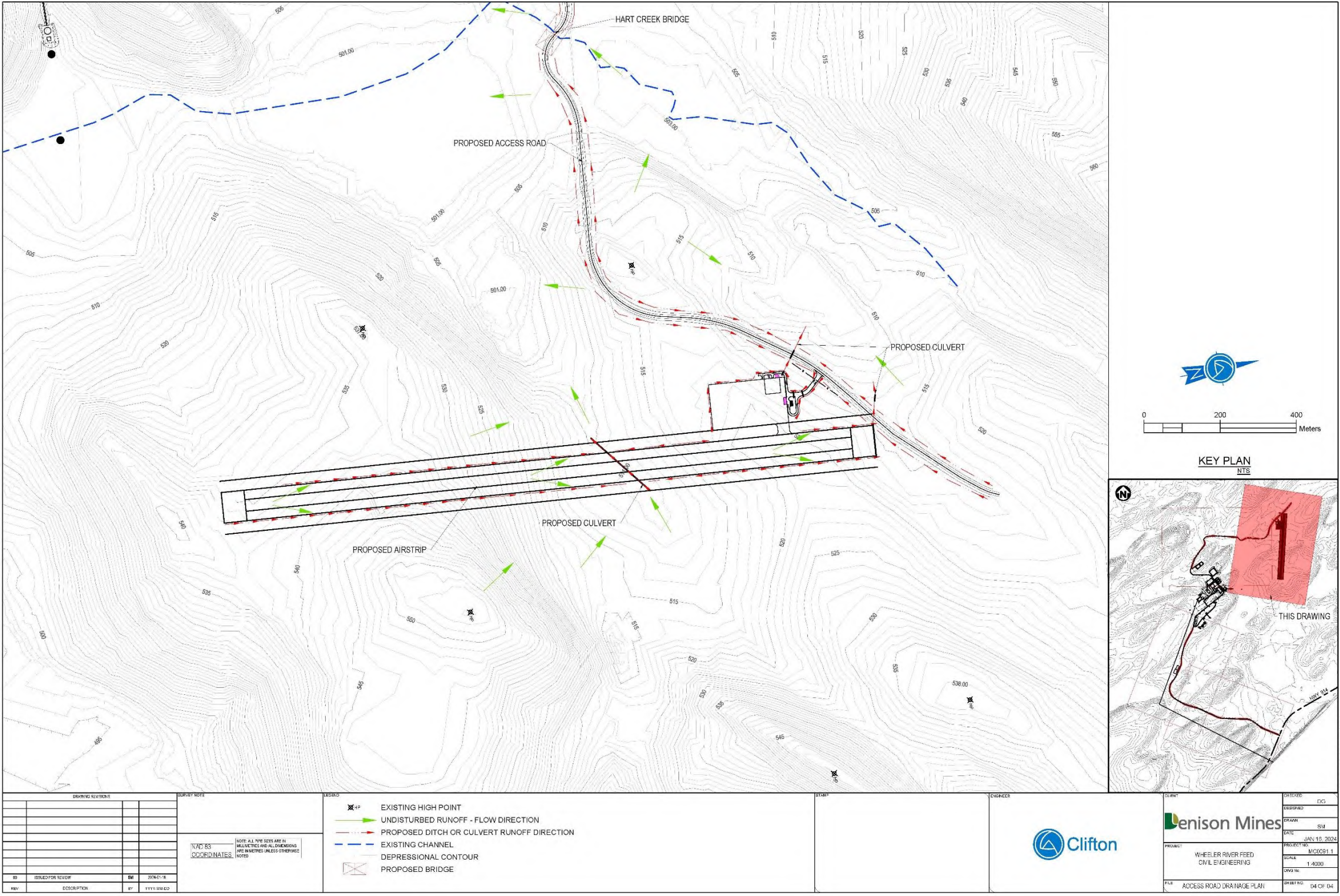


Figure IR-12- 4: Conceptual Site Drainage – Near Airstrip

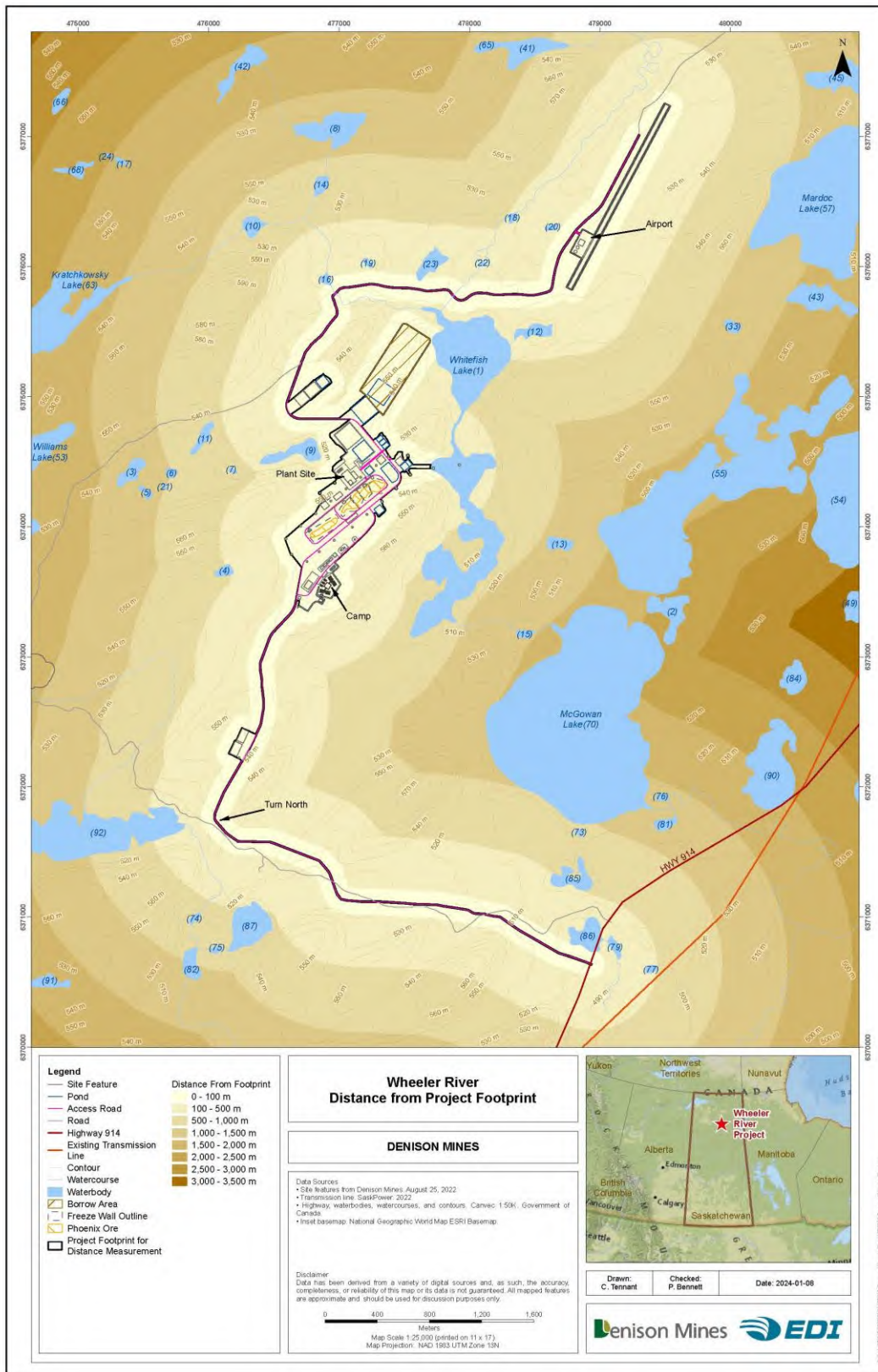


Figure IR-12-5: Distance from Project Footprint to Waterbodies



Figure 2.2-17: Site Drainage Plan with Flow Direction and Culvert Locations

For reference: Figure 2.2-17 from revised draft EIS

Attachment IR-12, IR-12-R1A, IR-12-R1B (Round 3)

In response to IR-12 and related IRs 12-R1A and 12-R1B Denison offers the following that has been divided into two parts.

In **Part 1**, an updated site water management plan is presented commensurate with the stage of the EA process for Wheeler River Project (or Project). That is, the site water management plan is largely conceptual at this time; however, Denison is able to provide additional information that builds on information presented previously in the EIS and supporting documentation including Round 1 and Round 2 IR responses as the Project-related engineering design process is advancing in parallel with the EA.

In **Part 2**, Denison has prepared specific responses to specific questions raised in IRs 12, 12-R1A and 12-R1B that are not necessary fully described by Part 1 of the response.

Part 1 – Wheeler River Project Site Water Management Plan

Introduction

The following conceptual Site Water Management Plan (SWMP, or Plan) has been prepared in response to the third round (May 2024) of Federal Indigenous Review Team (FIRT) information requirements (IRs) regarding the Wheeler River Project (Project) Environmental Impact Statement (EIS) submission. The information offered herein builds on information provided previously by Denison Mines (Denison) in the EIS, its supporting documents, and responses to Round 1 (March 2023) and Round 2 (November 2023) FIRT IRs.

As noted, the Plan builds on information provided previously by Denison; but further seeks to consolidate this information into once place for ease of reference, as well as provide additional water management related detail that has been developed as Project-related engineering design has been advancing in parallel with the environmental assessment process. The Plan describes the SWMP design concept, its design basis, the delineation of so-called “contact” versus “non-contact” water management areas on the Project site, water management structures / infrastructure, the quantities of water that would be expected to be managed within the water management areas under normal and event-related conditions and monitoring.

The SWMP is provided with a conceptual level of detail and information commensurate with the stage of development of the Project and advancement of engineering design. Further detail and documentation, including engineering design to support construction, regarding site water management will be developed as the Project moves from the environmental assessment (EA) process into permitting and licensing, initially for site preparation and construction, subsequently for operations and ultimately for decommissioning.

Design Concept

The Project’s design concept related to site water management is to keep clean water clean and minimize the total volume of water requiring more active management, treatment, and discharge. Denison will achieve this by 1) diverting clean, non-contact runoff around Project components and 2) collecting contact water for treatment in the Industrial Wastewater treatment Plant (IWWTP),

and eventual release to Whitefish Lake. In general terms and within the context of this Plan, the following definitions are provided for contact and non-contact waters:

- Contact water is potentially contaminated as the result of interaction with Project process/structures/infrastructure and therefore requires management through site water infrastructure and conveyance to the IWWTP prior to controlled release to the environment.
- Non-contact water is suitable for direct release to the environment with appropriate, conventional best management practices and mitigation measures.

The rationale for the distinction of the two water types and management strategies is primarily associated with the desire to affect local hydrology as little as possible by only diverting runoff from natural catchments and sub-catchments where it is deemed necessary to protect water quality. Conceptually, minimizing changes in surface drainage patterns and watersheds is an important mitigation measure in the surface water quantity assessment. Collecting and managing non-contact water would result in a larger potential Project effect on surface water quantity associated with changes in surface drainage patterns and is not preferred.

Design Basis

For the purpose of contact and non-contact water management, the following design bases have been assumed.

For the contact water portion of the system, all water management structures/infrastructure would be designed to contain an event equivalent to 493 mm of precipitation over a 24-hour period (herein referred to as the 24-hour probable maximum precipitation (PMP) event). By definition, events exceeding this magnitude would be conveyed to the environment through purposely built emergency spillways so that the structural integrity of the structures/infrastructure would be maintained and not result in further event related consequences. For context, this volume of water is greater than the average annual precipitation recorded at nearby Key Lake (refer to Appendix D to Appendix 6-C) for the period 2011 through 2020 that was 456 mm.

For the non-contact water portion of the system, all water management structures/infrastructure would be designed to withstand an event equivalent to 89 mm of precipitation over a 24-hour period (herein referred to as the 24-hour intensity-duration frequency (IDF) event). This event is the 1 in 100 year return event and was calculated utilizing the publicly available web-based intensity-duration-frequency tool that is pre-loaded with 898 Environment and Climate Change Canada rain stations. This number was derived based on the projection of conditions for the period 2020 - 2050 for the Wheeler River Project site coordinates and therefore considers the time period that overlaps with the time period when water is likely to be actively managed on the site (i.e., construction, operation, initial phase of decommissioning).

Delineation of Catchments Areas

For the purpose of defining water management areas / nodes within and adjacent to the Project site, a series of maps delineating catchments areas based on local topography and drainage patterns have been developed. The delineation of key catchments at the Project site is shown in Figures 1 to 5 below.

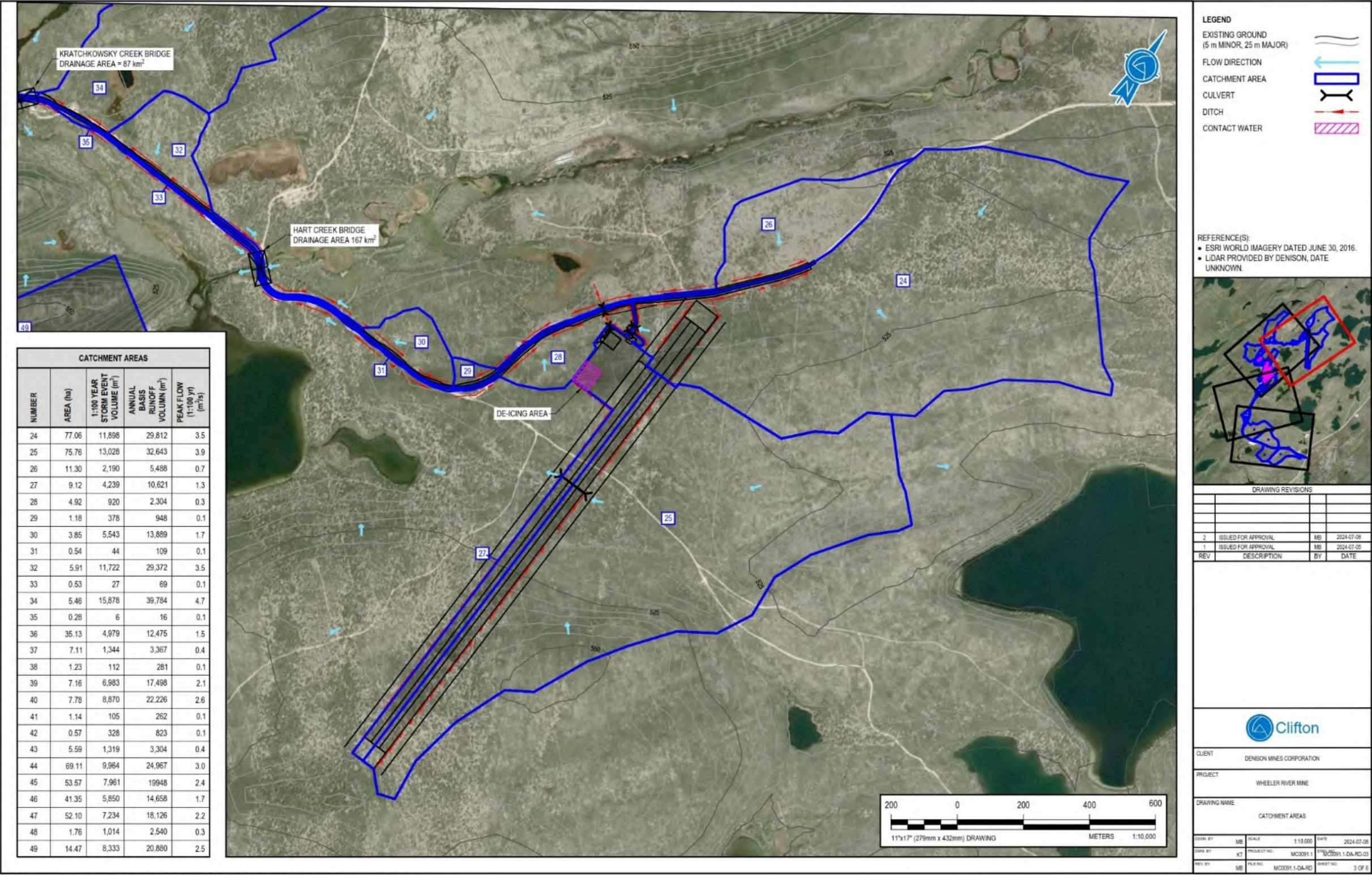


Figure 1: Site water management catchment areas – layout 1 of 5: Airstrip and portion of airstrip access road

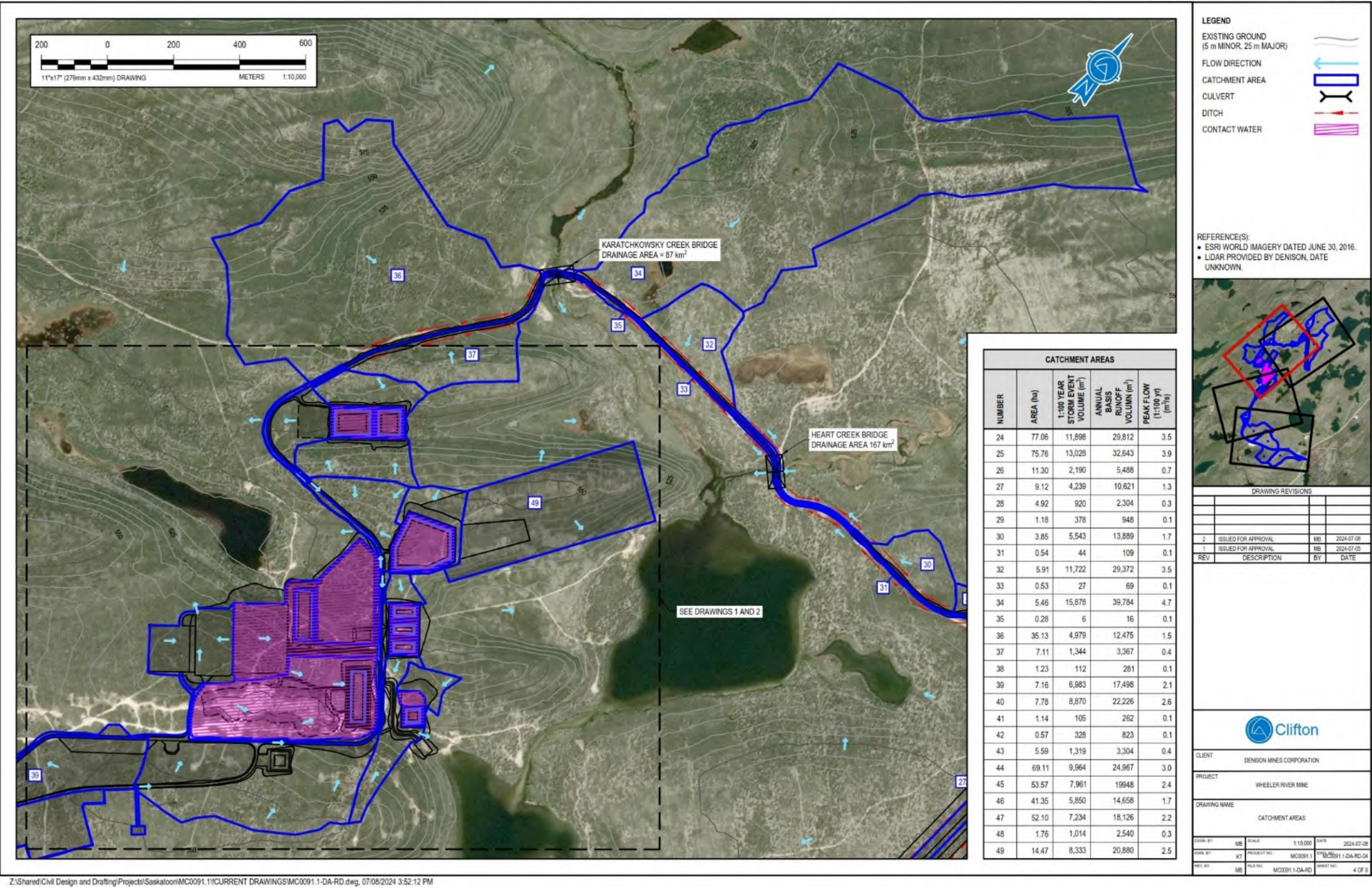
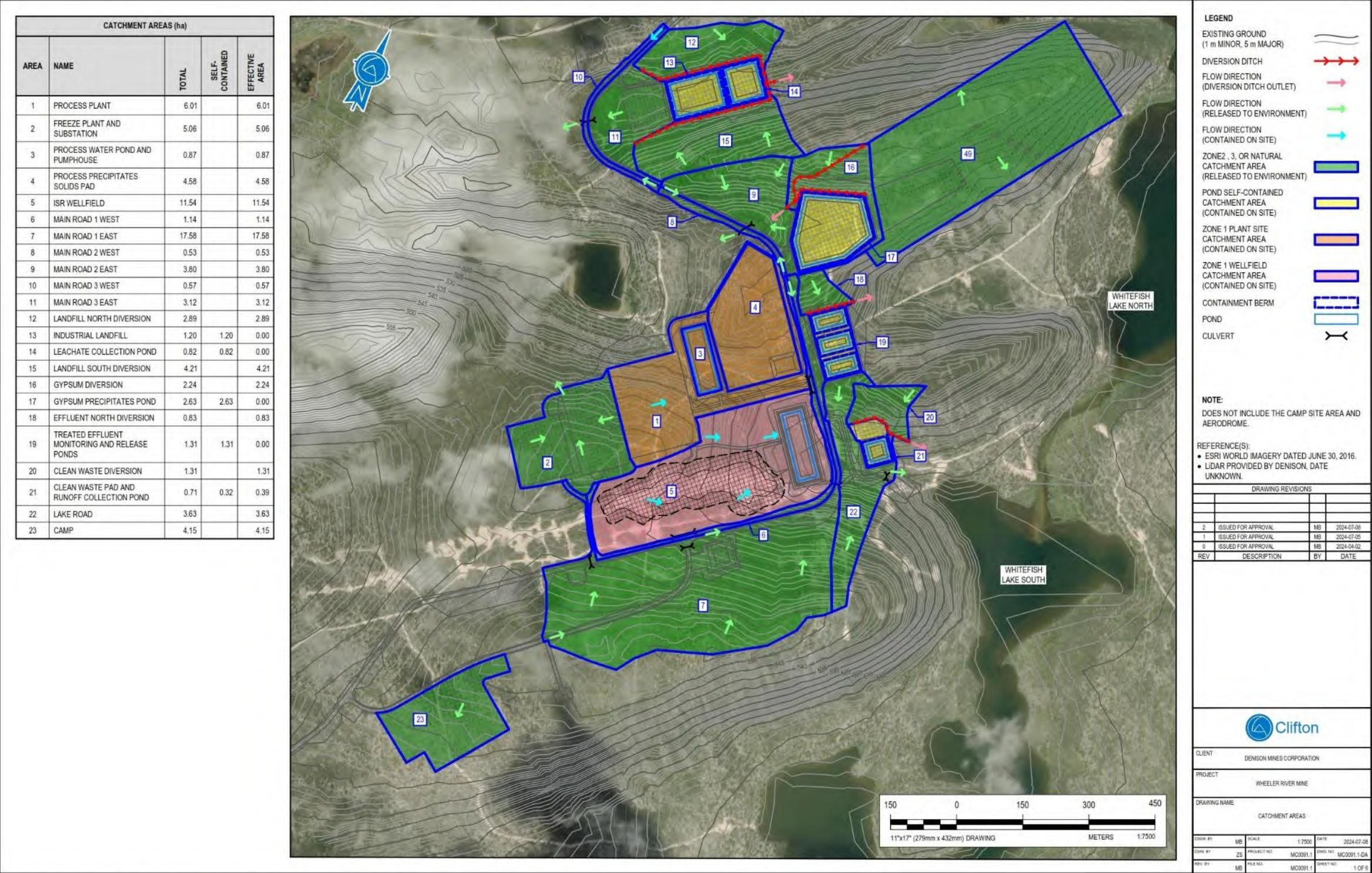


Figure 2: Site water management catchment areas – layout 2 of 5: Airstrip access road



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Figure 3: Site water management catchment areas – layout 3 of 5: main Project area

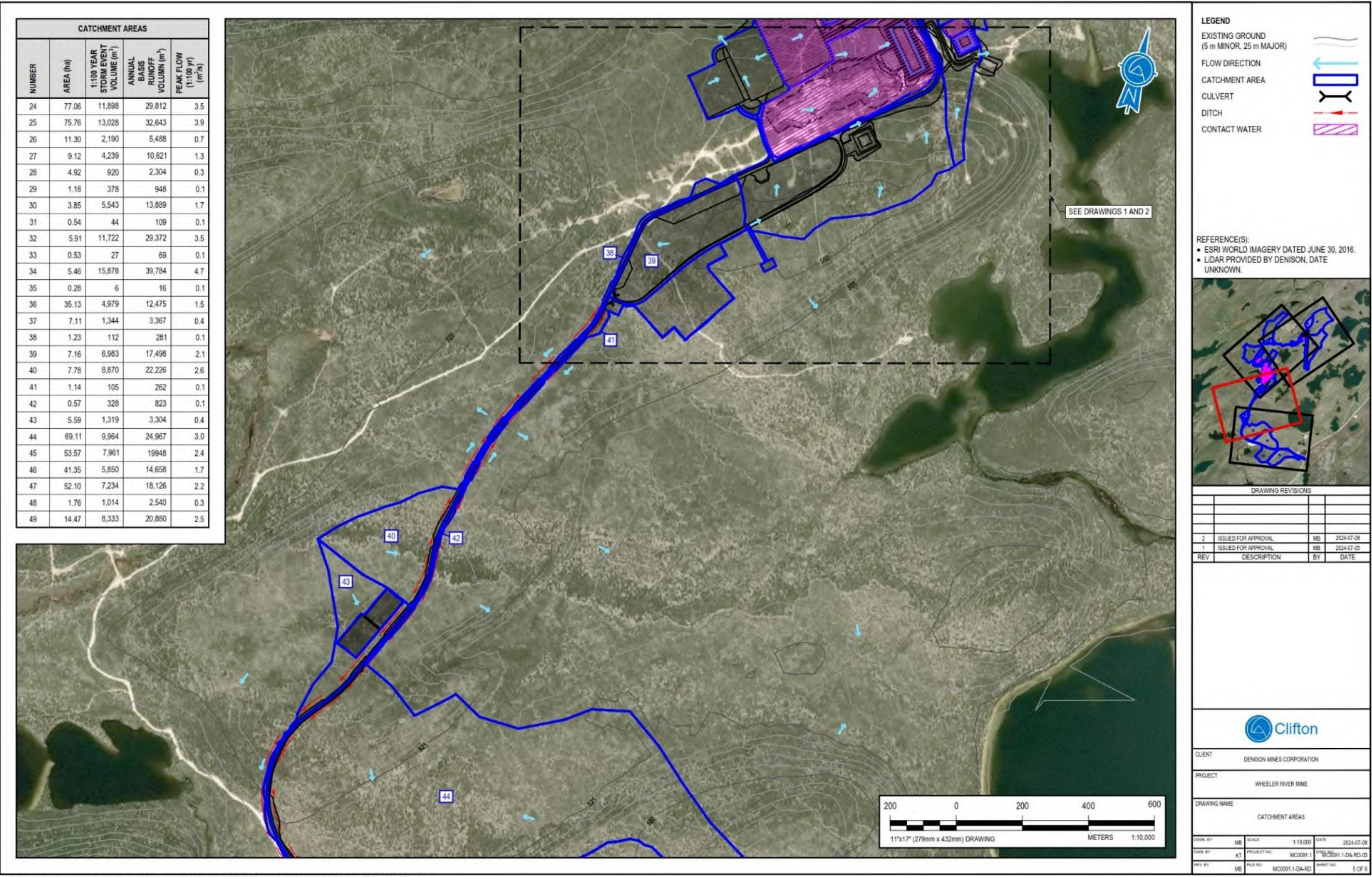


Figure 4: Site water management catchment areas – layout 4 of 5: Access road south of main Project area

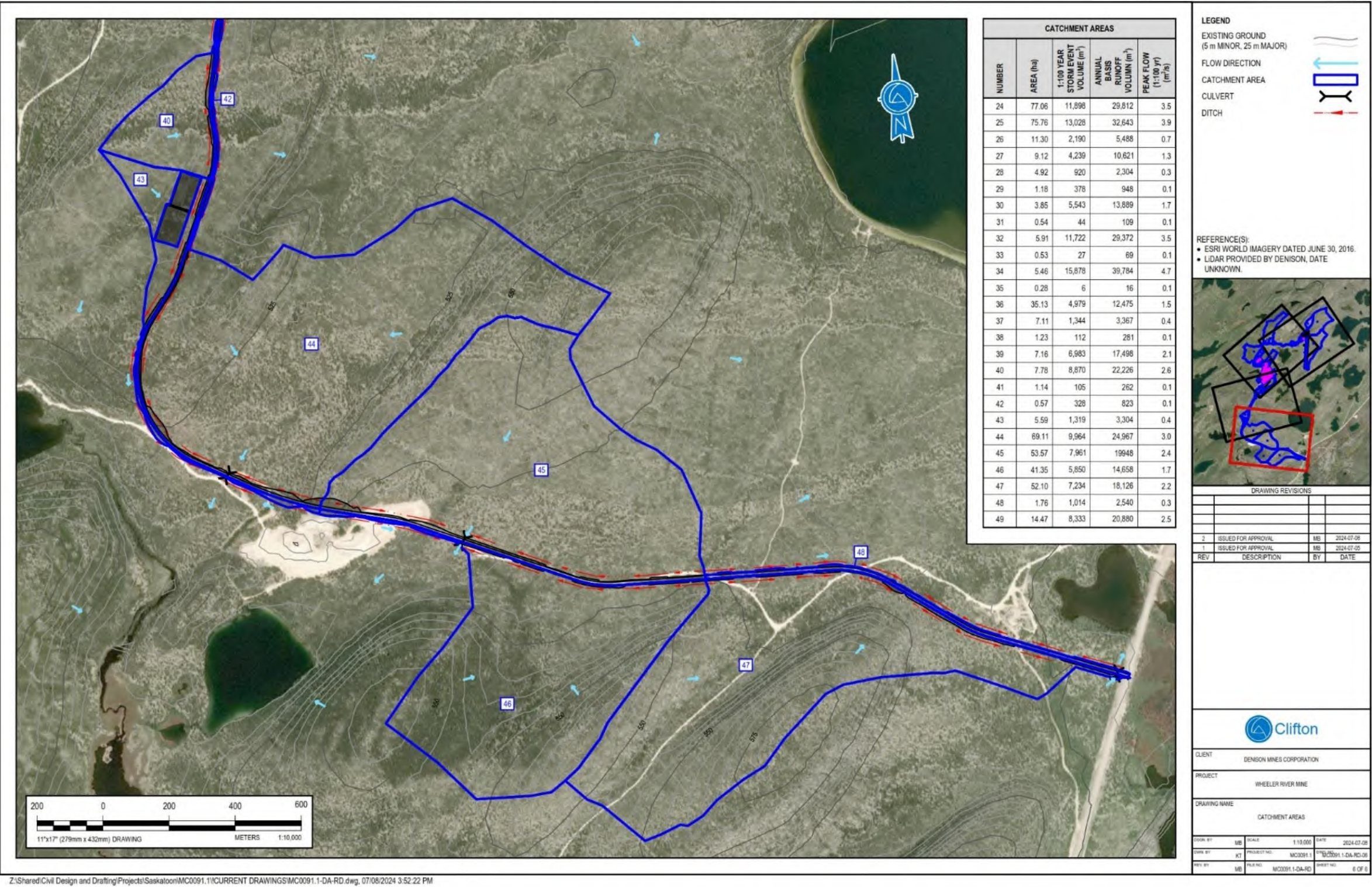


Figure 5: Site water management catchment areas – layout 5 of 5: Access road connection to Highway 914

Screening of Constituents of Potential Concern (COPCs) and Non-contact Water Source Areas

The screening of constituents of potential concern (COPCs) in non-contact water is provided in Table 1 and is organized in terms of catchment characteristics / land use and Project components within or adjacent to the catchments. A screening was not completed here for contact water, as Denison has previously outlined the need to collect and treat this water (refer to Section 2.3.3 of the EIS).

A description of the Project's landscape, key Project components and activities, and management system plans are included here to facilitate the screening exercise.

Setting

The Project is located within the Wheeler Upland Landscape Area of the Athabasca Plain Ecoregion within the Boreal Shield Ecozone of Saskatchewan. The area is characterized by Brunisolic soils which are typically sandy, well-drained soil. Standing water is not a common occurrence.

Ground surface topography regionally has been shaped by glacial and fluvial processes active for over tens of thousands of years. The terrain is characterized by northeast to southwest trending drumlins and eskers, with small variations in elevation (ranging 480 to 590 m above sea level) resulting in a gently sloping terrain. Most of the Project Area consists of upland forest ecosite. Refer to Figure 1-6 in the EIS for a summary of landscape features and current site conditions.

Airstrip

The airstrip will be constructed and maintained using locally-sourced granular material. Denison will be using material from the borrow area (overburden material). Borrow pit area selection was based on geotechnical program completed in 2021 which did not identify any potential for ARD/ML. Further works are ongoing part of engineering activities and with confirmation of characterization through assays of representative samples. As such, the material used to construct and maintain the airstrip will not be a source of metals or ARD.

Design for airstrip will in general be such that runoff will be encouraged through appropriate grading to drain away and not pond on or near the airstrip. The condition of the airstrip will be inspected and maintained routinely. For example, should unexpected water pooling be observed at the airstrip during Operation, temporary water removal means such as vac trucks or sump pumps could be employed, and the areas would be re-graded to minimize water accumulation.

All fueling and de-icing activities will occur in specifically designed areas to collect any hydrocarbons and de-icing fluids. Collected waters will be characterized and brought to the Project site for treatment, shipped offsite to an approved facility or released to environment if water quality allows.

Roads

Mainland access to the site will be from Highway 914. A 7-km section of road will be constructed from the highway to the Project site and a 5-km long road will also be constructed from the Project site to the airstrip; the total road length is 12 km. The road or trail to the airstrip is currently an

unmaintained road: the decommissioned Fox Lake Road. Additional site roads will include, for instance, a service loop to the camp.

Roads will be constructed of locally-source granular subbase and base. For road upgrades and maintenance, Denison will be using material from the borrow area (overburden material). Borrow pit area selection was based on geotechnical program completed in 2021 which did not identify any potential for ARD/ML. Further works are ongoing part of engineering activities and with confirmation of characterization through assays of representative samples. As such, the material used to construct, upgrade, and maintain roads will not be a source of metals or ARD. Design for roads will in general be such that runoff will be encouraged through appropriate grading to drain away and not pond on or near the road. The condition of site roads will be inspected and maintained routinely. For example, should unexpected water pooling be observed during Operation, temporary water removal means such as vac trucks or sump pumps could be employed, and the areas would be re-graded to minimize water accumulation.

In terms of material being transported on the site roads, the final product (yellowcake) will be transported in sealed drums from the processing plant south to the public highway network. With the selection of the in-situ recovery method the Project does not involve transporting large volumes of mine waste rock around the site.

Stream Crossings

Two water crossings (Kratchkowsky Creek and Hart Creek) will be installed along the road from the Project site to the airstrip. Both stream crossings occur along the section of the road which is an existing, unmaintained road (the decommissioning Fox Lake Road). The crossings will be designed, constructed, and maintained to avoid causing harm to fish and fish habitat and will be clear span bridges. Clear span bridges are designed to completely span a watercourse without interfering with the channel bed and banks.

Miscellaneous Project Components

In the SWMP, specific consideration is given to other areas of the Project including the diversion ditches at the main Project area, borrow area, camp, freeze plant and substation based on the delineation of catchments / land uses. Infrastructure in these areas will be constructed using locally-source material from the borrow area and are subject to Project-wide management system and best management practices. Any specifics of relevance to water quality are provided in Table 1.

Management System

We note that accident and malfunctions screening and assessment was completed in Section 14 of the EIS. The SWMP and screening of COPCs contained herein focuses on more routine events within the Project design basis, for example discrete leaks or spills of hydrocarbons from equipment. Events outside of the design basis were appropriately considered in Section 14 of the EIS. For instance, through the hazard identification process (see Appendix 14-A Section 3.0 and Appendix A), the release of fuel (diesel) was carried forward for more detailed analysis.

While details of Denison's management system programs and plans will be developed to support licensing, for context on the SWMP a description of key topics is provided here.

Erosion and Sediment Control (ESC):

Soil erosion is a natural process, but erosion is increased when land is disturbed. Erosion can result in sedimentation. The main concern is erosion caused by precipitation and run off. Erosion control is any measure undertaken to reduce the potential for erosion to occur (SK MHI 2012). Sediment control is any measure implemented to reduce the potential for sediment to be transported and/or deposited beyond the limits of the site (SK MHI 2012). Erosion control will be viewed as a first defense when protecting downstream aquatic habitats, while sediment control will be implemented as a contingency plan. Denison will focus on preventing soil erosion in order to reduce sedimentation and potential effects to the aquatic environment. In selecting the appropriate ESC treatment for areas of the Project, Denison will consider both temporary and permanent measures. Selection of ESC measures are dependent on site slopes, drainage patterns, existing vegetation and other site-specific conditions. Erosion control measures may include preventing or minimizing ground disturbance when working near water, maintaining/retaining as much vegetation as possible, erosion control blankets, and rip rap. Sediment control measures may include wattles and silt fencing.

Spill Response Plan:

Should unplanned events or conditions occur, it will be important for Denison to address and respond in an appropriate manner. Denison will identify and reduce the potential for accidents and emergency situations, and implement emergency response plans that will protect the health and safety of its workers, contractors, the public and the environment. Spill response plans would include procedures for worker and environment protection, details about personnel protection equipment, and procedures to evaluate exposures during a spill.

Radiation Protection Program:

The Radiation Protection Program has been designed, and will be implemented, such that Denison complies with, or exceeds, the level of radiation safety that is required by the applicable regulations and Denison's Environment, Health, Safety and Sustainability Policy. Areas within the Operation are designated according to potential radiological hazards and contamination control requirements. The movement and accumulation of all forms of radioactive contamination will be monitored via dosimetry and area monitoring. Contamination control measures will be in place to minimize the spread of radioactive materials into unintended locations.

Waste Management Program:

The Waste Management Program provides the framework that confirms Denison's licensed activities involving the processing, storage, and disposal of wastes are performed in a manner that complies with applicable regulatory and licence requirements and protects workers, the public, and the environment. The Waste Management Program includes identification of waste inventory and the characteristics of the waste (radiological and hazardous non-radiological). The program also includes waste segregation, waste packaging, and transfer requirements,

and the plan for storage or disposal of wastes. The Waste Management Program outlines the principles of reduction/reuse/recycle/and recovery (4 Rs) applied at the Project.

Personnel and Contractor Training and Performance Management Program:

A Personnel and Contractor Training and Performance Management Program would be developed to ensure all Project related personnel are fully equipped to effectively implement their work functions, in particular consideration of how job function may affect the environment, including worker and public health, within the context of the Environment Management System (EMS). Measurement of performance provides the means to Denison to foster a culture of continuous improvement.

Table 1: Screening of Constituents of Potential Concern (COPCs) in Water Catchments

| Catchment Description | Catchment IDs | Constituent Group | Risk to Aquatic Environment | Management / Mitigation | Summary |
|-----------------------|----------------|-------------------------|---|---|---|
| Airstrip | 24, 25, 27, 28 | Metals (metal leaching) | Metal leaching can occur when certain minerals in rocks containing metals are exposed to air and water. If the material used to construct, and maintain the airstrip contains metals, then there is the potential for metals to leach into runoff, and report to the surrounding environment, where there is the potential for negative effects on the aquatic environment. | <ul style="list-style-type: none">The borrow pit area selected for construction and maintenance of various Project components was based on geotechnical program completed in 2021 which did not identify any potential for ARD/ML. Further works are ongoing part of engineering activities and with confirmation of characterization through assays of representative samples. | At the airstrip, the infrastructure design in combination with management plans (e.g., geochemical characterization of borrow material, spill response plans, ESC) and best management practices result in a determination that runoff in this area is classified as non-contact water . |
| | | Acid Rock Drainage | Acid rock drainage (ARD) is a process where sulfide minerals in rocks react with air and water to produce sulfuric acid, which then leaches metals from the rocks. If the material used to construct and maintain the airstrip results in ARD, the quality of runoff will be impacted and there is the potential for negative effects on the aquatic environment. | <ul style="list-style-type: none">The borrow pit area selected for construction and maintenance of various Project components was based on geotechnical program completed in 2021 which did not identify any potential for ARD/ML. Further works are ongoing part of engineering activities and with confirmation of characterization through assays of representative samples. | |
| | | Nutrients | None expected | n/a | |
| | | Hydrocarbons | A release of hydrocarbons such as diesel, gasoline, or jet fuel to the environment poses a threat to aquatic organisms. | <ul style="list-style-type: none">All fueling and de-icing activities will occur in specifically designed areas to collect any hydrocarbons and de-icing fluids.<ul style="list-style-type: none">Collected waters will be characterized and brought to the project site for treatment, shipped offsite to an approved facility or released to environment if water quality allows.Personnel training.Spill Response Plan will be in place throughout the life of the Project.Appropriate spill response kits will be positioned adjacent to areas where hazardous materials such as hydrocarbons are stored in accordance with the Spill Response Plan.Fuel storage and distribution infrastructure will be constructed in accordance with applicable legislation requirements.Fuels will be stored in approved, above-ground, double-walled storage tank(s) equipped with secondary containment in accordance with provincial regulations and standards. | |
| | | Suspended solids | Erosion and the resulting sedimentation can have a number of impacts on the aquatic environment (WSA 2024): sediments can cover the small spaces between productive rock or gravel habitats; increased levels of sediment in the water can displace aquatic organisms from prime habitat into less suitable areas; cloudy or turbid waters affect visual predators' ability to forage; high levels of suspended sediment in the water can affect fish and other aquatic organisms' ability to breath; and turbid water absorbs more sunlight energy increasing the water temperature, which in turn, does not allow the water to hold as much oxygen. | <ul style="list-style-type: none">Restrict all construction activities to the approved construction footprint.Leave vegetated buffer zones around watercourses and other sensitive features when developing/operating supporting infrastructure.Implement best management practices associated with erosion and sediment control (ESC). | |
| | | Other Chemicals | A release of glycol and other de-icing fluids to the environment poses a threat to aquatic organisms. | <ul style="list-style-type: none">All fueling and de-icing activities will occur in specifically designed areas to collect any hydrocarbons and de-icing fluids.<ul style="list-style-type: none">Collected waters will be characterized and brought to the project site for treatment, shipped offsite to an approved facility or released to environment if water quality allows.Personnel trainingSpill and Emergency Response Plan will be in place throughout the life of the Project | |

| Catchment Description | Catchment IDs | Constituent Group | Risk to Aquatic Environment | Management / Mitigation | Summary |
|-----------------------|--|-------------------------|--|--|--|
| Roads | 26, 29, 30, 31, 32, 33, 34, 35, 36, 37, 11, 10, 9, 8, 7, 6, 22, 38, 41, 42, 40, 43, 44, 45, 46, 47, 48 | Metals (metal leaching) | Metal leaching can occur when certain minerals in rocks containing metals are exposed to air and water. If the material used to upgrade, construct, and maintain roads contains metals, then there is the potential for metals to leach into runoff, and report to the surrounding environment, where there is the potential for negative effects on the aquatic environment. | <ul style="list-style-type: none"> The borrow pit area selected for construction and maintenance of various Project components was based on geotechnical program completed in 2021 which did not identify any potential for ARD/ML. Further works are ongoing part of engineering activities and with confirmation of characterization through assays of representative samples. | On and adjacent to the Project's roads, ESC will be the focus. Best management practices are important for ESC throughout the life of the Project, and of particular importance during construction. Routine inspections and monitoring will be completed to document the effectiveness of the erosion and sediment control measures, and any required maintenance or replacement of ESC structures would be completed as required. Through the implementation of road design and best management practices, the runoff in these areas is classified as non-contact water . |
| | | Acid Rock Drainage | Acid rock drainage (ARD) is a process where sulfide minerals in rocks react with air and water to produce sulfuric acid, which then leaches metals from the rocks. If the material used to upgrade, construct, and maintain roads results in ARD, the quality of runoff will be impacted and there is the potential for negative effects on the aquatic environment. | <ul style="list-style-type: none"> The borrow pit area selected for construction and maintenance of various Project components was based on geotechnical program completed in 2021 which did not identify any potential for ARD/ML. Further works are ongoing part of engineering activities and with confirmation of characterization through assays of representative samples. | |
| | | Nutrients | None expected. | n/a | |
| | | Hydrocarbons | A release of hydrocarbons such as diesel, gasoline, or jet fuel to the environment poses a threat to aquatic organisms. | <ul style="list-style-type: none"> Spill Response Plan will be in place throughout the life of the Project Appropriate spill response kits will be positioned adjacent to areas where hazardous materials such as hydrocarbons are stored in accordance with the Spill Response Plan. Traffic control measures. Travel management plan. A minimum 100 m distance from any waterbody will be maintained for fuel storage, refueling activities, or equipment servicing. Project components including equipment and machinery will be regularly maintained and inspected to make sure they are in good working order. Fuel storage and distribution infrastructure will be constructed in accordance with applicable legislation requirements. Fuels will be stored in approved, above-ground, double-walled storage tank(s) equipped with secondary containment in accordance with provincial regulations and standards. A wash bay will be available to clean items, equipment, and vehicles that may have been in contact with potential contaminants. | |
| | | Suspended solids | Erosion and the resulting sedimentation can have a number of impacts on the aquatic environment (WSA 2024): sediments can cover the small spaces between productive rock or gravel habitats; increased levels of sediment in the water can displace aquatic organisms from prime habitat into less suitable areas; cloudy or turbid waters affect visual predators' ability to forage; high levels of suspended sediment in the water can affect fish and other aquatic organisms' ability to breathe; and turbid water absorbs more sunlight energy increasing the water temperature, which in turn, does not allow the water to hold as much oxygen. | <ul style="list-style-type: none"> Restrict all construction activities to the approved construction footprint. Leave vegetated buffer zones around watercourses and other sensitive features when developing/operating supporting infrastructure. Implement best management practices associated with ESC, with a particular focus on Project components and activities located within 50 to 100 m of a waterbody where required (i.e., at locations where there is no vegetated buffer adjacent to the waterbodies). Refer to Figure 6 below. Traffic control measures. | |
| | | Other Chemicals | Radionuclides are a potential contaminant associated with the Project activities. | <ul style="list-style-type: none"> A wash bay will be available to clean items, equipment, and vehicles that may have been in contact with potential contaminants. Administrative controls will be in place to control radioactive materials and radiological clearance: All objects (equipment, vehicles, etc.) from potentially contaminated work areas that need to be transported off-site as non-radioactive materials must be thoroughly cleaned and checked for contamination prior to release. | |

| Catchment Description | Catchment IDs | Constituent Group | Risk to Aquatic Environment | Management / Mitigation | Summary |
|-----------------------|---|-------------------------|--|--|--|
| Stream crossings | Kratchkowsky Creek bridge area and Hart Creek bridge area | Metals (metal leaching) | Metal leaching can occur when certain minerals in rocks containing metals are exposed to air and water. If the material used to upgrade, construct, and maintain roads adjacent to the stream crossings contains metals, then there is the potential for metals to leach into runoff, and report to the surrounding environment, where there is the potential for negative effects on the aquatic environment. | <ul style="list-style-type: none"> The borrow pit area selected for construction and maintenance of various Project components was based on geotechnical program completed in 2021 which did not identify any potential for ARD/ML. Further works are ongoing part of engineering activities and with confirmation of characterization through assays of representative samples. | The stream crossings are clear span bridges. At the stream crossing location, the infrastructure design in combination with management plans associated with the adjacent roads (e.g., geochemical characterization of borrow material, spill response plans, ESC) and best management practices result in a determination that runoff in these areas is classified as non-contact water . |
| | | Acid Rock Drainage | Acid rock drainage is a process where sulfide minerals in rocks react with air and water to produce sulfuric acid, which then leaches metals from the rocks. If the material used to upgrade, construct, and maintain roads adjacent to the stream crossings results in ARD, the quality of runoff will be impacted and there is the potential for negative effects on the aquatic environment. | <ul style="list-style-type: none"> The borrow pit area selected for construction and maintenance of various Project components was based on geotechnical program completed in 2021 which did not identify any potential for ARD/ML. Further works are ongoing part of engineering activities and with confirmation of characterization through assays of representative samples. | |
| | | Nutrients | None expected. | n/a | |
| | | Hydrocarbons | A release of hydrocarbons such as diesel, gasoline, or jet fuel to the environment poses a threat to aquatic organisms. | <ul style="list-style-type: none"> Spill Response Plan will be in place throughout the life of the Project Appropriate spill response kits will be positioned adjacent to areas where hazardous materials such as hydrocarbons are stored in accordance with the Spill Response Plan. A minimum 100 m distance from any waterbody will be maintained for fuel storage, refueling activities, or equipment servicing. Project components including equipment and machinery will be regularly maintained and inspected to make sure they are in good working order. A wash bay will be available to clean items, equipment, and vehicles that may have been in contact with potential contaminants. | |
| | | Suspended solids | Erosion and the resulting sedimentation can have a number of impacts on the aquatic environment (WSA 2024): sediments can cover the small spaces between productive rock or gravel habitats; increased levels of sediment in the water can displace aquatic organisms from prime habitat into less suitable areas; cloudy or turbid waters affect visual predators' ability to forage; high levels of suspended sediment in the water can affect fish and other aquatic organisms' ability to breathe; and turbid water absorbs more sunlight energy increasing the water temperature, which in turn, does not allow the water to hold as much oxygen. | <ul style="list-style-type: none"> Restrict all construction activities to the approved construction footprint. Leave vegetated buffer zones around watercourses and other sensitive features when developing/operating supporting infrastructure. Implement best management practices associated with ESC, with a particular focus on Project components and activities located within 50 to 100 m of a waterbody where required (i.e., at locations where there is no vegetated buffer adjacent to the waterbodies). Refer to Figure 6 below. Traffic control measures. | |
| Borrow area | 49 | Other Chemicals | None expected | n/a | Erosion and sediment control will be important at the borrow area. Routine inspections and monitoring will be completed to document the effectiveness of the erosion and sediment control measures, and any required maintenance or replacement of ESC structures would be completed as required. Through the implementation of various best management practices, the runoff at the borrow area is classified as non-contact water . |
| | | Metals (metal leaching) | Metal leaching can occur when certain minerals in rocks containing metals are exposed to air and water. If the borrow area contains metals, then there is the potential for metals to leach into runoff, and report to the surrounding environment, where there is the potential for negative effects on the aquatic environment. | <ul style="list-style-type: none"> The borrow pit area selected for construction and maintenance of various Project components was based on geotechnical program completed in 2021 which did not identify any potential for ARD/ML. Further works are ongoing part of engineering activities and with confirmation of characterization through assays of representative samples. | |
| | | Acid Rock Drainage | Acid rock drainage is a process where sulfide minerals in rocks react with air and water to produce sulfuric acid, which then leaches metals from the rocks. If earthworks associated with the borrow area results in ARD, the quality of runoff will be impacted and there is the potential for negative effects on the aquatic environment. | <ul style="list-style-type: none"> The borrow pit area selected for construction and maintenance of various Project components was based on geotechnical program completed in 2021 which did not identify any potential for ARD/ML. Further works are ongoing part of engineering activities and with confirmation of characterization through assays of representative samples. | |
| | | Nutrients | None expected. | n/a | |

| Catchment Description | Catchment IDs | Constituent Group | Risk to Aquatic Environment | Management / Mitigation | Summary |
|--|--|-------------------------|--|--|---|
| | | Hydrocarbons | A release of hydrocarbons such as diesel, gasoline, or jet fuel to the environment poses a threat to aquatic organisms. | <ul style="list-style-type: none"> Spill Response Plan will be in place throughout the life of the Project Appropriate spill response kits will be positioned adjacent to areas where hazardous materials such as hydrocarbons are stored in accordance with the Spill Response Plan. A minimum 100 m distance from any waterbody will be maintained for fuel storage, refueling activities, or equipment servicing. Project components including equipment and machinery will be regularly maintained and inspected to make sure they are in good working order. A wash bay will be available to clean items, equipment, and vehicles that may have been in contact with potential contaminants. | |
| | | Suspended solids | Erosion and the resulting sedimentation can have a number of impacts on the aquatic environment (WSA 2024): sediments can cover the small spaces between productive rock or gravel habitats; increased levels of sediment in the water can displace aquatic organisms from prime habitat into less suitable areas; cloudy or turbid waters affect visual predators' ability to forage; high levels of suspended sediment in the water can affect fish and other aquatic organisms' ability to breathe; and turbid water absorbs more sunlight energy increasing the water temperature, which in turn, does not allow the water to hold as much oxygen. | <ul style="list-style-type: none"> Restrict all construction activities to the approved construction footprint. Leave vegetated buffer zones around watercourses and other sensitive features when developing/operating supporting infrastructure. Implement best management practices associated with ESC, with a particular focus on Project components and activities located within 50 to 100 m of a waterbody where required (i.e., at locations where there is no vegetated buffer adjacent to the waterbodies). Refer to Figure 6 below. Traffic control measures. | |
| | | Other Chemicals | None expected | n/a | |
| Diversion ditches around Project components (Figure 3) | 12 (landfill north diversion), 15 (landfill south diversion), 16 (gypsum diversion), 18 (effluent north diversion), 20 (clean waste diversion) | Metals (metal leaching) | Metal leaching can occur when certain minerals in rocks containing metals are exposed to air and water. If diversion ditches are constructed with material containing metals, then there is the potential for metals to leach into runoff, and report to the surrounding environment, where there is the potential for negative effects on the aquatic environment. | <ul style="list-style-type: none"> The borrow pit area selected for construction and maintenance of various Project components was based on geotechnical program completed in 2021 which did not identify any potential for ARD/ML. Further works are ongoing part of engineering activities and with confirmation of characterization through assays of representative samples. | At the diversions ditches, the infrastructure design in combination with management plans (e.g., geochemical characterization of borrow material, spill response plans, ESC) and best management practices result in a determination that runoff in this area is classified as non-contact water . |
| | | Acid Rock Drainage | Acid rock drainage is a process where sulfide minerals in rocks react with air and water to produce sulfuric acid, which then leaches metals from the rocks. If diversion ditches are constructed of sulfide containing material, then there may be potential for ARD to occur, the quality of runoff will be impacted, and there is the potential for negative effects on the aquatic environment. | <ul style="list-style-type: none"> The borrow pit area selected for construction and maintenance of various Project components was based on geotechnical program completed in 2021 which did not identify any potential for ARD/ML. Further works are ongoing part of engineering activities and with confirmation of characterization through assays of representative samples. | |
| | | Nutrients | None expected. | n/a | |
| | | Hydrocarbons | A release of hydrocarbons such as diesel, gasoline, or jet fuel to the environment poses a threat to aquatic organisms. | <ul style="list-style-type: none"> Spill Response Plan will be in place throughout the life of the Project Appropriate spill response kits will be positioned adjacent to areas where hazardous materials such as hydrocarbons are stored in accordance with the Spill Response Plan. A minimum 100 m distance from any waterbody will be maintained for fuel storage, refueling activities, or equipment servicing. Project components including equipment and machinery will be regularly maintained and inspected to make sure they are in good working order. A wash bay will be available to clean items, equipment, and vehicles that may have been in contact with potential contaminants. | |
| | | Suspended solids | Erosion and the resulting sedimentation can have a number of impacts on the aquatic environment (WSA 2024): sediments can cover the small spaces between productive | <ul style="list-style-type: none"> Restrict all construction activities to the approved construction footprint. | |

| Catchment Description | Catchment IDs | Constituent Group | Risk to Aquatic Environment | Management / Mitigation | Summary |
|-----------------------------|---------------|-------------------------|---|--|---|
| | | | rock or gravel habitats; increased levels of sediment in the water can displace aquatic organisms from prime habitat into less suitable areas; cloudy or turbid waters affect visual predators' ability to forage; high levels of suspended sediment in the water can affect fish and other aquatic organisms' ability to breath; and turbid water absorbs more sunlight energy increasing the water temperature, which in turn, does not allow the water to hold as much oxygen. | <ul style="list-style-type: none"> Leave vegetated buffer zones around watercourses and other sensitive features when developing/operating supporting infrastructure. Implement best management practices associated with ESC, with a particular focus on Project components and activities located within 50 to 100 m of a waterbody where required (i.e., at locations where there is no vegetated buffer adjacent to the waterbodies). Refer to Figure 6 below. Traffic control measures. | |
| | | Other Chemicals | None expected. | n/a | |
| Freeze Plant and Substation | 2 | Metals (metal leaching) | Metal leaching can occur when certain minerals in rocks containing metals are exposed to air and water. If the freeze plant and substation foundations/pads are constructed with material containing metals, then there is the potential for metals to leach into runoff, and report to the surrounding environment, where there is the potential for negative effects on the aquatic environment. | <ul style="list-style-type: none"> The borrow pit area selected for construction and maintenance of various Project components was based on geotechnical program completed in 2021 which did not identify any potential for ARD/ML. Further works are ongoing part of engineering activities and with confirmation of characterization through assays of representative samples. | At the freeze plant and substation area, the infrastructure design in combination with management plans (e.g., geochemical characterization of borrow material, spill response plans, ESC) and best management practices result in a determination that runoff in this area is classified as non-contact water . |
| | | Acid Rock Drainage | Acid rock drainage is a process where sulfide minerals in rocks react with air and water to produce sulfuric acid, which then leaches metals from the rocks. If the freeze plant and substation foundations/pads are constructed of sulfide containing material, then there may be potential for ARD to occur, the quality of runoff will be impacted, and there is the potential for negative effects on the aquatic environment. | <ul style="list-style-type: none"> The borrow pit area selected for construction and maintenance of various Project components was based on geotechnical program completed in 2021 which did not identify any potential for ARD/ML. Further works are ongoing part of engineering activities and with confirmation of characterization through assays of representative samples. | |
| | | Nutrients | None expected. | n/a | |
| | | Hydrocarbons | A release of hydrocarbons such as diesel, gasoline, or jet fuel to the environment poses a threat to aquatic organisms. | <ul style="list-style-type: none"> Spill Response Plan will be in place throughout the life of the Project Appropriate spill response kits will be positioned adjacent to areas where hazardous materials such as hydrocarbons are stored in accordance with the Spill Response Plan. A minimum 100 m distance from any waterbody will be maintained for fuel storage, refueling activities, or equipment servicing. Project components including equipment and machinery will be regularly maintained and inspected to make sure they are in good working order. A wash bay will be available to clean items, equipment, and vehicles that may have been in contact with potential contaminants. | |
| | | Suspended solids | Erosion and the resulting sedimentation can have a number of impacts on the aquatic environment (WSA 2024): sediments can cover the small spaces between productive rock or gravel habitats; increased levels of sediment in the water can displace aquatic organisms from prime habitat into less suitable areas; cloudy or turbid waters affect visual predators' ability to forage; high levels of suspended sediment in the water can affect fish and other aquatic organisms' ability to breath; and turbid water absorbs more sunlight energy increasing the water temperature, which in turn, does not allow the water to hold as much oxygen. | <ul style="list-style-type: none"> Restrict all construction activities to the approved construction footprint. Leave vegetated buffer zones around watercourses and other sensitive features when developing/operating supporting infrastructure. Implement best management practices associated with ESC, with a particular focus on Project components and activities located within 50 to 100 m of a waterbody where required (i.e., at locations where there is no vegetated buffer adjacent to the waterbodies). Refer to Figure 6 below. Traffic control measures. | |
| | | Other Chemicals | Freeze plant chemicals, e.g., calcium chloride brine | <ul style="list-style-type: none"> Spill Response Plan will be in place throughout the life of the Project | |
| Camp | 22 | Metals (metal leaching) | Metal leaching can occur when certain minerals in rocks containing metals are exposed to air and water. If the camp foundations/pads are constructed with material containing metals, then there is the potential for metals to leach into | <ul style="list-style-type: none"> The borrow pit area selected for construction and maintenance of various Project components was based on geotechnical program completed in 2021 which did not identify any potential for ARD/ML. Further works are | At the camp area, the infrastructure design in combination with management plans (e.g., geochemical characterization of borrow material, |

| Catchment Description | Catchment IDs | Constituent Group | Risk to Aquatic Environment | Management / Mitigation | Summary |
|-----------------------|---------------|--------------------|--|--|---|
| | | | runoff, and report to the surrounding environment, where there is the potential for negative effects on the aquatic environment. | ongoing part of engineering activities and with confirmation of characterization through assays of representative samples. | spill response plans, ESC) and best management practices result in a determination that runoff in this area is classified as non-contact water . |
| | | Acid Rock Drainage | Acid rock drainage is a process where sulfide minerals in rocks react with air and water to produce sulfuric acid, which then leaches metals from the rocks. If the camp foundations/pads are constructed of sulfide containing material, then there may be potential for ARD to occur, the quality of runoff will be impacted, and there is the potential for negative effects on the aquatic environment. | <ul style="list-style-type: none"> The borrow pit area selected for construction and maintenance of various Project components was based on geotechnical program completed in 2021 which did not identify any potential for ARD/ML. Further works are ongoing part of engineering activities and with confirmation of characterization through assays of representative samples. | |
| | | Nutrients | None expected. | n/a | |
| | | Hydrocarbons | A release of hydrocarbons such as diesel, gasoline, or jet fuel to the environment poses a threat to aquatic organisms. | <ul style="list-style-type: none"> Spill Response Plan will be in place throughout the life of the Project Appropriate spill response kits will be positioned adjacent to areas where hazardous materials such as hydrocarbons are stored in accordance with the Spill Response Plan. A minimum 100 m distance from any waterbody will be maintained for fuel storage, refueling activities, or equipment servicing. Project components including equipment and machinery will be regularly maintained and inspected to make sure they are in good working order. A wash bay will be available to clean items, equipment, and vehicles that may have been in contact with potential contaminants. | |
| | | Suspended solids | Erosion and the resulting sedimentation can have a number of impacts on the aquatic environment (WSA 2024): sediments can cover the small spaces between productive rock or gravel habitats; increased levels of sediment in the water can displace aquatic organisms from prime habitat into less suitable areas; cloudy or turbid waters affect visual predators' ability to forage; high levels of suspended sediment in the water can affect fish and other aquatic organisms' ability to breathe; and turbid water absorbs more sunlight energy increasing the water temperature, which in turn, does not allow the water to hold as much oxygen. | <ul style="list-style-type: none"> Restrict all construction activities to the approved construction footprint. Leave vegetated buffer zones around watercourses and other sensitive features when developing/operating supporting infrastructure. Implement best management practices associated with ESC, with a particular focus on Project components and activities located within 50 to 100 m of a waterbody where required (i.e., at locations where there is no vegetated buffer adjacent to the waterbodies). Refer to Figure 6 below. Traffic control measures. | |
| | | Other Chemicals | Radionuclides are a potential contaminant associated with the Project activities. | <ul style="list-style-type: none"> A wash bay will be available to clean items, equipment, and vehicles that may have been in contact with potential contaminants. Administrative controls will be in place to control radioactive materials and radiological clearance: All objects (equipment, vehicles, etc.) from potentially contaminated work areas that need to be transported off-site as non-radioactive materials must be thoroughly cleaned and checked for contamination prior to release. | |

Notes:

As described earlier in the SWMP, the screening completed in Table 1 is based on routine or normal operating conditions. Accidents and malfunction type risks were assessed separately in Section 14 of the EIS and mitigations associated with accident and malfunction events have been incorporated and described in that analysis in the EIS.

n/a = not applicable

ARD = acid rock drainage

ARD/ML = acid rock drainage/metal leaching

ESC = erosion and sediment control

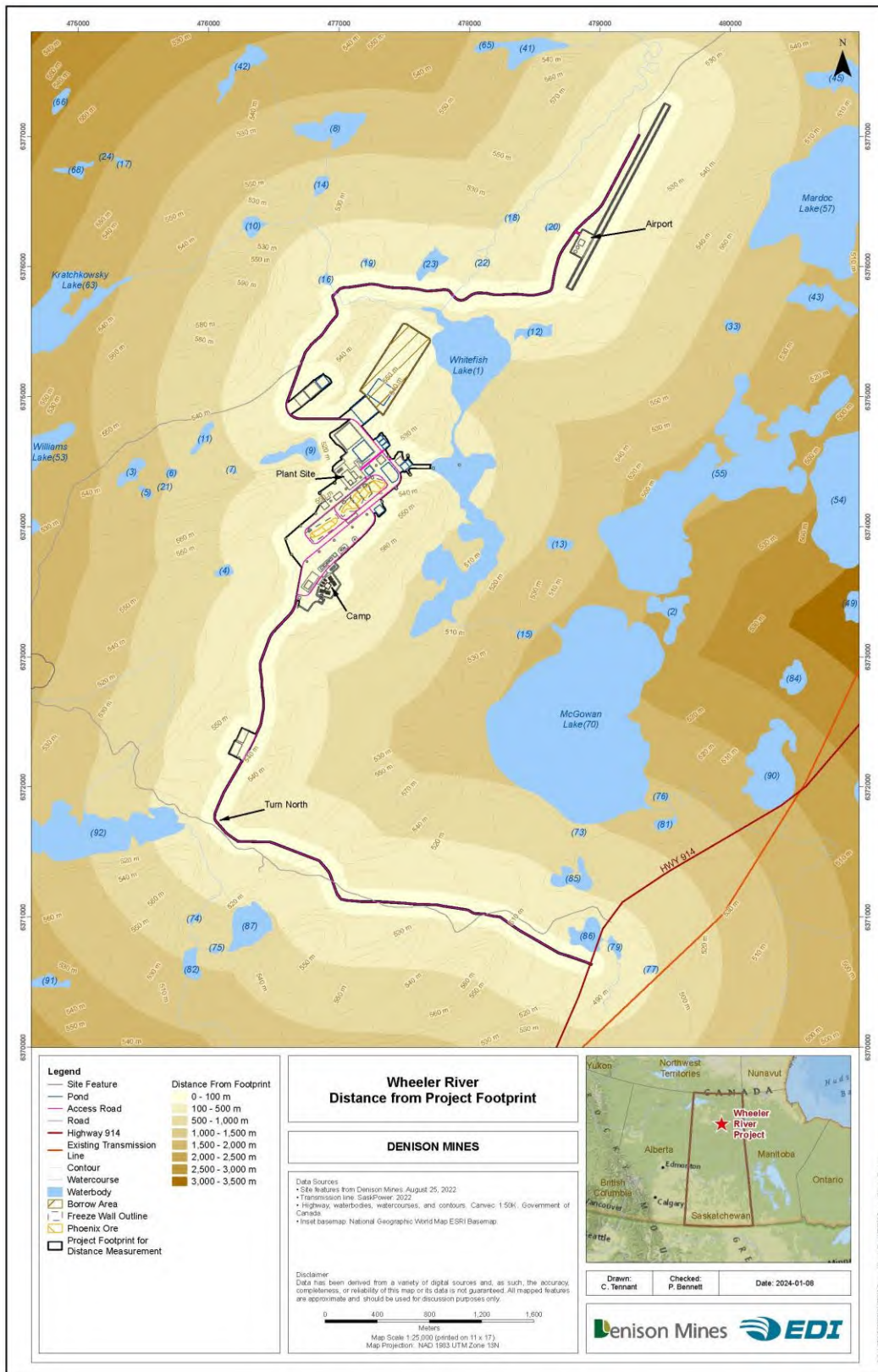


Figure 6: Distance from Project Footprint to Waterbodies

Delineation of Contact and Non-contact Water Source Areas on the Site

Based on information in the EIS and additional clarifications contained here, contact water is expected at the wellfield, processing plant terrace, the refueling and de-icing area at the airstrip, and leachate collection areas at the landfills. Contact water will be collected in various ponds and eventually routed through the IWWTP for treatment prior to release to Whitefish Lake.

Based on the screening completed in Table 1 using Figures 1 through 5, the non-contact water areas are locations where clean water can be diverted away from Project infrastructure. Through design and implementation of best management practices, the catchment areas described above were determined to contain non-contact water. The runoff from these areas will not be collected and treated.

Estimation of Typical and Event Volumes from Contact and Non-contact Water Source Areas

Refer to Figures 1 to 5 for information on the size of individual catchment areas, the volume of water expected on an annual basis and with a 1:100 year storm event, and the peak flow associated with a 1:100 year storm event.

At the wellfield and processing plant terrace the volume of water expected during a 24-hour PMP of 493 mm is approximately 37,240 m³. The wellfield runoff pond has been sized appropriately (38,200 m³ with 1 m of freeboard) to contain this volume of water.

Water Management Structures

The Stormwater Management Plan associated with non-contact water uses shallow ditching to dissipate the energy of runoff, to promote settling of suspended solids and allow the runoff to report to ground via natural grades that flow away from the infrastructure and into the natural drainage systems. The approximate location of proposed ditches are shown in Figures 1 through 5.

Diversion ditching of non-contact water away from disturbed and developed areas. Diversion ditching is designed to divert as much clean non-contact surface water as reasonably possible away from any disturbed areas, facilities or works where that water may become contaminated, including but not limited to the wellfield, processing plant area, and waste management areas.

Road ditch inverts adjacent to roadways and graveled pads should be lower than the subgrade at the shoulder and ditches will be designed based on specific criteria for slopes (sideslopes, longitudinal slopes), bottom widths, a range of velocities, and a minimum freeboard (refer to Table 2). Ditch design criteria will be refined as the Project advances.

Table 2: Preliminary Ditch Design Criteria

| Ditch Element | Design Criteria |
|----------------------------------|--|
| Conveyance Capacity Requirements | a) 1:100 yr., 24 hr. event for diversion ditches and non-contact water collection ditches b) 24 hr. PMP event critical ditches where upset would be considered a release to environment (i.e., contact water) |
| Manning's Roughness Coefficient | n = 0.030 |

| | |
|------------------------------|--|
| Preferred Ditch Sideslopes | 3H:1V |
| Maximum Ditch Sideslopes | 2H:1V (with depth restrictions and possible sideslope erosion protection determined on case-by-case basis) |
| Minimum Longitudinal Slope | 0.20% |
| Maximum Longitudinal Slope | 2.00% (steeper ditching require engineered channels) |
| Minimum Velocity | 0.3 m/s |
| Maximum Velocity | 0.73 m/s (subject to variance dependent on ditch bottom materials) |
| Preferred Ditch Bottom Width | 1200 mm |
| Minimum Ditch Bottom Width | 600 mm |
| Minimum Ditch Freeboard | 200 mm (below road finished grade shoulder to 1:100 yr 24 hour rain event) |

Armouring such as rip-rap or re-vegetation will be required for erosion prone areas on all road slopes and ditching. Because of the sandy soil conditions of this site, erosion control will be an important consideration in design for all ditching and grading features due to high erodibility of the soils. Ditches require armouring for a minimum horizontal distance of 3 metres around culvert inlets, or as determined by hydraulic modeling. The general rule for protecting the downstream of a culvert is that armouring of three (3) pipe diameters should be used for each 1 m/s of velocity reduction required.

Monitoring and Compliance

Site water management plan monitoring will be conducted, primarily to confirm the best management practices related to ESC are functioning as intended. Routine inspections and management would be completed to document the effectiveness of the ESC measures, and any maintenance or replacement of ESC structures would be completed as required.

The EIS Section 2.9 Management System outlines the framework to support EIS review. The Project's detailed management programs and plans will be developed to support licensing and permitting. Of relevance to this Plan, the following is noted:

- The Spill Response Plan will outline how Denison will appropriately respond to and clean-up any unexpected spills. Spill reporting to Saskatchewan Ministry of Environment, ECCC, and the public will be required depending on the nature of the spill.
- The Effluent and Emissions Monitoring Plan includes sampling plans for stormwater during construction.
- The Construction Management Plan incorporates environmental considerations. Construction activities with higher potential risk of ESC problems include excavation and borrow areas, clearing and grubbing, ditch construction, and earthwork near/across streams and lakes
- Environment inspections will be conducted at various project areas on a frequency specified in future licences and permits. This may include for instance daily and weekly

inspections of fuel storage tanks, ponds, pads, lines, etc. to ensure compliance with operational conditions, best management practices and other requirements. Inspection (and sampling) plans for non-contact water mitigation measures such as silt fencing will coincide with precipitation events and spring runoff.

Various aspects of Project monitoring will not only be included in Denison's management system documentation but also included as conditions in permits, authorizations, and licences. The Provincial laws governing development in, or near, water are set out in *The Environmental Management and Protection Act, 2010* and *The Environmental Management and Protection (General) Regulations*. Denison will apply to the Saskatchewan Water Security Agency for an Aquatic Habitat Protection Work for any work near water and will adhere to the conditions of the permit. Fish and fish habitat are protected by provisions of the *Fisheries Act*. The Project will be constructed, operated and decommissioned in a manner compliant with Section 36 of the *Fisheries Act*. The Ministry of Environment enforces provincial legislation in collaboration with federal regulators.

Education and Training

Denison will provide education and training to staff and contractors about the importance of non-contact water management and best practices associated with erosion and sediment control. This helps ensure that everyone involved in the safe Construction, Operation and Decommissioning of the Project understands their role in protecting the aquatic environment.

In Closing

Denison views the EIS as an important planning tool that will be used to support future activities and represents one stage in the rigorous overall approvals process for a uranium mining facility in Canada. Denison is completing a sequential EA and licensing process for the Project. In the EIS, a framework for the EMS is provided along with a clear commitment for Denison to include Project design and water management-related mitigation measures into the EMS documents as they are developed / as the Project proceeds through the licensing and permitting phases. We trust that the FIRT has been provided with the appropriate level of detail on the water management topic for drawing conclusions on the EA process, and the summary contained in this SWMP will facilitate ECCC's review.

References:

- Saskatchewan Water Security Agency. 2024. Aquatic Habitat Protection Permit - Preventing the discharge of deleterious substances. <https://www.wsask.ca/preventing-the-discharge-of-deleterious-substances>.
- Saskatchewan Ministry of Highways and Infrastructure (SK MHI). 2012. Erosion and Sediment Control. June 2003, updated February 2012. Available online: https://pubsaskdev.blob.core.windows.net/pubsask-prod/124304/EP_ESC%252B%2528Feb%252B2012%2529.pdf

Part 2 – Response to Specific Questions Raised in IRs 12, 12-R1A and 12-R1B

The table below highlights questions raised in IRs 12, 12-R1A and 12-R1B that weren't necessary fully described by the updated site water management plan (see Part 1).

| Question from the IR | Denison Response |
|--|---|
| From FIRT's Information Request Rationale (2023-12-05): CNSC requests that Denison use a PMP value that is estimated using historical rainfall data that includes the most up to date meteorological data or provide justification on the validity of the current PMP. | Denison understands that validation of the current PMP will be assessed as part of CNSC licensing. |
| From Denison submission of responses to IRs (2023-08-18): Details related to culvert design and conveyance capacity are being developed as part of ongoing engineering activities. Culverts will be a designed with a sufficient size and length to convey water around the site during a PMP event. | Project design is bound by the EIS. Culverts within contact water areas are being designed to convey water associated with a PMP event. |
| The Proponent should include updated information on water treatment, flows, capacity and effluent discharge during normal operations, and a 24-hr Probable Maximum Precipitation (PMP) Event. | Non-contact water is not collected and routed through the industrial wastewater treatment plant (IWWTP). The wellfield runoff pond has been designed to accommodate the PMP. Influent to the IWWTP would be metered into the plant, per the treatment design rates and there would be no changes in effluent release rates beyond the assessed rates and plant design criteria. |

- Department: ECCC
- Project Effects Link: Change to an environmental component due to hazardous contaminants
- Reference to EIS, appendices, or supporting documentation Section 2.2.3.9, Project Description, Appendix 8-E

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3; June 26, 2024) |
|--------------|----------------|--|---|--|--|--|--|--|
| IR-18 | - | <p>Context: In Table 2.2-1 the upper bound Industrial Wastewater Treatment Plant (IWWTP) effluent quality final discharge targets for Constituents of Potential Concern (COPCs) are provided. General parameters (e.g., temperature, pH, etc.), and several Schedule 4 Substances with maximum authorized concentrations (lead, nickel, suspended solids, and un-ionized ammonia) under the Metal and Diamond Mining Effluent Regulations (MDMER) have not been provided in this table. There are several COPCs (aluminum, mercury, iron, nitrate, thallium, phosphorus and manganese) for effluent characterization under Schedule 5 Section 4 of the MDMER that have not been provided in this table. Additionally, no information on water quality guidelines has been provided in this table.</p> <p>Furthermore, it is stated that the final effluent quality discharge target for uranium is 0.057 mg/L. However, the Canadian Council of Ministers of the Environment (CCME) water short term (acute) water quality guidelines for the protection of aquatic life is 0.033 mg/L. The proposed effluent discharge target for uranium exceeds the acute water quality guidelines, indicating effluent may pose the risk of being acutely lethal to aquatic biota at end-of-pipe.</p> <p>Rationale: ECCC requests the Proponent include the general water quality parameters that influence water quality thresholds, parameters in Schedule 4 and Schedule 5 Section 4 of the MDMER, and their respective water quality guidelines for consideration and transparency.</p> <p>Discharges from the proposed Project will alter water quality in the immediate receiving area, and this may include some sublethal effects on aquatic biota, which must be minimized. It remains the Proponent's responsibility to adhere to the MDMER to ensure that effluent at the end-of-pipe from all final discharge points be non- acutely lethal and meet requirements for prescribed deleterious substances under Schedule 4 of the regulations.</p> | <p>1. Update Table 2.2-1 and Appendix 8-E to include all general parameters required for environmental effects monitoring: pH, temperature, hardness, alkalinity, and conductivity.</p> <p>2. Update Table 2.2-1 and Appendix 8-E to include missing Schedule 4 Substances under the MDMER with maximum authorized concentrations: lead, nickel, suspended solids, and un-ionized ammonia.</p> <p>3. Update Table 2.2-1 and Appendix 8-E to include missing Schedule 5 Section 4 parameters required for effluent characterization under the MDMER: aluminum, mercury, iron, nitrate, thallium, phosphorus and manganese.</p> <p>4. Include all acute and chronic water quality thresholds for each parameter in Table 2.2-1 and Appendix 8-E.</p> <p>5. Describe additional mitigation measures that can be considered to minimize impacts to aquatic biota from uranium concentrations in effluent.</p> | <p>Denison fully understands its obligations with respect to the MDMER and will comply with the MDMER end of pipe effluent discharge criteria and other requirements of the regulations. The lack of the MDMER general parameters and Schedule 4 substances in the draft EIS table 2.2-1 should not be misconstrued to mean Denison was not intending to meet these requirements. Rather these tables were developed based on rigorous screening to identify COPCs and then model these in the receiving environment. Table 2.2-1 in the draft EIS is not reflective of the proposed monitoring parameters during effluent release. Regardless, Denison will update the table; please see the response below.</p> <p>1) Please see attachment IR-18 for updated Table 2.2-1 which is consistent with the updated Table 8.2-10 (as updated for IR-114). Parameters specific to Schedule 4 have been assessed and predicted. Schedule 5 parameters are included where available. As Schedule 5 parameters do no have screening criteria, they will be monitored by Denison consistent with the MDMER upon falling under this regulation.</p> <p>2) Please see attachment IR-18 for updated Table 2.2-1 which is consistent with the updated Table 8.2-10 (as updated for IR-114). Parameters specific to Schedule 4 have been assessed and predicted.</p> <p>3) Please see attachment IR-18 for updated Table 2.2-1 which is consistent with the updated Table 8.2-10 (as updated for IR-114). Parameters specific to Schedule 4 have been assessed and predicted. Schedule 5 parameters are included where available. As Schedule 5 parameters do no have screening criteria, they will be monitored by Denison consistent with the MDMER upon falling under this regulation.</p> <p>4) Please see attachment IR-18 for updated Table 2.2-1 which is consistent with the updated Table 8.2-10 (as updated for IR-114). Applicable screening criteria have been updated to identify most applicable acute or chronic thresholds for the protection of aquatic life.</p> <p>5) As noted in response to IR-16 and IR-17 effluent discharge criteria as depicted in the draft EIS provide a bounding scenario of the basis of the assessment of Project effects and final effluent quality will meet prescribe limits developed through licensing and permitting, as informed by the BATEA evaluation process. In that context, it is expected that the uranium concentration in effluent would be lower then assumed for the purpose of the evaluation in the draft EIS and it is understood that uranium concentrations (or concentrations of other constituents) that resulted in acute toxicity would be not be permitted. Accordingly, the need for and types of mitigation measures as might be needed for uranium (or other constituents) would be developed as part of the process of developing final effluent quality limits in the permitting and licensing processes.</p> | <p>This response has not been accepted.</p> <p>ECCC requested that the Proponent update Table 2.2-1 and Appendix 8-E to include all general water quality parameters required for environmental effects monitoring, including pH, temperature, hardness, alkalinity and conductivity. This information was not provided in the updated table in the Proponent's response. ECCC also requested that the Proponent Update Table 2.2-1 and Appendix 8-E to include missing Schedule 5 Section 4 parameters required for effluent characterization under the Metal and Diamond Mining Effluent Regulations (MDMER) including aluminum, iron, nitrate, thallium and manganese. The Proponent has not provided the requested information for aluminum, iron, nitrate, thallium and manganese. In the Proponent's response it is stated that, "Schedule 5 parameters are included where available." However, it is unclear if this means that the requested effluent characterization concentrations for these parameters is currently unknown, or if these parameters are expected to have negligible concentrations in the effluent. Furthermore, ECCC requested that the Proponent include all acute and chronic water quality thresholds under the most stringent of the MDMER, CCME, and/or Provincial Guidelines for each parameter in Table 2.2-1 and Appendix 8-E. This information has not been provided as only chronic toxicity guidelines have been provided.</p> <p>The Proponent is legally required to meet MDMER release targets and intends to continue to refine effluent quality predictions as part of the BATEA assessment and licensing phase of the Project. ECCC must advise the CNSC of predicted effects of COPCs to surface water quality and recognize the Proponent's legal requirement to comply with the MDMER. Therefore, proposed and draft effluent targets must be reviewed against the requirements of the regulations and with an eye to any potential effects to the receiving environment for both regulated and other effluent parameters. It is necessary for ECCC to review effluent targets for general water quality parameters and MDMER Schedule 5 Section 4 parameters required for effluent characterization and environmental effects monitoring to determine if effluent at the end-of-pipe from all final discharge points is not predicted to be acutely lethal. Additionally, the predicted uranium effluent concentration currently exceeds the acute water quality guidelines for the protection of aquatic life. Table 2.2-1 does not currently provide the information necessary to verify acute and chronic thresholds.</p> <p>Therefore, please see the following reiterated requests:</p> <p>1. Update Table 2.2-1 and Appendix 8-E to include all general parameters required for environmental effects monitoring: pH, temperature, hardness, alkalinity, and conductivity.</p> <p>2. Update Table 2.2-1 and Appendix 8-E to include the following missing Schedule 5 Section 4 parameters required for effluent characterization: aluminum, iron, nitrate, thallium, and manganese. Provide further explanation if this information is not available.</p> <p>3. Include all acute and chronic water quality thresholds for each parameter in Table 2.2-1 and Appendix 8-E. Include information on the concentrations of modifying environmental factors (i.e. pH, hardness, etc.) used to calculate these guidelines as footnotes.</p> <p>4. Provide a clear commitment to ECCC for continued consultation on developing effluent discharge targets including a review of final predicted effluent discharge targets once available.</p> | <p>The effluent modelling work presented in the draft EIS focused on COPCs which were predicted based on expected Project activities and water treatment processes and selected following CSA N288.6 Environmental Risk Assessments At Class I Nuclear Facilities And Uranium Mines And Mills. The CNSC participates in CSA documents and endorses use of this document.</p> <p>Schedule 5 of the MDMER outlines the various requirements of Environmental Effects Monitoring (EEM) Studies once a mine is subject to the regulation. The MDMER requires EEM as a condition for the authorization to deposit effluent into waters frequented by fish. Environmental effects monitoring involves assessing whether effluents are having an effect on receiver water quality, fish, fish habitat, and use of fish by humans. Schedule 5 of the MDMER is not a predictive section of the regulation to be used to direct EA scope. It is applicable to operational metal mines.</p> <p>Many MDMER parameters including those in Schedule 5, Section 4 identified by ECCC were not selected for analysis during lab studies completed by Denison to support the EIS, since they were not COPCs associated with IWWTP design. Information from laboratory tests is not available at this stage for all of the MDMER parameters. Further, MDMER Schedule 5 Section 4 include a list of parameters to be monitored (not modelled) and many of the 'missing' parameters have no associated limits under MDMER. Denison is committed to meet all requirements of MDMER, which includes future EEM programs.</p> <p>With respect to the bullet items in the IR the following is noted.</p> <p>1. Table 2.2-1 and Appendix 8-E have been updated to include all general water quality parameters required for environmental effects monitoring, including pH, temperature, hardness, alkalinity and conductivity.</p> <p>2. Table 2.2-1 and Appendix 8-E have been updated to include the following missing Schedule 5 Section 4 parameters required for effluent characterization: aluminum, iron, nitrate, thallium, and manganese.</p> <p>3. Updates to Table 2.2-1 and Appendix 8-E Include all acute and chronic water quality thresholds for each parameter as well as information on the concentrations of modifying environmental factors (i.e. pH, hardness, etc.) used to calculate these guidelines as footnotes.</p> <p>4. Denison is committed to meet the requirements of the MDMER as previously stated. Denison is also committed to working through the process of identifying discharge criteria as stipulated under Provincial legislation for mine effluent discharge as part of the application for an approval to operate a pollutant control facility as well as per the requirements and conditions of the CNSC, the licensing body for the Project. Denison will follow the advice of the CNSC with regard to requirements for further consultation with ECCC.</p> | <p>In response to the FIRT's previous review, Denison provided responses to the following outstanding requests from ECCC:</p> <ol style="list-style-type: none">1. Update Table 2.2-1 and Appendix 8-E to include all general parameters required for environmental effects monitoring: pH, temperature, hardness, alkalinity, and conductivity.2. Update Table 2.2-1 and Appendix 8-E to include the following missing Schedule 5 Section 4 parameters required for effluent characterization: aluminum, iron, nitrate, thallium, and manganese. Provide further explanation if this information is not available.3. Include all acute and chronic water quality thresholds for each parameter in Table 2.2-1 and Appendix 8-E. Include information on the concentrations of modifying environmental factors (i.e. pH, hardness, etc.) used to calculate these guidelines as footnotes.4. Provide a clear commitment to ECCC for continued consultation on developing effluent discharge targets including a review of final predicted effluent discharge targets once available. <p>The Proponent has resolved item two of the above, but items one, three, and four require additional follow up.</p> <p>For item one, the requested parameters (pH, temperature, hardness, alkalinity and conductivity) were added to Table 2.2-1 in the revised draft EIS and the tables in Appendix 8-E. However, the predicted conductivity presented would not be possible given the TDS reported in Table 2.2-1, and this inconsistency has been found throughout Section 8 and its appendices. Conductivity in µS/cm is typically 1.25-2 times TDS in mg/L, whereas the value in the table is 0.0034 times the TDS concentration. This item is not resolved, but can be carried over to licensing. The Proponent will be expected to correct the proposed effluent conductivity added to Table 2.2-1 and in Appendix 8-E.</p> <p>Follow up for item three is addressed in IR-108, IR-114 and IR-115.</p> <p>To address item four, the Proponent will have to follow the guidance and requirements in REGDOC-2.9.2 to develop effluent discharge targets. The CNSC will engage with ECCC during this process as necessary.</p> | <p>As stated, Denison has resolved item two of the above and items one, three, and four are addressed below with follow up commitments.</p> <ol style="list-style-type: none">1. As discussed during the June 14, 2024 meeting with ECCC, the information provided for conductivity and TDS in the EIS was consistent with what was available from effluent bench tests. Denison agrees to update the analysis and predictions incorporating pre construction water quality data available (including conductivity and TDS) during the operational licencing process, but there is no expectation there will be any change to the EIS conclusions.3. Follow up for item three is addressed in IR-108, IR-114 and IR-1154. Denison commits to following the guidance and requirements in REGDOC-2.9.2 to develop effluent discharge targets as part of operational licensing and in consultation with the CNSC. |

ATTACHMENT IR-18 (included in Round 1 submission)

Table 2.2-1 - Upper Bound Industrial Wastewater Treatment Plant Effluent Quality (updated)

| Constituent | Unit | Screening Concentration | Source of Screening Concentration | Predicted Site Discharge Concentration |
|--|------|-------------------------|-----------------------------------|--|
| Chloride | mg/L | 120 | SEQG/CCME | 600 |
| Sulphate (Hardness) | mg/L | 429 | BC MOE* | 3915 |
| Sulphate | mg/L | 128 | BC MOE | 3915 |
| TDS | mg/L | 500 | SEQG | 6420 |
| TSS | mg/L | 15 | Schd 4 - MDMER | 6 |
| Arsenic | mg/L | 0.01 | SEQG/CCME | 0.006 |
| Cadmium | mg/L | 0.0003 | SEQG/CCME* | 0.0018 |
| Chromium | mg/L | 0.001 | SEQG/CCME | 0.025 |
| Cobalt | mg/L | 0.0003 | FEQG | 0.0030 |
| Copper | mg/L | 0.004 | SEQG/CCME* | 0.022 |
| Lead | mg/L | 0.005 | CCME | 0.0003 |
| Molybdenum | mg/L | 0.07 | WHO | 2.5 |
| Nickel | mg/L | 0.07 | WHO | 0.014 |
| Selenium | mg/L | 0.001 | SEQG/CCME | 0.042 |
| Uranium | mg/L | 0.02 | SEQG/CCME | 0.057 |
| Vanadium | mg/L | 0.12 | FEQG | 0.059 |
| Zinc | mg/L | 0.1 | FEQG** | 0.042 |
| Mercury | mg/L | 0.000026 | SEQG/CCME | 0.000001 |
| Ammonia (as N) | mg/L | 5.74 | SEQG/CCME | 3.9 |
| Un-ionized Ammonia | mg/L | 1.00 | MDMER Sched 4 | 0.0078 |
| Phosphorus | mg/L | 0.015 | BC MOE | N/A |
| Thorium-230 | Bq/L | 0.6 | HC | 0.9 |
| Radium-226 | Bq/L | 0.11 | SEQG | 0.15 |
| Lead-210 | Bq/L | 0.2 | HC | 0.419 |
| Polonium-210 | Bq/L | 0.1 | HC | 0.15 |
| Notes | | | | |
| (1) Bolded values are those that exceed the screening concentrations | | | | |
| * Hardness induced guideline, assuming hardness > 250 mg/L | | | | |
| ** Hardness induced guideline, assuming hardness > 250 mg/L, pH=7.0, DOC = 5.26 mg/L | | | | |
| Un-ionized ammonia calculated | | | | |

- Department: ECCC
- Project Effects Link: Fish and fish habitat
- Reference to EIS: Appendix 7-C, Numerical Modelling: Post- Decommissioning Evaluation, Section 2.3.1.4, Desilicified Zone

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, June 28, 2024) |
|--------------|----------------|---|--|---|---|---|--|--|
| IR-89 | - | <p>Context: The Proponent states that a hydraulic conductivity value of 5x10-6 m/s was uniformly assigned to the model layers representing the Desilicified Zone. They additionally state that this value is consistent with packer and pumping tests screened in this unit that have interpreted hydraulic conductivity values ranging from 1x10-6 to 3x10-5 m/s (Appendix C), with a geomean of 6.0x10-6 m/s.</p> <p>Considering that the Desilicified Zone is of particular interest because it is the main pathway for the COPC to reach Whitefish lake, and that hydraulic conductivities are not entirely understood, ECCC recommends that a larger range of hydraulic conductivities be simulated to understand potential effects on fish and fish habitat.</p> <p>Rationale: The Desilicified Zone is a critical layer in the hydrogeological model as it represents a key potential pathway of contaminants to Whitefish Lake. The base case hydraulic conductivity value (5x10-6 m/s) is even lower than the geometric mean, not to mention the highest value found. When simulating geochemical processes and contaminant transport within this important pathway a more conservative approach should be employed. Modifying this parameter will affect travel times and distribution of COPC in the subsurface.</p> | <p>1. Provide an in-depth rationale for choosing a value of 5x10-6 m/s as the base case for the hydraulic conductivity, in both the PHREDOX EQUilibrium (PHREEQC) and Finite-Element Ground Water Flow (FEFLOW) models.</p> <p>2. Provide a rationale for keeping the sensitivity analysis within one order of magnitude considering the lack of physical data on the Desilicified Zone. Alternatively, provide contaminant transport simulation results with more conservative hydraulic conductivity (e.g., more than 3x10-5 m/s) values in the Desilicified Zone.</p> <p>See also related: IR-96.</p> | <p>1) Application of 5E-6 as the value for hydraulic conductivity within the desilicified zone is appropriate; the values of 5E-6 and 6E-6 are essentially the same number, particularly at the scale over which it is applied. We agree that the hydraulic conductivity of the desilicified zone is an important parameter to the fate and transport of dissolved minerals from the ore zone toward Whitefish Lake; that is why scenarios 4, 5, and 6 were designed to evaluate the prediction uncertainty related to the uncertainty of the desilicified zone, along with other hydraulic conductivity values along the transport migration pathway. Further, we recognize that packer tests provide a small-scale sample indication of the representative hydraulic conductivity, and as shown in the literature (Bradbury and Muldoon, 2000), such local tests are rarely representative of large-scale (i.e., macro) hydraulic conductivities. Macro-scale hydraulic conductivities are best determined using a large-scale pumping test or a model calibrated to observed water levels, which is the approach we completed; the value of 5E-6 for the desilicified zone hydraulic conductivity provides an excellent match to observed water levels and baseflow discharge. In addition, packer tests in fractured rock tend to bias the hydraulic conductivity to be higher than is representative on the large scale, as testing is generally targeted on observed fracture zones. Given all this, we reaffirm that the applied hydraulic conductivity of 5E-6 is representative for the conductivity of the desilicified zone.</p> <p>2) Calibration-constrained uncertainty analyses were performed (i.e., the state of the practice) to evaluate the range of potential hydraulic conductivity values that could exist within the desilicified zone while still maintaining calibration. That analysis is presented in section 2.8 of Appendix 7-C. The most conservative of the parameter scenarios that are consistent with the field observational data were used for the prediction uncertainty analyses presented in Appendix 7-C, section 4.7. Scenarios 4, 5, and 6 explore higher hydraulic conductivity values which are supported by the observation data (i.e., calibration-constrained uncertainty analysis). The range of desilicified-zone hydraulic conductivity incorporated within those scenarios (Figure 2-21) is 1.6 to 3.2 m/d (i.e., 1.8E-5 to 3.7E-5 m/s); 3.2 m/d was the highest conductivity value for the desilicified zone (referred to as the Altered Zone within the Intermediate Aquitard on Figure 2-21) for all 50 calibrated realizations generated using PEST. As such, the EIS presented the prediction uncertainty with the highest hydraulic conductivity values supported by the observation data. It would not be appropriate to test scenarios with even higher values of hydraulic conductivity which would not be supported by the field observed groundwater levels. Thus, we do not feel it is appropriate to test scenarios where the hydraulic conductivity of the desilicified zone is orders of magnitude greater than suggested by field observations.</p> <p>References: Bradbury K. R., and M.A. Muldoon. 1990. "Hydraulic Conductivity Determinations in Unlithified Glacial and Fluvial Materials." Groundwater and Vadose Zone Monitoring. ASTM STP 1053. D.M. Nielsen and A. I. Johnson Editors., American Society for Testing and Materials. Philadelphia, 1990. pp. 138-151.</p> | <p>This response has not been accepted.</p> <p>The Proponent used calibration-constrained uncertainty analysis to establish boundaries when conducting sensitivity analysis of hydraulic conductivity in the groundwater model.</p> <p>For sensitivity analysis to adequately manage uncertainty, parameter values that are outside of those determined by calibration-constrained uncertainty analysis should be used. There always exists some degree of uncertainty in using hydrogeologic data as a complete representation of a regional groundwater system. This uncertainty can be accounted for by broadening parameter ranges in a sensitivity analysis. Limiting sensitivity analysis to calibration-constrained values implies that available field data is a perfect and complete representation of the broader groundwater system, which may not be an accurate assumption.</p> <p>Considering the limitations of available physical data in the Desilicified Zone, a more conservative sensitivity analysis is required in order to adequately assess how contaminants may flow towards Whitefish Lake.</p> <p>Please also see follow-IR-89-R1, and AD-66 in the Advice to Proponent table.</p> | <p>In our SME’s experience, traditional “sensitivity analysis” where individual parameters are arbitrarily varied by within a subjective range can produce simulations which are inconsistent with the field-observed data. Such simulations should not be part of an EIS, as they can provide misleading results.</p> <p>Calibration-constrained uncertainty approach does not assume the data or the representation of the system are perfect or complete. Calibration-constrained models do not require a perfect fit to all the observed data, which is a recognition that there is measurement noise and structural noise present in every model. In addition, potential error in that data was accounted for by rounding the observed water levels to the nearest 0.1m (i.e., the data were not considered “perfect”) and allowing a general fit to all data (i.e., residuals are present at each observation point). Further, the analysis does not consider the data provide a “complete representation of the broader groundwater system” nor does it imply the data provides a “perfect and complete representation of the broader groundwater system”. Instead, the calibration-constrained approach tests sets of parameters within a broad range, wherein only parameters which are well informed by available observation data are constrained, while parameters not constrained by calibration data are allowed to vary more freely (i.e., to the degree that they do not otherwise impact the well-informed parameters).</p> <p>For the uncertainty assessment presented in the draft EIS, hydraulic conductivity parameters along the flow path between the ore zone and Whitefish Lake were allowed to vary within a 4-order of magnitude range (i.e., 1x10⁻⁸ to 1x10⁻⁴ m/s) to find alternative parameter sets that achieve a reasonable match to observation data. With this approach, values are not varied independently, but rather parameter combinations are sought that explore the potential 4-order of magnitude range for parameters, while maintaining a match to field-observed conditions.</p> <p>The most conservative of the calibrated scenarios obtained through the calibration-constrained approach presented within the EIS (i.e., those which achieved acceptable calibration statistics) were chosen for additional transport simulations. The scenarios tested hydraulic conductivity values for the desilicified zone as high as 3.7x10⁻⁵ m/s (realization 7 – predictive uncertainty case 5), which is two times higher than any measured value within this hydrogeologic unit, and 7.4 times higher than the base case calibration. Hydraulic conductivity values as high as 8.1x10⁻⁵ m/s were also tested within portions of the lower sandstone aquifer. In addition, the simulation documented as part of IR-55 presents a model wherein the hydraulic conductivity of the desilicified zone is 1x10⁻⁴ m/s, which is 20 times higher than the base case.</p> <p>In summary, we reaffirm that we have already provided an ample demonstration of the potential range of outcomes which are supported by the observation data at the site.</p> | <p>The Proponent has not adequately responded to the IR and has indicated in their response that they do not agree with ECCC’s previous advice relating to the sufficiency of the conservative sensitivity analysis. The Desilicified Zone is a critical layer in the hydrogeological model because it represents a key potential pathway of contaminants to Whitefish Lake. However, ECCC advises that the Proponent has not adequately considered conservative scenarios in its sensitivity analysis.</p> <p>In their response, the Proponent states that “<i>The scenarios tested hydraulic conductivity values for the desilicified zone as high as 3.7x10-5 m/s (realization 7 – predictive uncertainty case 5), which is two times higher than any measured value within this hydrogeologic unit,...</i>” This is inconsistent with the values presented in the Revised Draft Environmental Impact Statement Section 7 – Geology and Groundwater, where the maximum field values are presented as 3.0x10-5 m/s. The approach presented does not demonstrate a conservative scenario for evaluating the extent of potential travel times to Whitefish Lake.</p> <p>The Proponent should test a K value in the desilicified zone with a value at least an order of magnitude higher than the highest field K values in order to provide a conservative scenario for potential travel times to Whitefish Lake.</p> <p>The Revised Draft Environmental Impact Statement, Section 7, has a revised geometric mean for hydraulic conductivities in the desilicified zone where the value was changed from 6.0 x10⁻⁶ m/s to 4.8x10⁻⁶ m/s with no explanation regarding how this new value was obtained. The Proponent should clarify why this change was made, and provide any supporting evidence.</p> | <p>The Information Request is to evaluate potential travel times to Whitefish Lake (i.e., prediction uncertainty), whereas during the meeting June 6th, 2024, the reviewer phrased the request as a sensitivity analysis. The two terms have an important distinction. We submit that a prediction uncertainty analysis is the most relevant for the EIS, and that is why it has been the focus of our IR responses and the EIS documentation (i.e., Appendix 7C - Sections 2.7 and 4.6).</p> <p>A sensitivity analysis is not considered as valuable as a prediction uncertainty analysis. A sensitivity analysis measures the change in primary model output (i.e., hydraulic head for a groundwater flow model) due to a change in an input parameter (e.g., the hydraulic conductivity value applied for the Desilicified Zone). While a sensitivity analysis is part of model calibration and prediction uncertainty analysis, it is not considered a valuable stand-alone deliverable.</p> <p>It should be noted that parameter sensitivity (i.e., change in hydraulic head at monitoring point locations due to an incremental change in parameter values) is implicitly completed as part of all PEST simulations and stored in the Jacobian matrix, which is used to guide parameter estimation and objective function optimization (i.e., the sum of squared residuals). As such, parameter sensitivities were explored within the Denison modelling assessment.</p> <p>However, as parameter sensitivity values change depending on the location in solution space (i.e., how close you are to the objective function minimum), an individual snapshot of parameter sensitivity is of limited value, as it does not directly inform the EIS questions (i.e., the potential mass transport from the proposed mining development). This is why we believe that parameter sensitivity analysis is not as relevant to the EIS as the parameter uncertainty analysis presented.</p> <p>As stated in previous responses, as the range of parameter uncertainty evaluated is already beyond the range of data measured by a factor of 7 and did not produce significantly different peak concentrations at Whitefish Lake, it is our interpretation that extending this to a factor of 10 would not result in higher peak concentrations reaching this receptor.</p> <p>As such, we (Denison’s SME for the hydrogeological assessment) feel the prediction uncertainty analysis presented as part of the EIS reporting is already comprehensive and the requested additional analysis would not change the EA determination.</p> <p>It is acknowledged that there were some typographical errors in the reporting of K values for the Desilicified Zone in the Updated Draft EIS that will be corrected in the Final EIS. Further, rationale for the update to the geomean K value for the Desilicified Zone has been provided in an updated version of the Attachment IR-89-R1 (Round 3 response) at the end of this file.</p> <p>Denison also notes that the predicted changes to the regional groundwater do not begin until the remediation of the mining zone is complete and post decommissioning. It is expected that additional hydrogeological modeling for decommissioning will be required at the end of the operational phase with updated (relevant) data to support a final remediation criterion. This process will require approval by the CNSC and the Saskatchewan Ministry of Environment through the licensing and permitting processes.</p> <p>Changes to the Final EIS to correct the typographical errors are in:</p> <p>Final EIS: Table 7.3-2.</p> <p>Appendix 7-A: Table 3-4, Section 3.4.4, Section 4.3.3, and Table 5-2.</p> <p>Appendix 7-C; Section 2.3.1.5.</p> |
| IR-89 | IR-89-R1 | <p>Context: The Proponent states that the range of hydraulic conductivities considered in sensitivity analysis was limited to values that fit within a calibration constrained uncertainty analysis of the</p> | n/a | n/a | <p>Expand the sensitivity analysis of hydraulic conductivity outside of calibration constrained parameters to account for the lack of physical data in the Desilicified Zone.</p> | <p>See the Response to IR-89 for discussion regarding the calibration-constrained uncertainty analysis approach. As stated, we believe that asking for scenarios outside of the range supported by the available monitoring data is inappropriate as it suggests that unrepresentative, potentially misleading</p> | <p>See IR-89 (above).</p> | <p>Please see the IR response to IR-89, and the attachments below which were updated to address responses 89 and 89-R1.</p> |

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, June 28, 2024) |
|--------------|----------------|---|--------------------------|---|-----------------------------|--|----------------------------|---|
| | | <p>model.</p> <p>Considering that the Desilicified Zone is of particular interest because it is the main pathway for the COPC to reach Whitefish lake, and that hydraulic conductivities are not entirely understood, ECCC recommends that a larger range of hydraulic conductivities be simulated to understand potential effects on the aquatic</p> | | | | <p>scenarios should be tested, documented, and presented as potential outcomes. We do not believe that should be part of an EIS.</p> <p>While we do not support development of un-calibrated scenarios for inclusion within the EIS, additional scenarios that did not violate field observation data were evaluated as part of this response and presented as Attachment IR-89-R1. These scenarios further demonstrate the robust nature of the hydrogeologic setting, which has been shown to have a high assimilative capacity.</p> <p>Additional groundwater flow and transport modelling scenarios were performed in response to:</p> <ol style="list-style-type: none">1. IR-55, wherein the hydraulic conductivity of the Intermediate Sandstone Aquitard was increased to a maximum value of 1.0E-7 m/s, and other parameter values, including the hydraulic conductivity of the Desilicified Zone, were increased to maintain a calibrated condition.2. IR-70, wherein a higher hydraulic conductivity within the Ore Zone post-decommissioning was tested. This is an uncertain parameter which is unconstrained by calibration data.3. IR-71, wherein uncertainty in future groundwater recharge rates were evaluated by varying rates by +/- 20%. Future groundwater recharge is an uncertain parameter which is unconstrained by calibration data.4. IRs 78 & 88, wherein the effective porosity of the Paleoweathered zone was reduced by an order of magnitude to allow the initial source mass to migrate toward receptors 10-times faster. Effective porosity of the Paleoweathered zone is an uncertain parameter which is unconstrained by calibration data.5. IR-96, wherein the transverse dispersivity was reduced to 1m to be consistent with ratios of longitudinal-to-transverse dispersivity published in the literature (e.g., Gelhar et al.; 1992) based on anisotropic settings. Transverse dispersivity is an uncertain parameter which is unconstrained by calibration data. <p>The results of these simulations are presented as part of an attachment, however in summary all scenarios produced concentrations of primary COPCs at Whitefish Lake that are below the Groundwater Quality Screening Criteria established. Exceptions include pH, iron and manganese due to naturally high background levels, as reported within the EIS.</p> <p>The scenarios presented do not change the outcome of the scenarios already reported within the EIS documentation, nor in conclusions based thereon. Thus, we did not see the need to modify the EIS.</p> | | |

ATTACHMENT IR-89-R1 (from Round 2 response)

Introduction

Simulations of conditions that extend beyond the range of conditions supported by the monitoring data (i.e., calibration-constrained conditions) is inappropriate for an EIS as it suggests that unrepresentative, potentially misleading scenarios should be tested, documented, and presented as potential outcomes. In the SME's view this would confuse the groundwater transport and associated risk discussions.

While we do not support development of un-calibrated scenarios for inclusion within the EIS, additional scenarios that did not violate field observation data were evaluated as part of this response. These scenarios further demonstrate the robust nature of the hydrogeologic setting, which has been shown to have a high assimilative capacity.

Additional groundwater flow and geochemical reactive transport modelling scenarios were performed in response to:

1. IR-55, wherein the hydraulic conductivity of the Intermediate Sandstone Aquitard was increased to a maximum value of $1.0\text{E-}7$ m/s, and other parameter values, including the hydraulic conductivity of the Desilicified Zone, were increased to maintain a calibrated condition.
2. IR-70, wherein a higher hydraulic conductivity within the Ore Zone post-decommissioning was tested. This is an uncertain parameter which is unconstrained by calibration data.
3. IR-71, wherein uncertainty in future groundwater recharge rates were evaluated by varying rates by +/- 20%. Future groundwater recharge is an uncertain parameter which is unconstrained by calibration data.
4. IRs 78 & 88, wherein the effective porosity of the Paleoweathered zone was reduced by an order of magnitude to allow the initial source mass to migrate toward receptors 10-times faster. Effective porosity of the Paleoweathered zone is an uncertain parameter which is unconstrained by calibration data.
5. IR-96, wherein the transverse dispersivity was reduced to 1m to be consistent with ratios of longitudinal-to-transverse dispersivity published in the literature (e.g., Gelhar et al.; 1992) based on anisotropic settings. Transverse dispersivity is an uncertain parameter which is unconstrained by calibration data.

Post-Decommissioning Scenarios: Simulation Approach

Post-decommissioning reactive transport was evaluated using the same sub-domain model as was used for all other scenarios presented within the EIS. The sub-domain model area and mesh were unchanged from previous simulations.

Where applicable (i.e., for IR-55), groundwater flow boundary condition values were updated to reflect the revised groundwater flow solution, and the hydrogeologic property values were updated to match those within the alternatively calibrated groundwater flow model. For all other

simulations, only individual parameter values (e.g., hydraulic conductivity, recharge, porosity or dispersivity) were altered.

Transport boundary conditions and parameters were left unchanged from the Base Case condition. The 3D geochemical reactive transport simulation was completed using FEFLOW coupled with PiChem (i.e., the same approach followed for earlier simulations). The PHREEQC database, boundary and initial conditions, and simulation approach were the same as described within the EIS for the Base Case scenario. The full suite of 31 constituents was applied for selected scenarios, however as those simulations can take 3 to 4 weeks to complete, not all scenarios were able to be run with the full suite of constituents.

1. IR-55 Scenario: Higher Hydraulic Conductivity - Intermediate Sandstone Aquitard

The IR-55 scenario documents an alternative calibrated groundwater flow model which was developed with a hydraulic conductivity of $1.0\text{E-}07$ m/s within the Intermediate Sandstone Aquitard. This scenario also contained higher hydraulic conductivity values within the Desilicified Zone ($1.4\text{E-}04$ m/s) and Lower Sandstone Aquifer ($4.1\text{E-}05$ m/s); as such, the deeper units along the flow path between the Ore Zone and Whitefish Lake were all simulated as having increased hydraulic conductivity values. To maintain calibration, shallow materials along the flow path between the Ore Zone and Whitefish Lake were simulated to have a lower hydraulic conductivity than the Base Case (e.g., Overburden and Upper Sandstone Aquifer). For a full list of parameter values see the IR-55 groundwater flow response.

In general, the alternative calibrated model does not fit the observation data as well as the Base Case simulation presented within the EIS; however, the calibration statistics are acceptable. The alternative calibrated groundwater flow model results in higher volumes of groundwater flow converging upon Whitefish Lake, which lead to greater dilution potential for flow from depth, through the Ore Zone/mining area. As such, it is considered a less-conservative modelled scenario than those already presented within the EIS.

2. IR-70 Scenario: Higher Hydraulic Conductivity – Ore Zone

The hydraulic conductivity of the material remaining post mining within the Ore Zone, and the surrounding clay-rich or sulphide cemented units (i.e., natural barriers), is uncertain. Review comments have suggested that the impact of a higher value for hydraulic conductivity within the Ore Zone needs to be evaluated. While the hydraulic conductivity of the Ore Zone is not considered critical to predictions as it is only a small portion of the source area (i.e., 6% of the assumed Post-Decommissioning source mass), an additional scenario was performed to reflect the uncertainty in the post-mining hydraulic conductivity within the Ore Zone and the surrounding barrier zones; for this scenario the Ore Zone and natural barriers were treated as one uniform zone. As this is a future condition after the uranium ore and associated minerals have been removed, this parameter cannot be calibrated with current data. It is expected that the hydraulic conductivity of the Ore Zone and barriers will be enhanced due to mining, and thus a conservatively high hydraulic conductivity value of $5.0\text{E-}05$ m/s was assigned for this scenario. This value reflects the understanding that the voids created through mining will be infilled with the overlying desilicified sandstone (i.e., the altered sandstone within the Lower Sandstone Aquifer), and may have a higher hydraulic conductivity than currently within the Lower Sandstone Aquifer (i.e., $5.0\text{E-}06$ m/s).

3. a), b) IR-71 Scenario: Lower / Higher Groundwater Recharge

Recognizing that future climate conditions are uncertain, and that the predicted timespan of migration of chemical constituents from within the mining area to Whitefish Lake requires centuries to millennia, the future climate is uncertain. A reduction in groundwater recharge is considered most likely due to enhanced evapotranspiration and surface water runoff; such a reduction would reduce groundwater flow rates which is considered to be less conservative than scenarios presented within the EIS. While current groundwater recharge can be calibrated based on field observations (e.g., stream baseflow, water level fluctuations, etc.), groundwater recharge in future centuries cannot be calibrated.

Review of future climate predictions presented by Environment Canada (climatedata.ca – Key Lake) indicates precipitation will increase by 11 to 15%, and temperature will increase by 2.5 to 4.6°C. The future change in groundwater recharge is not specified but based on the range of variability that others (e.g., Erler et. al., 2019) have found for the foreseeable future (i.e., end of century), a range of +/- 20% was selected for future recharge simulations.

4. IR-78 & 88 Scenario: Lower Effective Porosity within the Paleoweathered Zone

Effective porosity within the units where constituents of potential concern (COPCs) will remain post-mining will affect the persistence of COPCs within the source area, and the residence time within deeper units. Simulations within the EIS illustrate that the most persistent portion of the source area is within the Paleoweathered bedrock, and so the uncertainty of the effective porosity within this unit is considered to be most relevant. As noted in Appendix 7-C of the revised Draft EIS (Table 4-2), the effective porosity within the Paleoweathered zone was enhanced to account for potential matrix diffusion effects. The scenario herein presents the change in predicted conditions if the effective porosity of the Paleoweathered zone is reduced by an order of magnitude, as would be consistent with lesser matrix diffusion effects. This value is not constrained by model calibration.

5. IR-96 Scenario: Lower Transverse Dispersivity

Dispersivity values incorporated within geochemical reactive transport calculations impact the degree of mass spreading as hydrogeologic heterogeneities are experienced. A wealth of literature is available to document that longer plumes experience greater dispersion as they flow through larger volumes of heterogeneous subsurface materials. While reviewers agree with the magnitude of dispersivity values applied within the EIS scenarios, the ratio of dispersivity along the flow paths (i.e., longitudinal) to perpendicular from the flow paths (i.e., transverse) was questioned. In settings with high degrees of anisotropy created by depositional variations (e.g., horizontally stratified sediments such as fluvial sands with silt interbeds), the ratio between longitudinal and transverse dispersivity has been shown to be 100:1 (Gelhar et al.; 1992), particularly for the transverse dispersion component across lower conductivity features such as silt interbeds within sand aquifers (i.e., vertical transverse dispersion in a horizontally dominated flow field). For the Denison Mines setting, where the hydrogeologic material of interest is within hydrothermally altered (i.e., desilicified) sandstone, transverse dispersion is expected to be relatively high and isotropic to be consistent with the isotropic hydraulic conductivity of desilicified sediments.

Further, as flow is not horizontally dominated (e.g., vertically upward flow through the Desilicified Zone) differentiating transverse components of dispersivity is not appropriate for this setting.

Since this parameter cannot practically be field verified, nor is it constrained through groundwater flow model calibration, an additional scenario with a lower transverse dispersion rate, such that a 10:1 ratio of longitudinal to transverse dispersion was evaluated.

Reactive Transport Predictions at Whitefish Lake

Table IR-89-R1-1 presents the transport results simulated for the above scenarios; the Base Case conditions are also provided for comparison. In general, the peak concentrations reaching Whitefish Lake were similar to the Base Case simulation and are within the range of simulation results presented within the EIS. As such these simulation results do not further expand the range of potential outcomes already presented. Further, the simulations indicate that groundwater quality screening criteria (GQSC) are only exceeded for dissolved manganese and iron, as was presented within the EIS.

1. IR-55 Scenario: Higher Hydraulic Conductivity - Intermediate Sandstone Aquitard

For the IR-55 scenario, which had a hydraulic conductivity of $1.0\text{E-}07$ m/s within the Intermediate Sandstone Aquitard, concentrations were simulated to be lower (i.e., less conservative) than the Base Case scenario. This is expected to be due to enhanced mixing with fresh water as a result of higher volumes of groundwater flow through those zones with higher hydraulic conductivity values. Under the IR-55 alternative calibrated case, the hydraulic gradient remained relatively unchanged to be consistent with the observed water levels, and thus the groundwater flow rates converging on Whitefish Lake were increased (see simulated baseflow: IR-55), resulting in a decreased contribution of flow from the deep aquifers relative to the total volumetric groundwater flow into Whitefish lake. This results in an overall reduction in the peak concentrations of COPCs in groundwater beneath Whitefish Lake.

2. IR-70 Scenario: Higher Hydraulic Conductivity – Ore Zone

Simulating a higher hydraulic conductivity for the Ore Zone post mining produced similar peak concentrations reaching Whitefish Lake as the Base Case scenario. As an increase of the hydraulic conductivity by more than one order of magnitude did not make an appreciable difference in the simulated peak concentrations reaching Whitefish Lake, we re-affirm that the hydraulic conductivity of the Ore Zone is not a controlling parameter for mass discharge reaching Whitefish Lake. This is consistent with the mass within the Ore Zone being a relatively small percentage (e.g., 6% uranium by mass) of the total dissolved-phase mass in the mining area Post-Decommissioning, as conceptualized in the model.

3. a), b) IR-71 Scenario: Lower / Higher Groundwater Recharge

The scenarios where future groundwater recharge was varied by +/- 20% due to future climate change did not appreciably change peak concentrations reaching Whitefish Lake. The findings of these simulations also support the IR-71 response wherein climate change was not simulated because it was expected to produce lower peak COPC concentrations at Whitefish Lake than the

Base Case. The simulation with lower groundwater recharge is interpreted to produce a lower hydraulic gradient, and thus a lower rate of groundwater flow from the mining area, than the Base Case. Conversely the higher groundwater recharge case provides more a greater volume of water moving through the sub-surface, resulting in a smaller relative contribution from the mining area. Both cases result in similar, but lower peak concentrations reaching Whitefish Lake.

4. IR-78 & 88 Scenario: Lower Effective Porosity within the Paleoweathered Zone

Reduction of the effective porosity within the Paleoweathered bedrock was shown to have the largest impact on simulated peak COPC concentrations reaching Whitefish Lake. Slightly higher peak concentrations than the Base Case were simulated for a suite of COPCs (i.e., As, Cd, Co, P, Ra, Se, Sr, U, Zn). This simulation reflects a reduced ability for matrix diffusion to contain mass within the Paleoweathered zone and slowly release it over time. With the exception of dissolved iron (Fe) and manganese (Mn) concentrations, none of the other (relatively) elevated COPC concentrations reached levels above GQSC within the simulated timeframe. Based on simulated trends, showing decreasing concentrations at depth, additional COPC concentrations are not expected to exceed GQSC even further into the future.

5. IR-96 Scenario: Lower Transverse Dispersivity

Reduction of the transverse dispersivity to maintain a ratio of 10:1 for the longitudinal to transverse dispersivity values resulted in higher COPC concentrations reaching Whitefish Lake than for the Base Case. For this scenario, the longitudinal dispersivity remained at the Base Case level (i.e., 10 m), while the transverse dispersivity value was reduced to 1m (5m in the Base Case). As in the other simulated cases, with the exception of dissolved iron (Fe) and manganese (Mn) concentrations, none of the other COPC concentrations reached levels above GQSC within the simulated timeframe.

Table IR-89-R1-1: Peak Groundwater Concentrations Reaching Whitefish Lake: Alternative Scenarios Consistent with Observed Conditions (all concentrations in mg/L)

| COPC | Groundwater Quality Screening Criteria | EIS Base Case | 1. IR-55 Alternative Calibration (K _{ISA} = 1.0E-7 m/s; K _{DSZ} = 4.0E-5 m/s) | 2. IR-70 High Ore Zone Hydraulic Conductivity Post Decommissioning (K _{OZ} = 5.0E-5 m/s) | 3a. IR-71 20% Lower Groundwater Recharge | 3b. IR-71 20% Higher Groundwater Recharge | 4. IR 78 & 88 Lower Effective Porosity Paleoweathered Zone (1%) | 5. IR-96 Lower Transverse Dispersivity (α _{TV} = α _{TH} = 1.0m) | Comment |
|------------------------|--|---------------|--|---|---|--|---|--|--|
| Al | 0.05 | 3.0E-02 | 3.0E-02 | 3.0E-02 | 4.1E-02 | 3.9E-02 | 3.7E-02 | 4.3E-02 | Naturally near GQSC, Peak @ 750 yrs. |
| As | 0.005 | 3.2E-04 | 3.1E-04 | 3.2E-04 | 3.2E-04 | 3.2E-04 | 3.4E-04 | 3.3E-04 | Naturally near GQSC, Peak @ 2000-3000 yrs. |
| Ba | -- | 3.9E-02 | 3.5E-02 | 3.9E-02 | | | 3.9E-02 | | Background |
| Ca | -- | 7.0 | 4.5 | 7.8 | 7.2 | 6.9 | 6.6 | 12 | Peak @ 400 yrs. |
| Cd | 4.0x10 ⁻⁵ | 1.1E-05 | 1.0E-05 | 1.1E-05 | 1.1E-05 | 1.1E-05 | 1.2E-05 | 1.1E-05 | Peak @ 500-3000 yrs. |
| Cl | 120 | 9.9 | 7.1 | 10.9 | 10.1 | 9.8 | 9.5 | 14.6 | Peak @ 400 yrs. |
| Co | 7.8x10 ⁻⁴ | 4.2E-04 | 4.2E-04 | 4.3E-04 | 4.2E-04 | 4.2E-04 | 4.5E-04 | 4.5E-04 | Late time peak |
| Cr | 8.9x10 ⁻³ | 5.3E-04 | 5.2E-04 | 5.3E-04 | | | 5.3E-04 | | Peak @ 500 yrs. |
| Cu | 2.0x10 ⁻³ | 7.0E-04 | 7.0E-04 | 6.9E-04 | | | 7.8E-04 | | Late time peak |
| F | -- | 6.1E-02 | 6.0E-02 | 6.1E-02 | | | 6.2E-02 | | Late time peak |
| Fe | 0.3 | 1.9 | 0.66 | 2.4 | 2.0 | 1.9 | 2.0 | 4.4 | Peak @ 400 yrs. |
| K | -- | 3.1 | 3.2 | 3.1 | 3.1 | 3.0 | 2.9 | 3.4 | Background |
| Mg | -- | 2.8 | 2.8 | 2.8 | 2.8 | 2.7 | 2.7 | 3.9 | Background |
| Mn | 0.23 | 0.28 | 0.22 | 0.28 | | | 0.28 | | Peak @ 400 yrs. |
| Mo | 31 | 3.1E-03 | 7.3E-04 | 9.2E-04 | | | 8.6E-04 | | Peak @ 400 yrs. |
| Na | -- | 5.1 | 4.5 | 5.4 | 5.2 | 5.0 | 6.4 | 7.6 | Peak @ 400 yrs. |
| Ni | 2.5x10 ⁻² | 1.9E-03 | 1.9E-03 | 1.9E-03 | 1.9E-03 | 1.9E-03 | 1.9E-03 | 2.0E-03 | Background |
| P | -- | 7.4E-02 | 5.8E-02 | 7.4E-02 | 1.2E-04 | 1.2E-04 | 9.4E-02 | 1.3E-04 | Peak @ 500 yrs. |
| Pb | 1.0x10 ⁻³ | 1.2E-04 | 1.2E-04 | 1.2E-04 | | | 1.2E-04 | | Background |
| Ra | 3.0x10 ⁻⁹ | 2.3E-09 | 1.8E-09 | 2.1E-09 | | | 2.6E-09 | | Peak @ 400 years and at late time |
| SO ₄ | 128 | 13 | 3.5 | 16 | 13 | 12 | 13 | 30 | Peak @ 400 yrs. |
| Se | 2.0x10 ⁻³ | 8.4E-04 | 8.2E-04 | 8.4E-04 | 8.4E-04 | 8.3E-04 | 8.4E-04 | 8.7E-04 | Peak @ 400-800 yrs. |
| Sr | 2.5 | 1.2E-01 | 7.7E-02 | 1.4E-01 | | | 1.2E-01 | | Peak @ 400 yrs. |
| Th | 1.24x10 ⁻⁴ | 3.2E-08 | 3.0E-08 | 3.1E-08 | | | 3.7E-08 | | Background |
| U | 0.015 | 5.4E-04 | 5.3E-04 | 5.4E-04 | 5.5E-04 | 5.5E-04 | 1.3E-03 | 6.0E-04 | Late time peak |
| V | 0.12 | 6.6E-03 | 1.0E-04 | 1.3E-04 | | | 1.3E-04 | | Peak @ 400 yrs. |
| Zn | 0.011 | 4.7E-03 | 4.6E-03 | 4.8E-03 | | | 5.1E-03 | | Late time peak |
| Simulated Time (years) | | 8720 | 7600 | 6400 | 5600 | 10000 | 10000 | 10000 | |

Summary of Additional Simulation Results

Additional long-term predictive simulations of COPC transport were undertaken to evaluate the areas of uncertainty highlighted within the second round IRs. Scenarios tested were limited to those that were consistent with, or did not contradict, available observations. The areas of uncertainty included:

- 1) Hydraulic conductivity of the Intermediate Sandstone Aquitard ($1.0\text{E-}07$ m/s), Desilicified Zone ($1.4\text{E-}04$ m/s), and Lower Sandstone Aquifer ($4.1\text{E-}05$ m/s). The alternative calibrated scenario presented contained higher hydraulic conductivities than the Base Case model for each of these hydrogeologic units with increases of 10, 28, and 4, respectively.
- 2) Hydraulic conductivity of the Ore Zone post-decommissioning was increased to $5.0\text{E-}05$ m/s, which is a factor of 10 higher than the overlying Lower Sandstone Aquifer. It is considered to reflect a very high value that could result due to the dissolution mining process.
- 3) Groundwater recharge was varied by $\pm 20\%$ to evaluate potential future climate change impacts on groundwater flow and subsequent COPC transport.
- 4) The effective porosity of the Paleoweathered zone was lowered by a factor of 10 to evaluate a case where the mass was less persistent within this unit, which is the deepest portion of the source zone.
- 5) The transverse dispersivity value was lowered by a factor of 5 to achieve the requested 10:1 ratio between longitudinal and transverse dispersivity values.

All additional scenarios produced similar predicted peak COPC concentrations reaching Whitefish Lake. All scenarios produced concentrations of primary COPCs at Whitefish Lake that are below the groundwater quality screening criteria established, with the exception of iron and manganese due to naturally high background levels, as reported within the EIS.

The key understanding gained, or further supported, through these simulations is that the natural groundwater system has a high assimilative capacity such that reasonable changes to parameters do not produce concentrations of COPCs at Whitefish Lake that exceed the groundwater quality screening criteria (with the exceptions of dissolved manganese and iron, which naturally occur at elevated concentrations). As the peak concentrations reaching Whitefish Lake do not exceed groundwater quality screening criteria within these additional scenarios, no additional or enhanced risk to the natural environment is expected.

References

Erler, A. R., Frey, S. K., Khader, O., d'Orgeville, M., Park, Y.J., Hwang, H. T., et al. (2019). Evaluating climate change impacts on soil moisture and groundwater resources within a Lake affected region. *Water Resources Research*, 55, 8142–8163. <https://doi.org/10.1029/2018WR023822>

Gelhar, L.W., Welty, C., & Rehfeldt, K.R. (1992). A critical review of data on field-scale dispersion in aquifers. *Water Resources Research* 28, no. 7, 1955-1974.

ATTACHMENT IR-89-R1 (Round 3 response)

Denison has corrected typographical errors in the Updated Draft EIS in the final EIS pertaining to the geomean hydraulic conductivity values for the Desilicified Zone (DSZ). ECCC is correct in noting that a lack of detail was provided on how the updated geomean K value in the DSZ reported in the Updated Draft EIS was arrived upon/calculated. Details on this matter are provided in Section 4.0, below.

Sections 1.0 through 3.0 of this IR response are unchanged from the response provided to Round 2 IR comments on February 10, 2024.

1.0 Introduction

Simulations of conditions that extend beyond the range of conditions supported by the monitoring data (i.e., calibration-constrained conditions) is inappropriate for an EIS as it suggests that unrepresentative, potentially misleading scenarios should be tested, documented, and presented as potential outcomes. In the SME's view this would confuse the groundwater transport and associated risk discussions.

While we do not support development of un-calibrated scenarios for inclusion within the EIS, additional scenarios that did not violate field observation data were evaluated as part of this response. These scenarios further demonstrate the robust nature of the hydrogeologic setting, which has been shown to have a high assimilative capacity.

Additional groundwater flow and geochemical reactive transport modelling scenarios were performed in response to:

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2. IR-70, wherein a higher hydraulic conductivity within the Ore Zone post-decommissioning was tested. This is an uncertain parameter which is unconstrained by calibration data.
3. IR-71, wherein uncertainty in future groundwater recharge rates were evaluated by varying rates by +/- 20%. Future groundwater recharge is an uncertain parameter which is unconstrained by calibration data.
4. IRs 78 & 88, wherein the effective porosity of the Paleoweathered zone was reduced by an order of magnitude to allow the initial source mass to migrate toward receptors 10-times faster. Effective porosity of the Paleoweathered zone is an uncertain parameter which is unconstrained by calibration data.
5. IR-96, wherein the transverse dispersivity was reduced to 1m to be consistent with ratios of longitudinal-to-transverse dispersivity published in the literature (e.g., Gelhar et al.; 1992) based on anisotropic settings. Transverse dispersivity is an uncertain parameter which is unconstrained by calibration data.

2.0 Post-Decommissioning Scenarios: Simulation Approach

Post-decommissioning reactive transport was evaluated using the same sub-domain model as was used for all other scenarios presented within the EIS. The sub-domain model area and mesh were unchanged from previous simulations.

Where applicable (i.e., for IR-55), groundwater flow boundary condition values were updated to reflect the revised groundwater flow solution, and the hydrogeologic property values were updated to match those within the alternatively calibrated groundwater flow model. For all other simulations, only individual parameter values (e.g., hydraulic conductivity, recharge, porosity or dispersivity) were altered.

Transport boundary conditions and parameters were left unchanged from the Base Case condition. The 3D geochemical reactive transport simulation was completed using FEFLOW coupled with PiChem (i.e., the same approach followed for earlier simulations). The PHREEQC database, boundary and initial conditions, and simulation approach were the same as described within the EIS for the Base Case scenario. The full suite of 31 constituents was applied for selected scenarios, however as those simulations can take 3 to 4 weeks to complete, not all scenarios were able to be run with the full suite of constituents.

1. IR-55 Scenario: Higher Hydraulic Conductivity - Intermediate Sandstone Aquitard

The IR-55 scenario documents an alternative calibrated groundwater flow model which was developed with a hydraulic conductivity of $1.0\text{E-}07$ m/s within the Intermediate Sandstone Aquitard. This scenario also contained higher hydraulic conductivity values within the Desilicified Zone ($1.4\text{E-}04$ m/s) and Lower Sandstone Aquifer ($4.1\text{E-}05$ m/s); as such, the deeper units along the flow path between the Ore Zone and Whitefish Lake were all simulated as having increased hydraulic conductivity values. To maintain calibration, shallow materials along the flow path between the Ore Zone and Whitefish Lake were simulated to have a lower hydraulic conductivity than the Base Case (e.g., Overburden and Upper Sandstone Aquifer). For a full list of parameter values see the IR-55 groundwater flow response.

In general, the alternative calibrated model does not fit the observation data as well as the Base Case simulation presented within the EIS; however, the calibration statistics are acceptable. The alternative calibrated groundwater flow model results in higher volumes of groundwater flow converging upon Whitefish Lake, which lead to greater dilution potential for flow from depth, through the Ore Zone/mining area. As such, it is considered a less-conservative modelled scenario than those already presented within the EIS.

2. IR-70 Scenario: Higher Hydraulic Conductivity – Ore Zone

The hydraulic conductivity of the material remaining post mining within the Ore Zone, and the surrounding clay-rich or sulphide cemented units (i.e., natural barriers), is uncertain. Review comments have suggested that the impact of a higher value for hydraulic conductivity within the Ore Zone needs to be evaluated. While the hydraulic conductivity of the Ore Zone is not considered critical to predictions as it is only a small portion of the source area (i.e., 6% of the assumed Post-Decommissioning source mass), an additional scenario was performed to reflect the uncertainty in the post-mining hydraulic conductivity within the Ore Zone and the surrounding barrier zones; for this scenario the Ore Zone and natural barriers were treated as one uniform zone. As this is a future condition after the uranium ore

and associated minerals have been removed, this parameter cannot be calibrated with current data. It is expected that the hydraulic conductivity of the Ore Zone and barriers will be enhanced due to mining, and thus a conservatively high hydraulic conductivity value of $5.0\text{E-}05$ m/s was assigned for this scenario. This value reflects the understanding that the voids created through mining will be infilled with the overlying desilicified sandstone (i.e., the altered sandstone within the Lower Sandstone Aquifer), and may have a higher hydraulic conductivity than currently within the Lower Sandstone Aquifer (i.e., $5.0\text{E-}06$ m/s).

3. a), b) IR-71 Scenario: Lower / Higher Groundwater Recharge

Recognizing that future climate conditions are uncertain, and that the predicted timespan of migration of chemical constituents from within the mining area to Whitefish Lake requires centuries to millennia, the future climate is uncertain. A reduction in groundwater recharge is considered most likely due to enhanced evapotranspiration and surface water runoff; such a reduction would reduce groundwater flow rates which is considered to be less conservative than scenarios presented within the EIS. While current groundwater recharge can be calibrated based on field observations (e.g., stream baseflow, water level fluctuations, etc.), groundwater recharge in future centuries cannot be calibrated.

Review of future climate predictions presented by Environment Canada (climatedata.ca – Key Lake) indicates precipitation will increase by 11 to 15%, and temperature will increase by 2.5 to 4.6°C. The future change in groundwater recharge is not specified but based on the range of variability that others (e.g., Erler et al., 2019) have found for the foreseeable future (i.e., end of century), a range of +/- 20% was selected for future recharge simulations.

4. IR-78 & 88 Scenario: Lower Effective Porosity within the Paleoweathered Zone

Effective porosity within the units where constituents of potential concern (COPCs) will remain post-mining will affect the persistence of COPCs within the source area, and the residence time within deeper units. Simulations within the EIS illustrate that the most persistent portion of the source area is within the Paleoweathered bedrock, and so the uncertainty of the effective porosity within this unit is considered to be most relevant. As noted in Appendix 7-C of the revised Draft EIS (Table 4-2), the effective porosity within the Paleoweathered zone was enhanced to account for potential matrix diffusion effects. The scenario herein presents the change in predicted conditions if the effective porosity of the Paleoweathered zone is reduced by an order of magnitude, as would be consistent with lesser matrix diffusion effects. This value is not constrained by model calibration.

5. IR-96 Scenario: Lower Transverse Dispersivity

Dispersivity values incorporated within geochemical reactive transport calculations impact the degree of mass spreading as hydrogeologic heterogeneities are experienced. A wealth of literature is available to document that longer plumes experience greater dispersion as they flow through larger volumes of heterogeneous subsurface materials. While reviewers agree with the magnitude of dispersivity values applied within the EIS scenarios, the ratio of dispersivity along the flow paths (i.e., longitudinal) to perpendicular from the flow paths (i.e., transverse) was questioned. In settings with high degrees of anisotropy created by depositional variations (e.g., horizontally stratified sediments such as fluvial sands with silt interbeds), the ratio between longitudinal and transverse dispersivity has been shown to be 100:1 (Gelhar et al.; 1992), particularly for the transverse dispersion component across lower conductivity features such as silt interbeds within sand aquifers (i.e., vertical transverse dispersion in a

horizontally dominated flow field). For the Denison Mines setting, where the hydrogeologic material of interest is within hydrothermally altered (i.e., desilicified) sandstone, transverse dispersion is expected to be relatively high and isotropic to be consistent with the isotropic hydraulic conductivity of desilicified sediments. Further, as flow is not horizontally dominated (e.g., vertically upward flow through the Desilicified Zone) differentiating transverse components of dispersivity is not appropriate for this setting.

Since this parameter cannot practically be field verified, nor is it constrained through groundwater flow model calibration, an additional scenario with a lower transverse dispersion rate, such that a 10:1 ratio of longitudinal to transverse dispersion was evaluated.

3.0 Reactive Transport Predictions at Whitefish Lake

Table IR-89-R1-1 presents the transport results simulated for the above scenarios; the Base Case conditions are also provided for comparison. In general, the peak concentrations reaching Whitefish Lake were similar to the Base Case simulation and are within the range of simulation results presented within the EIS. As such these simulation results do not further expand the range of potential outcomes already presented. Further, the simulations indicate that groundwater quality screening criteria (GQSC) are only exceeded for dissolved manganese and iron, as was presented within the EIS.

1. IR-55 Scenario: Higher Hydraulic Conductivity - Intermediate Sandstone Aquitard

For the IR-55 scenario, which had a hydraulic conductivity of $1.0\text{E-}07$ m/s within the Intermediate Sandstone Aquitard, concentrations were simulated to be lower (i.e., less conservative) than the Base Case scenario. This is expected to be due to enhanced mixing with fresh water as a result of higher volumes of groundwater flow through those zones with higher hydraulic conductivity values. Under the IR-55 alternative calibrated case, the hydraulic gradient remained relatively unchanged to be consistent with the observed water levels, and thus the groundwater flow rates converging on Whitefish Lake were increased (see simulated baseflow: IR-55), resulting in a decreased contribution of flow from the deep aquifers relative to the total volumetric groundwater flow into Whitefish lake. This results in an overall reduction in the peak concentrations of COPCs in groundwater beneath Whitefish Lake.

2. IR-70 Scenario: Higher Hydraulic Conductivity – Ore Zone

Simulating a higher hydraulic conductivity for the Ore Zone post mining produced similar peak concentrations reaching Whitefish Lake as the Base Case scenario. As an increase of the hydraulic conductivity by more than one order of magnitude did not make an appreciable difference in the simulated peak concentrations reaching Whitefish Lake, we re-affirm that the hydraulic conductivity of the Ore Zone is not a controlling parameter for mass discharge reaching Whitefish Lake. This is consistent with the mass within the Ore Zone being a relatively small percentage (e.g., 6% uranium by mass) of the total dissolved-phase mass in the mining area Post-Decommissioning, as conceptualized in the model.

3. a), b) IR-71 Scenario: Lower / Higher Groundwater Recharge

The scenarios where future groundwater recharge was varied by +/- 20% due to future climate change did not appreciably change peak concentrations reaching Whitefish Lake. The findings of these simulations also support the IR-71 response wherein climate change was not simulated because it was expected to produce lower peak COPC concentrations at Whitefish Lake than the Base Case. The

simulation with lower groundwater recharge is interpreted to produce a lower hydraulic gradient, and thus a lower rate of groundwater flow from the mining area, than the Base Case. Conversely the higher groundwater recharge case provides more a greater volume of water moving through the sub-surface, resulting in a smaller relative contribution from the mining area. Both cases result in similar, but lower peak concentrations reaching Whitefish Lake.

4. IR-78 & 88 Scenario: Lower Effective Porosity within the Paleoweathered Zone

Reduction of the effective porosity within the Paleoweathered bedrock was shown to have the largest impact on simulated peak COPC concentrations reaching Whitefish Lake. Slightly higher peak concentrations than the Base Case were simulated for a suite of COPCs (i.e., As, Cd, Co, P, Ra, Se, Sr, U, Zn). This simulation reflects a reduced ability for matrix diffusion to contain mass within the Paleoweathered zone and slowly release it over time. With the exception of dissolved iron (Fe) and manganese (Mn) concentrations, none of the other (relatively) elevated COPC concentrations reached levels above GQSC within the simulated timeframe. Based on simulated trends, showing decreasing concentrations at depth, additional COPC concentrations are not expected to exceed GQSC even further into the future.

5. IR-96 Scenario: Lower Transverse Dispersivity

Reduction of the transverse dispersivity to maintain a ratio of 10:1 for the longitudinal to transverse dispersivity values resulted in higher COPC concentrations reaching Whitefish Lake than for the Base Case. For this scenario, the longitudinal dispersivity remained at the Base Case level (i.e., 10 m), while the transverse dispersivity value was reduced to 1m (5m in the Base Case). As in the other simulated cases, with the exception of dissolved iron (Fe) and manganese (Mn) concentrations, none of the other COPC concentrations reached levels above GQSC within the simulated timeframe.

Table IR-89-R1-1: Peak Groundwater Concentrations Reaching Whitefish Lake: Alternative Scenarios Consistent with Observed Conditions (all concentrations in mg/L)

| COPC | Groundwater Quality Screening Criteria | EIS Base Case | 1. IR-55 Alternative Calibration (K _{ISA} = 1.0E-7 m/s; K _{DSZ} = 1.4E-4 m/s) | 2. IR-70 High Ore Zone Hydraulic Conductivity Post Decommissioning (K _{OZ} = 5.0E-5 m/s) | 3a. IR-71 20% Lower Groundwater Recharge | 3b. IR-71 20% Higher Groundwater Recharge | 4. IR 78 & 88 Lower Effective Porosity Paleoweathered Zone (1%) | 5. IR-96 Lower Transverse Dispersivity (α _{TV} = α _{TH} = 1.0m) | Comment |
|------------------------|--|---------------|--|--|---|--|---|---|--|
| Al | 0.05 | 3.0E-02 | 3.0E-02 | 3.0E-02 | 4.1E-02 | 3.9E-02 | 3.7E-02 | 4.3E-02 | Naturally near GQSC, Peak @ 750 yrs. |
| As | 0.005 | 3.2E-04 | 3.1E-04 | 3.2E-04 | 3.2E-04 | 3.2E-04 | 3.4E-04 | 3.3E-04 | Naturally near GQSC, Peak @ 2000-3000 yrs. |
| Ba | -- | 3.9E-02 | 3.5E-02 | 3.9E-02 | | | 3.9E-02 | | Background |
| Ca | -- | 7.0 | 4.5 | 7.8 | 7.2 | 6.9 | 6.6 | 12 | Peak @ 400 yrs. |
| Cd | 4.0x10 ⁻⁵ | 1.1E-05 | 1.0E-05 | 1.1E-05 | 1.1E-05 | 1.1E-05 | 1.2E-05 | 1.1E-05 | Peak @ 500-3000 yrs. |
| Cl | 120 | 9.9 | 7.1 | 10.9 | 10.1 | 9.8 | 9.5 | 14.6 | Peak @ 400 yrs. |
| Co | 7.8x10 ⁻⁴ | 4.2E-04 | 4.2E-04 | 4.3E-04 | 4.2E-04 | 4.2E-04 | 4.5E-04 | 4.5E-04 | Late time peak |
| Cr | 8.9x10 ⁻³ | 5.3E-04 | 5.2E-04 | 5.3E-04 | | | 5.3E-04 | | Peak @ 500 yrs. |
| Cu | 2.0x10 ⁻³ | 7.0E-04 | 7.0E-04 | 6.9E-04 | | | 7.8E-04 | | Late time peak |
| F | -- | 6.1E-02 | 6.0E-02 | 6.1E-02 | | | 6.2E-02 | | Late time peak |
| Fe | 0.3 | 1.9 | 0.66 | 2.4 | 2.0 | 1.9 | 2.0 | 4.4 | Peak @ 400 yrs. |
| K | -- | 3.1 | 3.2 | 3.1 | 3.1 | 3.0 | 2.9 | 3.4 | Background |
| Mg | -- | 2.8 | 2.8 | 2.8 | 2.8 | 2.7 | 2.7 | 3.9 | Background |
| Mn | 0.23 | 0.28 | 0.22 | 0.28 | | | 0.28 | | Peak @ 400 yrs. |
| Mo | 31 | 3.1E-03 | 7.3E-04 | 9.2E-04 | | | 8.6E-04 | | Peak @ 400 yrs. |
| Na | -- | 5.1 | 4.5 | 5.4 | 5.2 | 5.0 | 6.4 | 7.6 | Peak @ 400 yrs. |
| Ni | 2.5x10 ⁻² | 1.9E-03 | 1.9E-03 | 1.9E-03 | 1.9E-03 | 1.9E-03 | 1.9E-03 | 2.0E-03 | Background |
| P | -- | 7.4E-02 | 5.8E-02 | 7.4E-02 | 1.2E-04 | 1.2E-04 | 9.4E-02 | 1.3E-04 | Peak @ 500 yrs. |
| Pb | 1.0x10 ⁻³ | 1.2E-04 | 1.2E-04 | 1.2E-04 | | | 1.2E-04 | | Background |
| Ra | 3.0x10 ⁻⁹ | 2.3E-09 | 1.8E-09 | 2.1E-09 | | | 2.6E-09 | | Peak @ 400 years and at late time |
| SO ₄ | 128 | 13 | 3.5 | 16 | 13 | 12 | 13 | 30 | Peak @ 400 yrs. |
| Se | 2.0x10 ⁻³ | 8.4E-04 | 8.2E-04 | 8.4E-04 | 8.4E-04 | 8.3E-04 | 8.4E-04 | 8.7E-04 | Peak @ 400-800 yrs. |
| Sr | 2.5 | 1.2E-01 | 7.7E-02 | 1.4E-01 | | | 1.2E-01 | | Peak @ 400 yrs. |
| Th | 1.24x10 ⁻⁴ | 3.2E-08 | 3.0E-08 | 3.1E-08 | | | 3.7E-08 | | Background |
| U | 0.015 | 5.4E-04 | 5.3E-04 | 5.4E-04 | 5.5E-04 | 5.5E-04 | 1.3E-03 | 6.0E-04 | Late time peak |
| V | 0.12 | 6.6E-03 | 1.0E-04 | 1.3E-04 | | | 1.3E-04 | | Peak @ 400 yrs. |
| Zn | 0.011 | 4.7E-03 | 4.6E-03 | 4.8E-03 | | | 5.1E-03 | | Late time peak |
| Simulated Time (years) | | 8720 | 7600 | 6400 | 5600 | 10000 | 10000 | 10000 | |

Summary of Additional Simulation Results

Additional long-term predictive simulations of COPC transport were undertaken to evaluate the areas of uncertainty highlighted within the second round IRs. Scenarios tested were limited to those that were consistent with, or did not contradict, available observations. The areas of uncertainty included:

- 1) Hydraulic conductivity of the Intermediate Sandstone Aquitard ($1.0\text{E-}07$ m/s), Desilicified Zone ($1.4\text{E-}04$ m/s), and Lower Sandstone Aquifer ($4.1\text{E-}05$ m/s). The alternative calibrated scenario presented contained higher hydraulic conductivities than the Base Case model for each of these hydrogeologic units with increases of 10, 28, and 4, respectively.
- 2) Hydraulic conductivity of the Ore Zone post-decommissioning was increased to $5.0\text{E-}05$ m/s, which is a factor of 10 higher than the overlying Lower Sandstone Aquifer. It is considered to reflect a very high value that could result due to the dissolution mining process.
- 3) Groundwater recharge was varied by +/- 20% to evaluate potential future climate change impacts on groundwater flow and subsequent COPC transport.
- 4) The effective porosity of the Paleoweathered zone was lowered by a factor of 10 to evaluate a case where the mass was less persistent within this unit, which is the deepest portion of the source zone.
- 5) The transverse dispersivity value was lowered by a factor of 5 to achieve the requested 10:1 ratio between longitudinal and transverse dispersivity values.

All additional scenarios produced similar predicted peak COPC concentrations reaching Whitefish Lake. All scenarios produced concentrations of primary COPCs at Whitefish Lake that are below the groundwater quality screening criteria established, with the exception of iron and manganese due to naturally high background levels, as reported within the EIS.

The key understanding gained, or further supported, through these simulations is that the natural groundwater system has a high assimilative capacity such that reasonable changes to parameters do not produce concentrations of COPCs at Whitefish Lake that exceed the groundwater quality screening criteria (with the exceptions of dissolved manganese and iron, which naturally occur at elevated concentrations). As the peak concentrations reaching Whitefish Lake do not exceed groundwater quality screening criteria within these additional scenarios, no additional or enhanced risk to the natural environment is expected.

4.0 Geomean Hydraulic Conductivity Calculation for the Desilicified Zone

This response is also related to the response provided to AD-66, on February 10, 2024.

There was an error made during the calculation of the geomean hydraulic conductivity value (K) for the Desilicified Zone as part of the Draft EIS, submitted in October, 2022. Within the Draft EIS, available field-testing based estimates of hydraulic conductivity values for the Wheeler River project were compiled in Table C-1 (Appendix 7-A). The error made in calculating the geomean K value is detailed in Figure IR-89-R1-1, which shows an excerpt of Table C-1 from the Draft EIS (Appendix 7-A). Specifically, the K value of 3×10^{-5} m/s estimated from a packer test at WR-405 was included erroneously in the original geomean K value calculation for the Desilicified Zone. We reviewed the interval tested at WR-405 (356.4 – 379.6 m deep) with respect to delineation of the Lower Sandstone Aquifer and Desilicified Zone. Shown in Figure IR-89-R1-2 is a cross section displaying rock core friability, the interpreted extent

of the Desilicified Zone presented Appendix 7-A of the Draft EIS, and the packer interval at WR-405. This figure illustrates that the packer interval, and thus the associated K value at WR-405, is representative of the Lower Sandstone Aquifer, and not the Desilicified Zone, as was documented in Table C-1 of Appendix 7-A in the (October, 2022) Draft EIS. Thus, during preparation of the Updated Draft EIS, submitted in February, 2024, the error was corrected; omitting the packer test within WR-405, the geomean K value for the Desilicified Zone was recalculated to be 4.8×10^{-6} m/s.

Noted also is that in correcting the geomean K value for the Desilicified Zone in the Updated EIS, the associated range of K values from the field testing was erroneously not updated. That has been corrected in the Final EIS. The correct range of field-measured K values for the Desilicified Zone is 1×10^{-6} m/s to 2×10^{-5} m/s, as shown in Figure IR-89-R1-1. The calibrated K value for the Desilicified Zone was 5×10^{-6} m/s, which is in the middle of the observed range, and consistent with the revised geomean value.

Table C-1 Summary of Hydraulic Testing Data and Conductivity Values

| Well Name | Hydrostratigraphic Unit | Lithologic Unit | Estimated K (m/s) | Comment | Type of Hydraulic Test | Reference | Direction | Depth to Screen/ Packer (m) | |
|-----------|-------------------------|------------------------------|-------------------|--|------------------------|----------------|-----------|-----------------------------|--------|
| | | | | | | | | Top | Bottom |
| WR-555 | Desilicified Zone | MFb | 1.00E-06 | Did packer seal? | Packer test | Golder, 2014 | Vertical | 213.7 | 256.5 |
| WR-555 | | MFb | 1.00E-05 | | Packer test | Golder, 2014 | Vertical | 255.9 | 298.5 |
| GWR-014 | | MFc | 8.70E-06 | | Packer test | Scibek, 2019 | Vertical | 149.0 | 158.0 |
| WR-555 | | MFa | 2.00E-05 | | Packer test | Golder, 2014 | Vertical | 281.7 | 363.3 |
| GWR-047 | | MFb | 2.70E-06 | | Pumping test | Petrotek, 2021 | Vertical | 279.0 | 282.2 |
| GWR-048 | | MFa | 2.70E-06 | | Pumping test | Petrotek, 2021 | Vertical | 379.0 | 382.0 |
| WR-405 | Lower Sandstone Aquifer | MFa | 3.00E-05 | Packer stayed inflated Pumping well | Packer test | SRK, 2017 | Vertical | 356.4 | 379.6 |
| GWR-008 | | MFa | 1.30E-05 | | Packer test | Scibek, 2019 | Oriented | 369.0 | 380.0 |
| GWR-025 | | MFa | 6.60E-06 | | Packer test | Scibek, 2019 | Vertical | 374.0 | 380.0 |
| GWR-033 | | MFa | 4.00E-06 | | Pseudo Pump Test | Appendix D | Vertical | 345.6 | 351.6 |
| GWR-048 | | MFa | 2.70E-06 | | Pumping test | Petrotek, 2021 | Vertical | 379.0 | 382.0 |
| WR-555 | | MFa, Barrier Zones, Ore zone | 2.00E-06 | | Packer test | Golder, 2014 | Vertical | 365.5 | 409.5 |
| WR-594 | | MFa | 2.50E-07 | | Open Hole | SRK, 2015 | Oriented | 451.2 | 489.0 |
| WR-601 | | MFa and Basement | 1.30E-06 | | Packer test | SRK, 2015 | Oriented | 376.2 | 822.0 |

Calculated geomean K value for Desilicified Zone = 4.8×10^{-6} m/s

Calculated geomean value for Desilicified Zone erroneously including measured value in the LSA at WR-405

Figure IR-89-R1-1: Details on data used in updated calculation of geomean hydraulic conductivity value for the Desilicified Zone

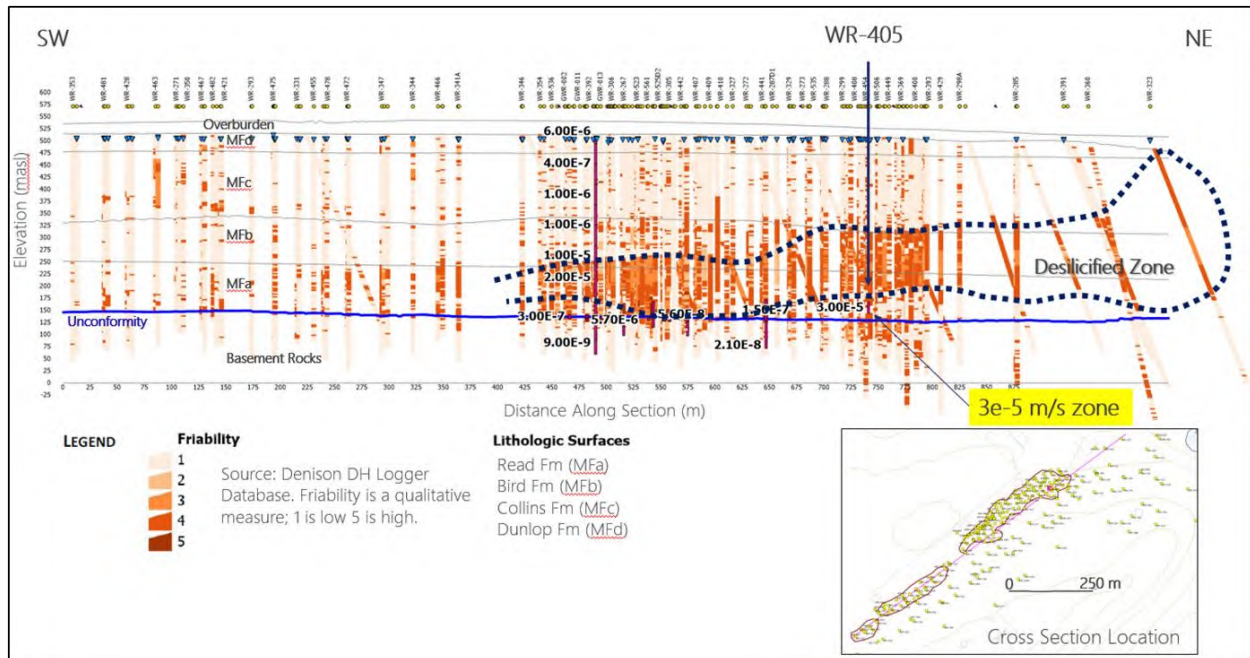


Figure IR-89-R1-2: Packer Testing Interval at WR-405, in the Lower Sandstone Aquifer

References

- Erlar, A. R., Frey, S. K., Khader, O., d'Orgeville, M., Park, Y.J., Hwang, H. T., et al. (2019). Evaluating climate change impacts on soil moisture and groundwater resources within a Lake affected region. *Water Resources Research*, 55, 8142–8163. <https://doi.org/10.1029/2018WR023822>
- Gelhar, L.W., Welty, C., & Rehfeldt, K.R. (1992). A critical review of data on field-scale dispersion in aquifers. *Water Resources Research* 28, no. 7, 1955-1974.

- Department: HC
- Project Effects Link: Indigenous Peoples' health / Socio- economic conditions
- Reference to EIS, appendices, or supporting documentation: Section 8, (p. 8-195), Section 8.5.3, Table 8.5-2, (p. 8-226)

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, June 2024) |
|--------------|----------------|--|---|---|--|--|--|---|
| IR-100 | - | <p>Mercury is excluded as a COPC in the assessment. Inadequate consideration of mercury and methylmercury in fish and other country foods, and use of incorrect Hg-related health guideline values can underestimate the risks to human health among country food consumers.</p> <p>Context: Section 8 states “Mercury has not been identified as a COPC for the Project as it is currently not present in the receiving environment (i.e., background condition) at detectable concentrations and will not be produced as part of the mine process; therefore, it will not be discharged to the aquatic environment.</p> <p>However, it is understood that potential nutrient enrichment-related effects are possible and can be linked to increases in mercury in the environment” (p. 8-195).</p> <p>Table 8.5-2 shows that there is mercury present in the tissues of Northern Pike and White Sucker sampled in the waterbodies within the local study area and in Russell Lake. These fish are regularly consumed by nearby communities according to the ERFN 2017 dietary survey.</p> <p>In Section 8.5.3, fish tissue concentrations are compared to Health Canada’s human health risk- based maximum permissible mercury concentration (0.5 µg/g wet weight), which is applicable to most species of commercially sold fish rather than country foods.</p> <p>Rationale: It is recommended that mercury be listed as a COPC considering it is in fact present in fish tissue under existing conditions, the significant consumption of fish by the local Indigenous communities, and its toxicological significance to human health.</p> <p>Further, the Health Canada provisional tolerable daily intake (pTDI) value of 0.2 µg/kg/bw/day (Health Canada, 2007) is a more appropriate reference level when evaluating consumption of mercury in fish by Indigenous people, as it allows for the consideration of food consumption patterns in the risk assessment that differ from the general population and is protective of the most sensitive sub-group (i.e., developing fetus).</p> <p>It is important to note that methylmercury, rather than inorganic mercury, is generally the predominant mercury species present in fish and is also the most toxicologically significant form. The assumption of 100% of mercury in fish and other country food items being present as methylmercury ensures that the potential health risks are not underestimated. It is unclear, however, if the mercury data presented throughout the EIS represent total mercury, inorganic mercury or methylmercury.</p> | <p>1. Include mercury (including methylmercury) as a COPC in the assessment given the baseline presence of mercury in sampled fish, the potential increase of methylmercury in receiving waters due to nutrient enrichment resulting from the project, the significant fish consumption by the local population and that country foods, particularly fish, are an important source of dietary exposure to mercury.</p> <p>2. Assess health risks from fish consumption by calculating hazard quotients for baseline and predicted methylmercury levels in country foods using Health Canada’s pTDI for methylmercury (Health Canada, 2007).</p> <p>3. Clarify whether mercury data represented throughout the EIS represents total mercury, inorganic mercury or methylmercury.</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends including methylmercury in the list of COPCs to be monitored in fish throughout all project phases.</p> <p>See also related Advice to the Proponent: AD-31.</p> | <p>1. The intent is not to include mercury (and methylmercury) as a COPC for the assessment. As indicated in EIS Section 8.4.6.1, Residual Effects Characterization, mercury is not associated with the local geology and is not expected to be released in the effluent at measurable levels and was therefore not identified as a COPC. Denison notes that there is potential for increased methylmercury production in the receiving environment under a certain combination of factors to which the Project may contribute, such as increased nutrient levels in the environment; however, prediction of methylmercury production is not practical. Denison commits to monitoring mercury and methylmercury in the aquatic environment over the life of the Project to determine the potential changes in mercury concentrations in fish tissue over time.</p> <p>2. As the Project advances and operational monitoring is underway, Denison will assess health risks from fish consumption by comparing fish tissue data collected during operation from the monitoring program against Health Canada’s mercury guideline of 0.5 ug/g wet weight. This is a human health risk-based maximum permissible concentration.</p> <p>3. Mercury data presented throughout the draft EIS represents total mercury. Denison agrees to included methylmercury as part of the constituents monitored in fish throughout all project phases.</p> | <p>This response has not been accepted.</p> <p>Health Canada does not support the responses to points 1 and 2 of IR-100.</p> <p>1. The response to IR-100 point 1 indicates that mercury (including methylmercury) was not included as a COPC in the assessment because mercury is not associated with the local geology and therefore not expected to be released in the effluent at measurable levels, and because prediction of methylmercury production, based on a variety factors, is not practical. Health Canada continues to recommend that mercury (including methylmercury) be included in the assessment given</p> <p>1. the detected presence of mercury in fish under baseline conditions, and</p> <p>2. the high consumption rates of fish and other country foods by Indigenous land users, particularly intensive land users such as the Trapper receptor.</p> <p>2. The response to IR-100 point 2 continues to state that the HC maximum level (ML) for mercury of 0.5 µg/g (or 0.5 ppm) will be used to assess risks to human health from fish consumption during monitoring. The use of the HC ML for mercury is not appropriate in this case as it was developed for retail fish using consumption rates for the Canadian general population. Health Canada’s provisional tolerable daily intake (pTDI) values of 0.20 µg/kg bw/day day for young children and women of childbearing age (Health Canada, 2007) are more appropriate reference levels when evaluating consumption of mercury in fish by Indigenous people, as it allows for the consideration of food consumption patterns in the risk assessment that differ from those used to develop the ML for retail fish and is protective of the most sensitive sub-group (i.e., developing fetus).</p> <p>For instance, the HC Human Health Risk Assessment of Mercury in Fish and Health Benefits of Fish Consumption (Health Canada, 2007) currently employs 40 g as an estimate of daily fish intake by adults who are at the high end of fish intake. This rate is below the rate of consumption for intensive land users for the Project, which is ~500g of fish per day, meaning that the HC ML may not be protective of all land users/receptors.</p> <p>Health Canada reiterates its recommendation to assess health risks from fish consumption by calculating hazard quotients for baseline and predicted methylmercury levels in country foods using Health Canada’s pTDI values for methylmercury (Health Canada, 2007).</p> | <p>1. The EA scope does not include quantifying current risks that don’t have project activity connections. Per CSA N288.6 <i>Environmental Risk Assessments at Class I Nuclear Facilities and Uranium Mines and Mills</i>, Section 6.2.5.4 “The goal is to identify and describe the contaminants and physical stressors that are relevant to the site and operations and that require further quantitative evaluation. The contaminants identified for further evaluation are then referred to as COPCs. These decisions are based on information gathered during site characterization.”</p> <p>Mercury was not identified as a project issue based on mining and milling methods and though it is understood that mercury is a ubiquitous earth element at trace levels it is not identified as uniquely being associated with the local geology; as such, Denison does not believe it is appropriate to quantify existing risk when there is no incremental project risk. Public or existing concerns about mercury do not make this topic an EA question. At this time there is no way to accurately predict potential methylation rates.</p> <p>While the draft EIS (Section 8) highlights increased sulphate concentrations downstream of the Site during period of effluent discharge as a potential factor related to increased methylation (in the presence sulphate reducing bacteria in sediment), it is one of several factors in combination that would need to occur. For example, the IR highlights nutrient enrichment as a contributing factor –significantly increased primary productivity via enrich resulting in high levels of organic carbon in sediments (through algal senescence, deposition, decomposition). This could in fact be a contributing factor, but no such nutrient enrichment has been predicted in the draft EIS as no incremental Project-related nutrient source has been identified. Additionally, the draft EIS does not raise a concern that the Project would cause anoxia in study area lakes, another prerequisite for methylation driven by sulphate reducing bacteria. Denison and its SME’s believe that the treatment of mercury in the draft EIS is appropriate given the level of risk related to the Project. Denison acknowledges the concerns that have been raised by the Indigenous Communities of Concern through its engagement process, as well as those by the FIRT, and in response to those concerns has committed to implementing a mercury monitoring program.</p> <p>In addition to Denison’s future monitoring programs, there are provincial fish consumption guidelines for consumers available at: https://pubsaskdev.blob.core.windows.net/pubsask-prod/76439/76439-Mercury_in_SK_Fish_-_Guidelines_for_Consumption_-_2015.pdf. The guidelines in Saskatchewan for Russell Lake indicate the recommended number of meals per month for northern pike for the general and sensitive population. Further, the Eastern Athabasca Regional Monitoring Program (https://www.earmp.ca/) provides information on community monitoring programs which includes analysis of mercury in fish tissue. In the most recent 2022 EARMP report mercury was measured in lake trout and lake whitefish and the conclusions were that mercury levels were low (ranging from <0.01 mg/L to 0.5 mg/kg) and it was concluded that fish are safe to eat. Monitoring will continue as part of the program (EARMP+2022+2023+Community+Report.pdf (squarespace.com)). The results of the Wheeler River baseline fish tissue sampling program showed measured fish tissue concentrations near the Project in the range of 0.01 to 0.48 mg/kg, which is consistent with that observed in the EARMP. This would indicate that based on baseline conditions fish are considered safe to eat, and no further baseline assessment is warranted.</p> <p>2. As previously indicated, it is currently not practical to calculate hazard quotients for baseline and predicted methylmercury levels in country foods as there is no information on baseline methylmercury and no way to realistically predict the project related methylmercury. Denison has previously committed to a mercury monitoring program which will include assessment of mercury and methylmercury in fish tissue. That information can feed into future hazard quotient calculations if warranted. Denison agrees to use Health Canada’s 2007 provisional tolerable daily intake (pTDI) values of 0.20 µg/kg bw/day for young children and women of childbearing age for future assessments, or the relevant updated value at that time. Denison has committed to a monitoring and follow-up program, which will include measurements of fish health for comparison to baseline data and regulatory criteria (i.e., Canadian Tissue Residue</p> | <p>This IR remains not accepted. It is unclear what threshold concentration(s) of mercury in fish would trigger further assessment of potential health risks.</p> <p>The response to IR-100 includes a commitment to monitor mercury concentrations in fish, and to assess potential health risks if concentrations are greater than that used to derive the Government of Saskatchewan (GoS) guidelines for fish consumption (last updated in 2015). However, using this concentration as a threshold would not be protective of human health if the local population consumes greater quantities than the published consumption guideline.</p> <p>Please provide the following information:</p> <p>1. Discuss how the fish consumption rates from average and high traditional foods consumer groups (Section 10-A, Table 4-4: Annual Food Intakes for Components of the Human Receptor’s Diet) relate to the GoS fish consumption limits for general and sensitive populations.</p> <p>2. Justify the use of GoS guidelines for fish consumption for mercury monitoring in fish and as a trigger for possible management actions.</p> | <p>1. To clarify, Denison has not committed to using the Government of Saskatchewan guidelines for fish consumption and identified in the Round 2 IR response “Denison agrees to use Health Canada’s 2007 provisional tolerable daily intake (pTDI) values of 0.20 µg/kg bw/day for young children and women of childbearing age for future assessments, or the relevant updated value at that time.” The GoS guideline was provided in the IR response as an example of an existing guideline. Denison acknowledges that traditional food consumers may not be considered in the GoS guidelines or other guidelines. Denison has revised commitment 8-44 related to developing a trigger response mechanism related to interpreting results from country foods sampled, which would also apply to mercury and other constituents of interest such as lead. For completeness, the revised commitment 8-44 is provided here in quotations with revisions from version 1 to version 2 shown in bold:</p> <p>“1. The intent is not to include mercury (and methylmercury) as a COPC for the assessment. As indicated in EIS Section 8.4.6.1, Residual Effects Characterization, mercury is not associated with the local geology and is not expected to be released in the effluent at measurable levels and was therefore not identified as a COPC. Denison notes that there is potential for increased methylmercury production in the receiving environment under a certain combination of factors to which the Project may contribute, such as increased nutrient levels in the environment; however, prediction of methylmercury production is not practical. Denison commits to monitoring mercury and methylmercury in the aquatic environment over the life of the Project to determine the potential changes in mercury concentrations in fish tissue over time.</p> <p>2. As the Project advances and operational monitoring is underway, Denison will assess health risks from fish consumption by comparing fish tissue data collected during operation from the monitoring program against Health Canada’s mercury guideline of 0.5 ug/g wet weight, as applicable. This is a human health risk-based maximum permissible concentration. As part of the country food monitoring document, any site-specific contaminant criteria or trigger mechanisms will be developed to support operational licence applications, and in consultation with Indigenous Nations and communities.”</p> <p>The response to IR-212 in Denison’s round 2 submission provides a conceptual trigger-response mechanism which is reproduced below. The intent is to develop the details of the trigger-response mechanism in discussion and engagement with Indigenous Nations and communities.</p> <p>Response from IR-212 (Round 2) “A conceptual trigger-response mechanism framework related to sampling / monitoring of country foods is described for consideration that would be the basis of detailed plans developed in the next phase of Project approvals.</p> <ul style="list-style-type: none">• Conceptually, screening criteria would be defined in consideration of increasing trends measured in environmental media relative to background.• Where a screening criteria/threshold/benchmark was triggered, an investigation would be initiated to verify the result and to determine if the change in concentration is significant relative to background. This could include lab reanalysis, review of QA/QC data and field notes, reconnaissance, re-sampling or additional sampling and/or additional analyses. Potential causes of the increasing trend would be investigated to establish whether the trend was Project related, and the investigation may be informed by mine operations data (e.g., water treatment performance), climatic data, local and Indigenous knowledge, and background data from reference locations in the region.• If the investigation confirms that the criteria/threshold/benchmark criteria was triggered by the Project, additional analyses such as modelling, toxicity testing, increased sampling may be initiated (as appropriate) or assessment of human health risks may be warranted.• If, based on the additional investigation, modified or additional mitigation measure(s) are identified, such measures may need to be developed, implemented and monitored to address the specific issue identified as being of concern. Monitoring would be adapted to ensure it was capable of monitoring the performance of any mitigations implemented and to demonstrate the risk identified had been mitigated. <p>It is envisioned that Denison would engage its Indigenous Communities of Interest in all aspects of the process. Members of the public and the provincial and federal</p> |

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, June 2024) |
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| | | | | | | <p>Guidelines for the Protection of Wildlife Consumers of Aquatic Biota [e.g., CCME 2000], MDMER [Government of Canada 2022], CSA N288.4-19 (CSA Group 2019), and applicable United States Environmental Protection Agency criteria (e.g., US EPA 2021). At a minimum, this will include collection of representative fish species from multiple trophic levels and size classes to investigate the bioaccumulation potential of non-radiological (e.g., molybdenum, selenium, mercury, methyl mercury and other metals) and radiological parameters. Fish will also be assessed for their general health condition through assessment of condition and growth metrics consistent with those described in current or updated MDMER EEM technical guidance (e.g., Environment Canada 2012) (See commitments register – commitment #s 834 and 844).</p> <p>References:</p> <p>Health Canada. 2007. Human Health Risk Assessment of Mercury in Fish and Health Benefits of Fish Consumption. March.</p> | | <p>governments would be engaged through with the formalized public information program, required by the CNSC.”</p> <p>2. See response to #1.</p> |

- Department: ECCC
- Project Effects Link: Fish and fish habitat
- Reference to EIS, appendices, or supporting documentation: Section 8.1.1.3, Section 8.2.1.3 Aquatic Environment

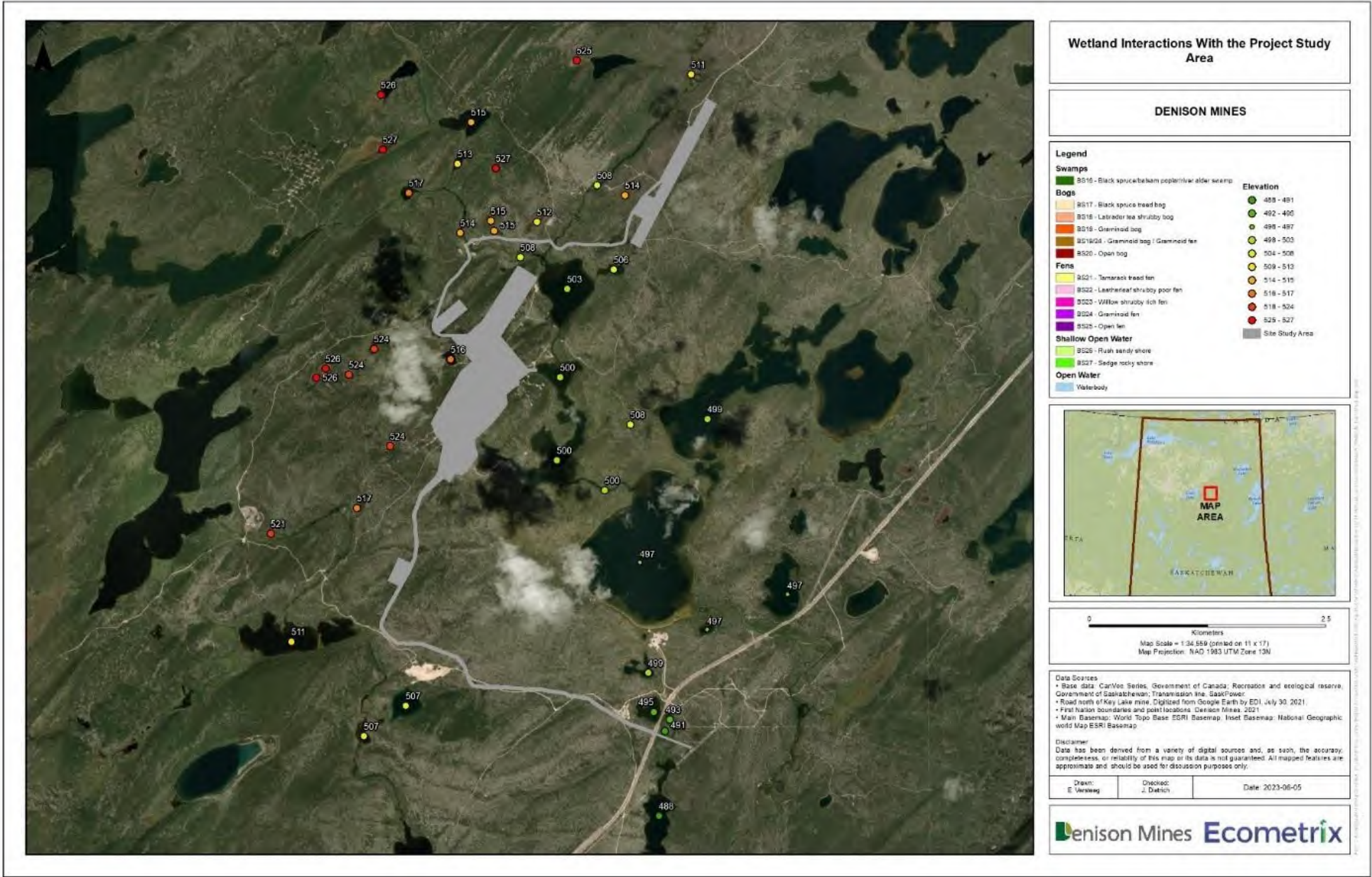
| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, June 28, 2024) |
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| IR-101 | - | <p>Context: In Section 8.1.1.3 Spatial and Temporal Boundaries the Project Area, Local Study Area (LSA) and Regional Study Area (RSA) are established as they pertain to surface water quantity. The same is done in Section 8.2.1.3 for surface water quality. In Section 8.1.1.3 Figure 8.1-4, the locations of the Project Area, LSA, RSA and surface water features and monitoring stations are provided.</p> <p>However, the locations of wetlands located near the Project area and within the LSA and RSA have not been provided. The location of wetlands within or near the Project footprint, as well as the other wetlands existing within the LSA can be confirmed from Part II_S9 Terrestrial Environment, Section 9.2.3.3 Figure 9.2.-8, including the wetland classifications. There appears to be at least one shallow open water wetland and several bogs located within the Project Area. There is no consideration of wetlands or potential effects to wetland hydrology, surface water or sediment quality throughout the aquatic environment assessments. There is no baseline information regarding wetlands and their status as fish habitat and ecological function, or assessment of potential effects to flow rates, water levels, water quality, sediment quality, or biota.</p> <p>Rationale: There is currently not enough information provided for ECCC to provide advice on the potential risks of the proposed Project to wetland hydrology, surface water and sediment quality within the LSA. This pathway of effects is important to assess in terms of potential effects to wetland habitat availability and quality due to changes in flow rates, water levels, water quality, sediment transport, sediment quality and potential effects to terrestrial and aquatic receptors. It is necessary to evaluate if changes in groundwater and surface water runoff flows and routing will affect water levels and habitat availability within wetlands. Potential effects from COPCs and radionuclides to surface water and sediment, or potential effects to ecological receptors within wetlands have not been evaluated.</p> | <p>1. Provide baseline information regarding wetland characterization within the Project Area and LSA, including: locations, wetland type, size, water surface elevation, depth, water flow pathways, and the presence of wildlife receptors including presence of fish/fish habitat within the Aquatic Environment section of the draft EIS. If this information is available in annexes or baseline studies, summarize it within the main body of the Aquatic Environment section of the draft EIS with references to respective documents for review.</p> <p>2. Provide baseline information on wetland surface water and sediment quality characterization for wetlands within the Project footprint.</p> <p>3. Provide an assessment of potential effects to wetlands within the LSA and potential effects to ecological receptors during all phases of the proposed Project.</p> <p>4. Provide further information on mitigation measures and monitoring that would be applied for the protection of wetlands.</p> | <p>Responses are numbered as listed in the IR. Figures associated with this IR are provided in Attachment IR-101.</p> <p>1) Below indicates the information that is presented in the draft EIS regarding wetland characteristics. This information was housed within the terrestrial environment component and potential impacts to wetlands as a valued component is further assessed under Section 9.2 of the draft EIS, and specifically Section 9.2.6.4. The following list indicates what information was provided in the draft EIS specific to information request #1. As such, repackaging the available information in Section 8 would be redundant and therefore in Denison’s view unnecessary.</p> <p>a. <i>Locations of Wetlands</i> Section 9, Figure 9.2-8 on page 9-83 of the draft EIS presents a map of the RSA and LSA detailing the locations of various wetland features including bogs and fens.</p> <p>b. <i>Wetland Types</i> Section 9, Figure 9.2-8 on page 9-83, and Table 9.2-8 on pages 9-91 to 9-92 of the draft EIS provides the geographical distribution and listing of the following wetland types within the LSA:</p> <p>i.BS17 – Black spruce treed bog ii.BS18 – Labrador tea shrubby bog iii.BS19 – Graminoid bog iv.BS19/24 – Graminoid bog/Graminoid fen v.BS20 – Open bog vi.BS21 – Tamarack treed fen vii.BS23 – Willow shrubby rich fen viii.BS24 – Graminoid fen ix.BS25 – Open fen x.BS27 – Sedge rocky shore (shallow open water)</p> <p>c. <i>Wetland Size</i> Section 9, Table 9.2-8 on pages 9-91 to 9-92 of the draft EIS lists the following wetland types and the cumulative area they encompass within the LSA:</p> <p>i.BS17 – 18.2 ha ii.BS18 – 23.3 ha iii.BS19 – 2.8 ha iv.BS19/24 – 0.8 ha v.BS20 – 0.6 ha vi.BS21 – 1.9 ha vii.BS23 – 0.6 ha viii.BS25 – 0.4 ha ix.BS27 – 4.2 ha</p> <p>d. <i>Wetland Water Surface Elevation</i> Surface elevations for the wetland have been assessed and the information is summarized below and in the Attachment IR-101 Figure 1 Elevations of wetland features in the LSA.</p> <ul style="list-style-type: none">• Wetlands 1.5 km west of the SSA range from 526-524 masl• Waterbodies and their surrounding wetlands directly to the east of the SSA are at an elevation of between 506 and 500 masl• Waterbodies and surrounding wetlands 2 km east of site are approximately between 499 and 497 masl• Wetlands north of the SSA and in the vicinity of the proposed air strip range from 514-508 masl.• Wetlands situated further north of the SSA in the LSA were at an elevation of approximately 526 masl• Southern wetlands that will interact with the proposed hydro corridor extension for the mine have an elevation of 491masl• Most wetland evaluated south of the SSA had elevations ranging from 491-488 masl <p>e. <i>Wetland Depth</i> – information associated with wetland depth for those in the LSA is not available.</p> <p>f. <i>Wetland Flow Pathways</i> - Nearly all wetlands are connected or adjacent to rivers and tributaries, and thus flow</p> | <p>This response has not been accepted for the following reasons:</p> <p>1. The response (#1(d)) by the proponent states that “Surface elevations for the wetland have been assessed and the information is summarized below and in the Attachment IR-101 Figure 1 Elevations of wetland features in the LSA” but it is not indicated that this information will be placed in the EIS. CNSC staff requests proponent to include the information provided in response #1(d) and Attachment IR-101 Figure 1 (Elevations of Wetland Features in the LSA) and Attachment IR-101 Figure 2: (Denison Wheeler River Project SSA and Wetland Feature Distribution) in the EIS.</p> <p>2. The Proponent stated in response #2 (a) and (b) that “surface water quality and sediment quality in wetlands were not specifically sampled in the wetland complexes adjacent to the Project footprint during the original baseline assessment.” CNSC staff requests the proponent to provide justification why they have relied on measurements upstream and downstream of the wetlands over direct measurements in the wetland areas. It is recommended to conduct direct measurements in the wetland areas.</p> <p>3. The information provided did not satisfy the IR. Additional information regarding the potential impacts to wetlands due to changes in surface water quality and sediment quality should be included within Section 8.3 of the main EIS. This is needed to fully understand the scope of potential effects to the aquatic environment.</p> <p>a. Update Section 8.3 to include additional information on predicted water and sediment quality impacts to wetlands from the Proponent's response to directly consider wetlands as fish and fish habitat for the purpose of assessing water quality impacts.</p> <p>b. Update Section 8.3 to provide an assessment of potential effects to wetlands from water and sediment quality changes within the LSA.</p> <p>4. It is stated in response #4 that “[...] Updated baseline information on wetland depths and water-levels may be useful in providing a frame of comparative reference to potential changes during the operation, decommissioning and post-decommissioning phases of the project” and CNSC staff agrees with the proponent and recommend collection of monitoring information on the wetland areas.</p> | <p>1. This information has been incorporated into the EIS as Appendix 8-F.</p> <p>2. Denison is committed to conducting surface water quality and sediment quality in wetlands within the LSA and specifically in wetlands directly adjacent to the Operation prior to construction commencing for the purposes of collecting baseline to further assess the effectiveness of mitigation measures.</p> <p>3(a). Section 8.3 has been updated and specifically sections 8.3.1, 8.3.1.2, 8.3.3, 8.3.4.1, 8.3.4.2 (8.3.4.2.2 and 8.3.4.2.3, 8.3.4.2.5), 8.3.5, 8.3.7, 8.3.9 to include consideration of wetlands as aquatic habitat features within the context of their potential to provide fish and fish habitat. Sections 9.2.4.2.1, 9.2.6.2.1, 9.2.6.4.1, 9.2.7.3, and 9.2.9 have been updated to be aligned with Section 8.</p> <p>3(b). Section 8.3 has been updated and specifically sections 8.3.1, 8.3.1.2, 8.3.3, 8.3.4.1, 8.3.4.2 (8.3.4.2.2 and 8.3.4.2.3, 8.3.4.2.5), 8.3.5, 8.3.7, 8.3.9 to include consideration of wetlands as aquatic habitat features within the context of changes to water quality and sediment quality within the LSA due to the Project. Sections 9.2.4.2.1, 9.2.6.2.1, 9.2.6.4.1, 9.2.7.3, and 9.2.9 have been updated to be aligned with Section 8.</p> <p>4. Denison is committed to conducting surface water quality and sediment quality in wetlands within the LSA and specifically in wetlands directly adjacent to the Operation prior to construction commencing for the purposes of collecting baseline to further assess the success of mitigative measures.</p> | <p>Responses to items one and four have been accepted, but items two and three require additional information.</p> <p>For item two, the Proponent has not included justification regarding why they have relied on measurements upstream and downstream of the wetlands over direct measurements in the wetland areas within their response. Please provide the missing justification for item two, as well as describe how baseline information will be used to further assess the effectiveness of mitigation measures. Water and sediment quality in wetlands differ than those in stream and lakes systems because of their distinct biota and hydrology. In wetlands, there is a greater cycling of nutrients, more nutrients and metals can be sequestered in sediment, and metal toxicity modifying water quality factors such as pH and dissolved organic carbon are not the same as in streams and lakes. Baseline data on water and sediment quality in wetlands are necessary to evaluate potential effects on fish and fish habitat of proposed discharge to Whitefish Lake upstream of the wetlands. The information would also be used to assess possible effectiveness of proposed mitigation measures.</p> <p>For item three, the Proponent has not provided the predicted sediment quality impacts within item three, which is part of the wetlands assessment that was requested.</p> <p>Please also update Section 8.3 to include additional information on predicted sediment quality impacts to wetlands and to provide an assessment of potential effects to wetlands from sediment quality changes within the LSA.</p> <p>This Information is required in order to identify and define potential effect pathways linked to project-related changes to wetland sediment quality and assess effects on wetland functions, fish and fish habitat, and other valued components. Potential effect pathways in wetlands can be different than those in lakes and streams and warrant a separate assessment.</p> | <p>Per the Round 3 IR, responses to items 1 and 4 from the Round 2 IR have been accepted, but items 2 and 3 require additional information.</p> <p>For Item 2, for clarity ECCC specified during the meeting on June 14, 2024, that the wetlands of interest are those located within the nearshore environments of Whitefish Lake (Upper, Mid and Lower) as these lakes will directly receive treated effluent during operation.</p> <p>Water quality was sampled both upstream (river inlet to lake) within the lakes and downstream (river outlet of lakes) (e.g., SA4, SA-5, SA-6, LA-5 and LA-6; refer to Appendix 8-D for the aquatic baseline report including photographs of water quality sampling areas for context). As identified in Denison's response to the IR-107 (round 3), the baseline water quality variability was very low between these stations and therefore overall representative of the LSA and encompassing depositional and non-depositional environments. This was deemed appropriate and suitable for the scale of the EIS.</p> <p>The rationale for using water and sediment quality specific to the inlet/lake/outlet is further described below.</p> <p>Surface water quality modelling included predictions of water and sediment concentrations in Whitefish Lake, the lake into which treated effluent will be released, as well as locations farther downstream. Water quality was predicted as the incremental change in constituent concentrations during periods of effluent discharge on a monthly time step. Sediment quality predictions (as concentrations of constituents in sediment) were made on the same time step from surface water concentrations using the partitioning coefficients (Kd). The Kd values are presented in Table 3-6 of the ERA. They consist of regional published values that have been calibrated on similar sites in northern Saskatchewan over several years and have been checked against Wheeler River measurement data as shown in Figure 3-2 and Figure 3-3 of the ERA.</p> <p>For the purposes of the analysis the Kd value was used for a lake environment meaning that one estimate of sediment quality was assumed to be reasonable for the purposes of the EIS because the wetlands are directly connected to the lake as they are functional nearshore environments of the waterbody itself.</p> <p>The wetland portions under discussion are more accurately described as littoral areas and these wetland portions are not cut-off from or isolated from the main basin of the lake. As such, it can be assumed that the lake environment is likely to be as depositional as the nearshore environment. The lakes of interests are very shallow (on average 1.5 m in depth) and therefore deposition may be as likely in the “offshore” environment as the nearshore.</p> <p>The wetlands are not likely to have a dominating effect on the water quality of Whitefish Lake due to their lesser aerial extent vs. the lake proper and the connectivity between the zones suggests that water quality would be similar between the shoreline and the “offshore” (i.e. likely good exchange).</p> <p>With respect to Item 4, and to further confirm these assumptions discussed above, Denison has committed to the collection of additional baseline information with the wetlands for water quality and sediment quality prior to construction as part of operational licencing (Commitment 8-46).</p> <p>Denison has also committed to conducting a pre-construction preliminary EEM for the site. The EEM study design will be further guided by the final design of the diffuser and the behaviour of the effluent plume (Commitment 8-49).</p> <p>Based on this and if applicable, the EEM study design could include an investigation of the differences in WQ and SQ nearshore and offshore. This would allow for an understanding of the differences in water to sediment contaminant ratios between nearshore and offshore environments.</p> |

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| | | | | <p>pathways are discernable in Figure 9.2-8 of the draft EIS.</p> <p><i>g. Presence of Fish and Fish Habitat</i> For the purposes of this assessment the bogs and fens within the area can be assumed to provide supporting fish habitat to the adjacent lake and river water bodies in the vicinity of the LSA. Section 9.2.6.4.1 of the draft EIS described the estimated change in the aerial extent of wetland due to direct impacts of the Project footprint (see also Figure 9.2-8). The assessment indicated a total loss of 0.5 ha (less than 0.1%) of all wetlands within the Terrestrial RSA.</p> <p>2) As noted in other parts of this IR response, the wetlands within the Project footprint are limited to two areas (i.e., stream crossings along the access road to the airstrip and powerline connection SE of Highway 914 [See Figure 2: Denison Wheeler River Project SSA and Wetland Feature Distribution in Attachment IR-101]) and these wetland areas can be avoided through design and construction mitigations. As such, no direct impact to any wetlands or waterbodies are expected as part of the Wheeler River Project that may impact fish or fish habitat.</p> <p>In regard to baseline information on wetland surface water and sediment quality characterization for wetlands within the Project footprint:</p> <p><i>a. Surface water quality in wetlands –</i> surface water quality was not specifically sampled in the wetland complexes adjacent to the project footprint during the original baseline assessment. However, surface water quality was sampled and assessed at stream and lake stations situated upstream and downstream of wetland areas. These stations were selected for sampling as they were identified as providing repeatability (i.e., relative water depth) and informative with respect to desired segments of the system. For example, water quality was sampled at SA-4, SA-5, LA-6, SA-6 and LA-5 following the flow path from upstream to downstream, respectively. The water quality at these nodes was inclusive of upstream wetland influences. For further reference to surface water sampling station during baseline, please refer to Figure 8.2-4 of the EIS.</p> <p><i>b. Sediment quality in wetlands -</i> sediment quality was not specifically sampled in the wetland complexes adjacent to the project footprint during the original baseline assessment. However, sediment quality was sampled and assessed at depositional lake stations situated upstream and downstream of wetland areas. The sediment quality at these nodes would be inclusive of upstream wetland surface water and sediment influences. For further reference to sediment sampling stations during baseline, please refer to Figure 8.2-4 of the EIS.</p> <p>3) For the purposes of this assessment the bogs and fens within the area can be assumed to provide supporting fish habitat to the adjacent lake and river water bodies in the vicinity of the LSA. Section 9.2.6.4.1 of the draft EIS described the estimated change in the aerial extent of wetland due to direct impacts of the Project footprint (see also Figure 9.2-8). The assessment indicated a total loss of 0.5 ha (less than 0.1%) of all wetlands within the Terrestrial RSA</p> <p>However, when further scrutinizing the potential overprinting of wetland features as a result of the Project it is evident that even this loss is avoidable. The interaction of the Project with wetlands is relegated to those areas where stream crossings for access roads and powerline connections are proposed (See Figure 2: Denison Wheeler River Project SSA and Wetland Feature Distribution (Attachment IR-101)).</p> <p>Wetlands associated with stream crossings have been identified to have mitigative designs (clear-span) to ensure no impacts to fish and fish habitat. The hydro-line as shown in Figure 1 will be constructed to avoid direct impacts to fish and fish habitat following best installation practices. As such, no direct impact to any wetlands or waterbodies are expected as part of the Wheeler River Project that may impact fish or fish habitat.</p> | | | | |
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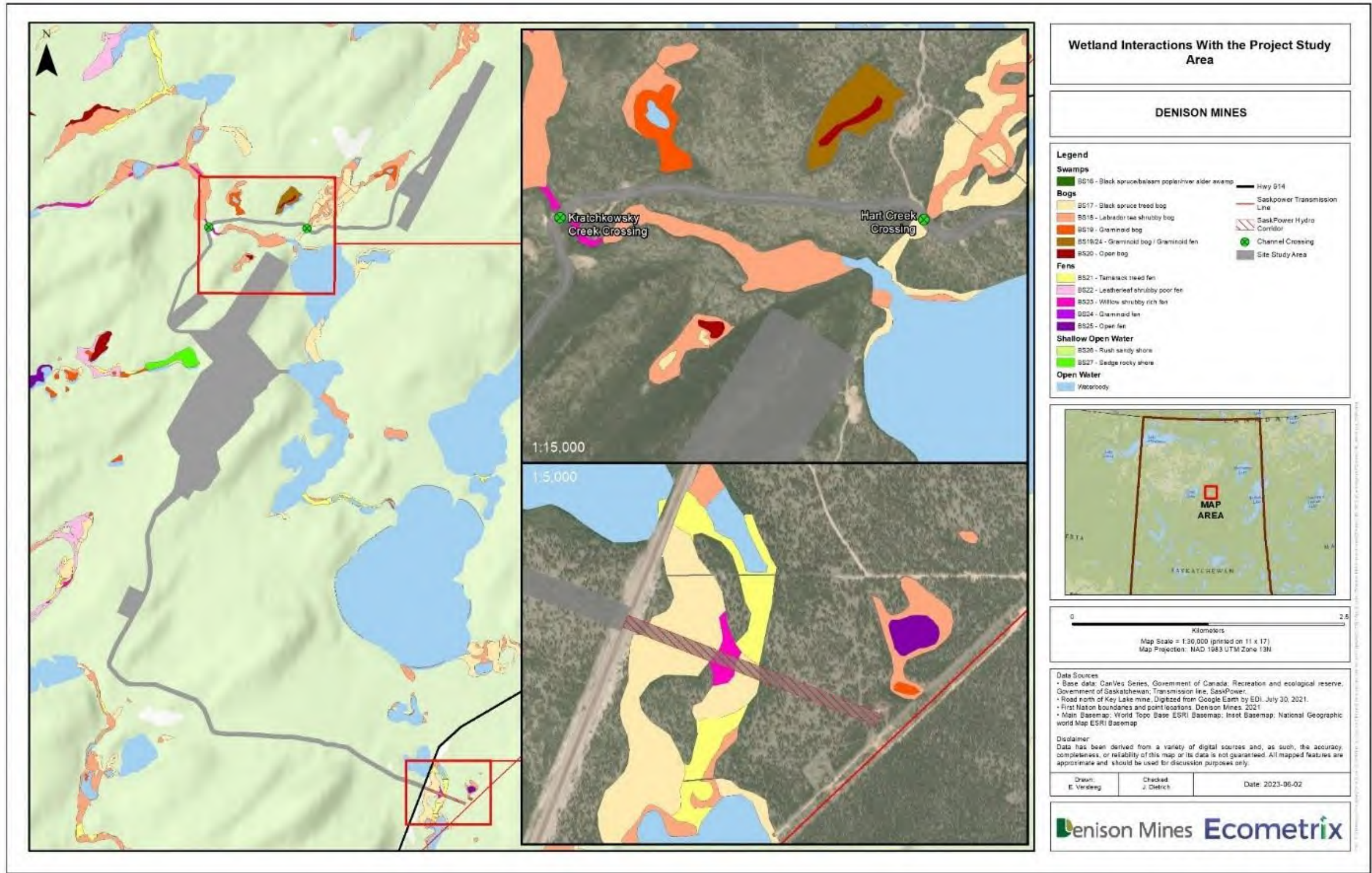
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| | | | | <p>As discussed in Section 8.1.6.1 of the EIS, water levels in the ponds and lakes in the vicinity of the of the Project are expected to experience negligible effects, with magnitudes of changes in water levels predicted to be in the sub-centimeter range. As natural fluctuations in lake water levels were approximately 0.4 m from 2011 to 2019, Project-related changes are not expected to be of a magnitude to compromise the Surface Water Quantity VC. It can then be considered a reasonable assumption that any changes to wetland features will have similar sub-centimeter impacts to water levels due to changes in surface flow and/or groundwater and therefore do not pose an indirect effect to water quantity or fish and fish habitat associated with these wetland features.</p> <p>4) As no impact is expected due to overprinting or due to draw down effects by the ISR, additional mitigation measures are not warranted. Updated baseline information on wetland depths and water-levels may be useful in providing a frame of comparative reference to potential changes during the operation, decommissioning and post-decommissioning phases of the project. However, such changes are expected to be less than measurable.</p> | | | | |
|--|--|--|--|--|--|--|--|--|

Attachment: IR-101 (included in Round 1 submission)

Supporting figures to the response provided in table:



Attachment IR-101 Figure 1 – Elevations of Wetland Features in the LSA.



Attachment IR-101 Figure 2: Denison Wheeler River Project SSA and Wetland Feature Distribution

Round 2: New EIS Appendix 8-F



 enison Mines

Wheeler River Project

Revised Draft Environmental Impact Statement

January 2024

Powering
**PEOPLE, PARTNERSHIPS
AND PASSION.**

TO:

Denison Mines – Janna Switzer

FROM:

Ecometrix

REF:Wheeler River Project EIS – Appendix 8-F:
Wetland Effects Assessment Report**DATE:**

19 January 2024

1.0 Introduction

On October 21, 2022, Denison Mines Corp. (Denison) submitted a draft Environmental Impact Statement (EIS) for the proposed Wheeler River Project (the Project). Based on their initial review, the Canadian Nuclear Safety Commission indicated that the submission contained the required information to proceed with the Federal-Indigenous Review Team (FIRT) technical review of the draft EIS. On March 20, 2023, the FIRT provided Denison with a list of information requests (IRs) for Denison to respond to and eventually submit a final EIS document. Responses to these IRs were provided in July and August of 2023. Additional FIRT IRs were provided to Denison on December 5, 2024. Of these IR-101 was not adequately answered and additional information was requested.

This appendix provides additional information to address IR-101 provided by Environment Canada and Climate Change (ECCC) as part of the second round of FIRT comments. The comment included a request for a further summary of wetland characterization information from available sources, baseline information pertaining to water quality and sediment quality, and assessment of potential effects to wetlands within the LSA for all phases of the Project and provide further information on mitigation measures and monitoring that would be applied for the protection of wetlands.

2.0 Scope of the Assessment

This section addresses the potential effects of the Project on the Fish and Fish Habitat VC for which wetland habitats are considered a component. The purpose of this assessment is to assess potential changes to wetlands (as represented by the Fish and Fish Habitat VC) in consideration of all phases of the Project at the Project Area, local, and regional study area scales. Pathways affecting wetlands are directly associated with potential changes to the Surface Water Quantity (hydrology), Surface Water Quality, Sediment Quality, and Benthic Invertebrates VCs. Changes to

hydrology, water quality, sediment quality, and benthic invertebrate communities may directly affect wetlands as both fish and wildlife habitat and food resources. The assessment approach reflects these connections within the environment, as the significance determination for the Surface Water Quantity and Surface Water Quality VCs was conducted at the receptor VC level.

The Vegetation and Ecosystems, Listed Plant Species, and Wetlands VCs are interrelated, to varying extents, and are linked to other VCs, including:

Surface Water Quality – surface water contributes to local moisture regimes, and surface water quality can influence the persistence of Vegetation and Ecosystems, Listed Plant Species, and Wetlands.

Surface Water Quantity – surface water contributes to local moisture regimes, and surface water quantity contributes to site drainage and discharge, which can influence the persistence of Vegetation and Ecosystems, Listed Plant Species, and Wetlands.

Sediment Quality – Vegetation and Ecosystems, Listed Plant Species, and Wetlands contribute to ecosystem form and function that stabilize riparian areas and influence quality of surface water runoff to aquatic systems.

This appendix will focus on the interrelations between these VCs as they apply to Wetland function.

Pathways that are of interest include those associated with site clearing and the potential for erosion-driven mobilization of suspended sediment into local surface waters; groundwater interactions with surface water features including wetlands; the establishment of new subwatershed boundaries and the resulting effects of effluent discharge to the receiving environment; and the potential overprinting of wetland habitat by Project infrastructure.

2.1 Key indicators and Measurable Parameters

The KIs for the wetland component of the Fish and Fish Habitat VC include potential changes in surface water quantity, surface water quality, and available wetland habitat from baseline conditions. The rationale for each KI and associated MPs is summarized in Table 1.

Table 1: Key Indicators and Measurable Parameters for the Wetlands Valued Component

| Key Indicator | Rationale for Key Indicator | Measurable Parameter |
|--|--|--|
| Change in available wetland habitat from baseline conditions | <ul style="list-style-type: none"> Project activities may result in a change in the extent of Wetlands. Of provincial and federal management concern Contributes to biodiversity and habitat for wildlife species and listed plant species. Cultural importance. Contributes to biodiversity, maintenance of hydrologic cycles, nutrient cycling, water quality, and carbon storage. Sensitive to disturbance. Historically addressed for other mining projects in northern Saskatchewan. | Aerial extent (m ² or ha) of overprinted wetland habitat. |
| Change to water levels or flows from baseline conditions | Project activities are expected to result in changes to local hydrology. A reduction or increase in flows may result due to the elimination or redirection of subwatershed area and through Project water management (i.e., water taking, storage, and effluent discharge). These changes in flow to the environment may alter stream flows, lake levels and such feature interactions (inundation) with wetland features required for fish and wildlife during all life stages. | Changes in water levels (m) or percent changes to flow conditions (%). |
| Change in surface water quality from baseline conditions | <p>Changes in water quality are regulated (subsection 36(1) of the <i>Fisheries Act</i> and the MDMER). Changes that may occur as a result of the Project include:</p> <ul style="list-style-type: none"> mobilization of solids into local watersheds; and deposition of deleterious substances into the receiving environment as a result of mine effluent and/or surface runoff. | Change in the concentration of constituents that are directly related to Project activities, measured as a mass of a chemical per unit volume in water (e.g., mg/L). |

2.2 Spatial and Temporal Boundaries

The areas used to assess the effects of the Project on the Vegetation and Ecosystems, Listed Plant Species, and Wetlands VCs are (Figure 1):

Project Area: the area within which the Project and all components/activities are located (i.e., the area of maximum physical disturbance). The Project Area is considered to be a conservative estimate of the area of direct disturbance effects on VCs in this assessment.

Vegetation LSA: the area that surrounds the Project Area where all direct effects and most indirect effects are likely to occur on the Vegetation and Ecosystems, Listed Plant Species, and

Wetlands VCs. The Vegetation LSA is defined as the Project Area plus a 250 m buffer along roads and a 500 m buffer around all other infrastructure (1,161.8 ha).

Terrestrial RSA: the area that surrounds and includes the Vegetation LSA, established to assess the potential, largely indirect effects of the Project on Vegetation and Ecosystems, Listed Plant Species, and Wetlands VCs in a regional context. The Terrestrial RSA (40,173.6 ha) is defined as a minimum 8 km buffer around the Vegetation LSA and has been delineated to capture all indirect effects of the Project on the Vegetation and Ecosystems, Listed Plant Species, and Wetlands VCs and provide context for the type, distribution, extent, and prevalence of plant species and ecosystems in the region. The Terrestrial RSA also defines the area within which cumulative effects are likely to occur (i.e., CEA boundary).

Temporal boundaries identify when an effect is expected to occur in relation to specific Project phases and activities. The temporal boundaries are based on the timing and duration of Project activities, with the associated interactions with each VC and KI (where applicable). In the EA, the temporal boundaries are described as appropriate for each activity and cumulatively for the life of the Project.

The temporal boundaries for the EA represent the timeframes that the Project is expected to interact with and potentially affect Vegetation and Ecosystems, Listed Plant Species, and Wetlands VCs. The temporal boundaries are aligned with the Project development schedule as described in the EIS: Construction; Operation; Decommissioning; and Post-Decommissioning.

3.0 Existing Conditions

Wetlands are defined as “land that is saturated with water long enough to promote wetland or aquatic processes as indicated by poorly drained soils, hydrophytic vegetation and various kinds of biological activity which are adapted to a wet environment” (National Wetlands Working Group 1997). As such, ecosites have been determined to be wetland ecosystems where these conditions are expected to occur. This includes both wetland ecosites and sparsely vegetated ecosites where the water table is within 50 cm of the ground surface (McLaughlan et al. 2010). No wetlands within the Terrestrial RSA have been designated as Ramsar Wetlands of International Importance (The RAMSAR Convention Secretariat 2022).

Project-specific investigations pertaining to the Terrestrial Environment were conducted by Omnia Ecological Consulting (Omnia; Calgary, AB) from 2017 to 2019. Details on the methods, survey parameters and assumptions, and comprehensive data summaries/findings are presented in the Project-specific baseline report (Omnia 2020; see **Error! Reference source not found.** of the EIS) and a supplementary baseline annex report completed in 2021 (EDI 2021; see **Error! Reference source not found.** of the EIS).

Project baseline studies for vegetation presented a description of the ecosystems/habitat types (i.e., ecosite classifications) within the Terrestrial RSA. Vegetation communities and ecosystems are represented by provincial ecosite classifications for the Boreal Shield Ecozone in accordance with the Field Guide to the Ecosites of Saskatchewan's Provincial Forests (McLaughlan et al. 2010). These ecosite classifications were summarized within a 1:20,000 interpreted ecosite mapping product compiled within the Terrestrial RSA with the use of the following inputs:

- 1:5,000 anthropogenic features mapping;
- historical fires data;
- provincial Predicted Ecosite Mapping;
- current and historical imagery; and
- field sampling/ground truthing sites (EIS Appendix 9-B).

As the Boreal Shield Ecozone experiences a largely natural fire regime, much of the vegetation within the Terrestrial RSA (70.6%) is comprised of post-fire regeneration (i.e., shrubby structural stages). Twenty (20) upland ecosites were identified within the RSA with relative percentages by area estimated for each ecosite code.

The assessment also identified fourteen (14) wetland ecosite types within the RSA which included swamps, bogs, fens and shallow open water ecosite codes. The area of these wetlands was also estimated to provide a relative percent area of representation within the RSA.

This cataloguing of ecosite presence and relative area composition across the RSA provides the basis for understanding landscape change and succession over the course of the construction and operation of the Wheeler River Operation.

Waterbodies were conservatively included here as wetlands, as they have the potential to be classified as shallow open water wetlands (i.e., water bodies 2 m deep or less; Warner et al. 1997). Waterbodies represent the most common wetland ecosystem within the Vegetation LSA and the Terrestrial RSA, comprising 3.9% (44.9 ha) and 10.7% (4,101.9 ha), respectively. The black spruce treed bog is the second most common wetland ecosystem within the Vegetation LSA (18.2 ha, 1.6%) and the Terrestrial RSA (1,157.1 ha; 2.9%). The Labrador tea shrubby bog is the most common wetland ecosystem in the Vegetation LSA, comprising 2.0% (23.3 ha), and the second most common wetland ecosystem in the Terrestrial RSA (989.9 ha, 2.5%). All other wetland ecosites are relatively uncommon, each comprising less than 0.5% of the Vegetation LSA and

Terrestrial RSA. The location, size and relative area composition of the wetland features is provided in Table 2 and Figure 1).

Table 2: Summary of Wetlands

| Ecosite Code ¹ | Ecosite Description ¹ | Structure Code ² | Vegetation LSA (ha) | Vegetation LSA (%) | Terrestrial RSA (ha) | Terrestrial RSA (%) |
|---------------------------|--|-----------------------------|---------------------|--------------------|----------------------|---------------------|
| Swamps | | | | | | |
| BS16 | Black spruce / balsam poplar / river alder swamp | 6 | -- | -- | 8.8 | <0.1 |
| Swamps Subtotal | | | -- | -- | 8.8 | <0.1 |
| Bogs | | | | | | |
| BS17 | Black spruce treed bog | 5 | 18.2 | 1.6 | 1,157.1 | 2.9 |
| BS18 | Labrador tea shrubby bog | 3 | 23.3 | 2.0 | 967.6 | 2.4 |
| | | 3a | -- | -- | 20.3 | 0.1 |
| | | 3b | -- | -- | 2.0 | <0.1 |
| | | Total | 23.3 | 2.0 | 989.9 | 2.5 |
| BS19 | Graminoid bog | 2 | 2.8 | 0.2 | 160.5 | 0.4 |
| BS19/24 ³ | Graminoid bog or graminoid fen | 2 | 0.8 | 0.1 | 1.2 | <0.1 |
| BS20 | Open bog | 1 | 0.6 | <0.1 | 65.5 | 0.2 |
| Bogs Subtotal | | | 45.6 | 3.9 | 2,374.2 | 5.9 |
| Fens | | | | | | |
| BS19/24 ³ | Graminoid bog or graminoid fen | 2 | 0.8 | 0.1 | 1.2 | <0.1 |
| BS21 | Tamarack treed fen | 5 | 1.9 | 0.2 | 66.5 | 0.2 |
| BS22 | Leatherleaf shrubby poor fen | 3a | - | - | 28.5 | 0.1 |
| BS23 | Willow shrubby rich fen | 3b | 0.6 | <0.1 | 20.9 | 0.1 |
| BS24 | Graminoid fen | 2 | - | - | 9.0 | <0.1 |
| BS25 | Open fen | 1 | 0.4 | <0.1 | 5.7 | <0.1 |
| Fens Subtotal | | | 3.6 | 0.3 | 131.8 | 0.3 |
| Shallow Open Water | | | | | | |
| BS26 | Rush sandy shore | 2 | - | - | 15.1 | <0.1 |

| Ecosite Code ¹ | Ecosite Description ¹ | Structure Code ² | Vegetation LSA (ha) | Vegetation LSA (%) | Terrestrial RSA (ha) | Terrestrial RSA (%) |
|------------------------------------|----------------------------------|-----------------------------|---------------------|--------------------|----------------------|---------------------|
| BS27 | Sedge rocky shore | 2 | 4.2 | 0.4 | 29.3 | 0.1 |
| Waterbody ⁴ | -- | 0 | 44.9 | 3.9 | 4,101.9 | 10.7 |
| Shallow Open Water Subtotal | | | 49.0 | 4.2 | 4,146.3 | 10.3 |
| Total Wetlands⁵ | | | 98.3 | 8.5 | 6,661.1 | 16.6 |

Notes:

- 1 Ecosystems are described in detail in the Guide to the Ecosites of Saskatchewan's Provincial Forests (McLaughlan et al. 2010).
- 2 Modified from the Field Manual for Describing Terrestrial Ecosystems (BC Ministry of Environment, Lands, and Parks, and BC Ministry of Forests 1998). 0 = unvegetated; 1 = sparse / bryophyte / lichen; 2 = herb/graminoid; 3a = low shrub; 3b = tall shrub; 5 = young forest, 6 = mature forest.
- 3 This ecosite type is an artifact of mapping uncertainty, as baseline mappers were unable to distinguish between these ecosites due to a lack of available information (e.g., soil information, vegetation field plots, water quality data). As such, this ecosite has conservatively been split between bog and fen classifications.
- 4 Areas of open water <2 m deep are defined as shallow open water wetland ecosystems (National Wetlands Working Group 1997); as such, unnamed waterbodies and areas of open water observed to exhibit an average depth of <2 m (Ecometrix Incorporated 2020) have been conservatively included as wetland ecosystems.
- 5 Some numbers are rounded for presentation purposes. Therefore, the totals may not equal the sum of the individual values.

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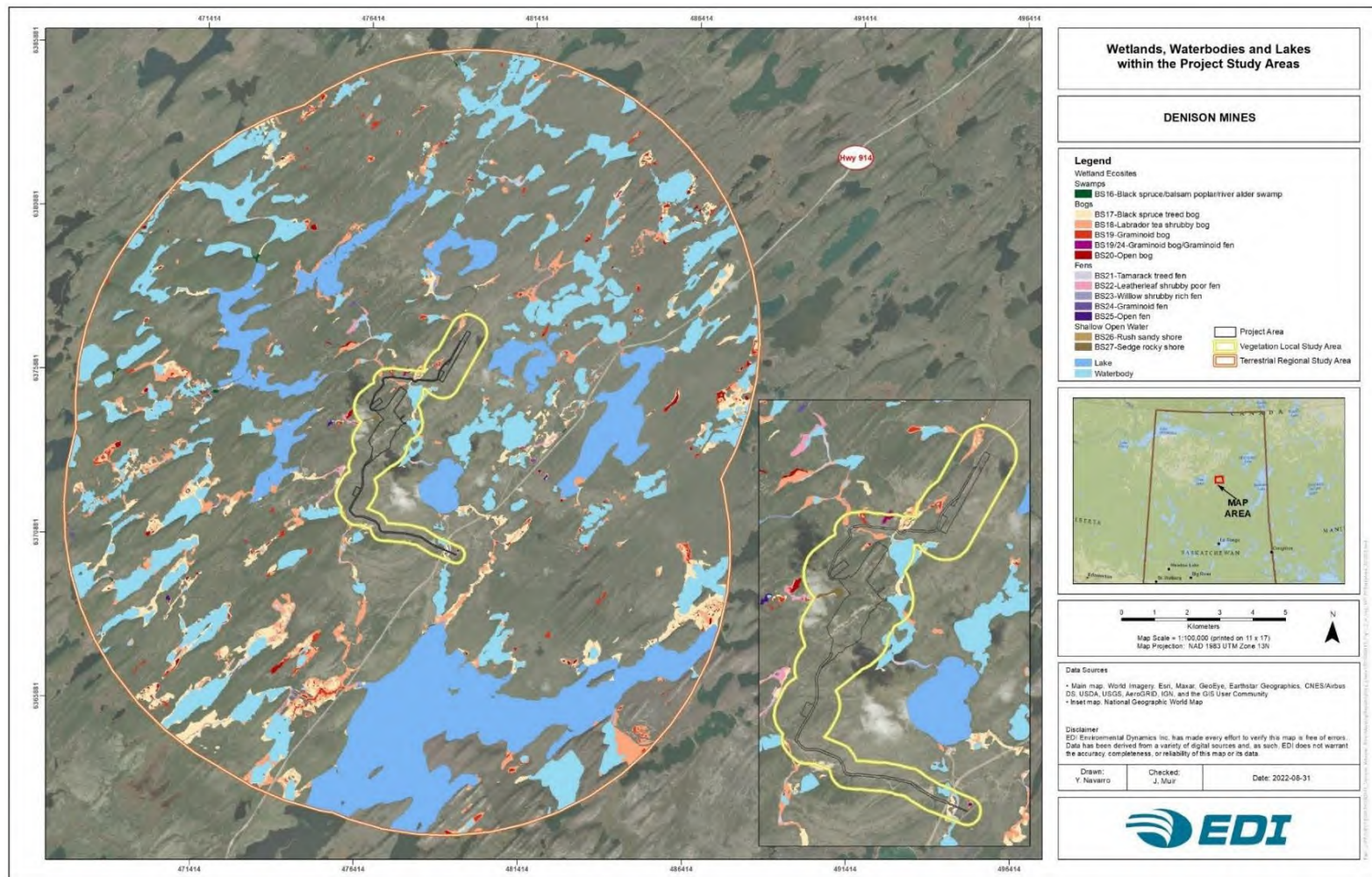


Figure 1: Wetlands, Waterbodies and Lakes within the Project Study Areas

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Surface elevations for the wetland have been assessed and the information is summarized below and in the Figure 1 .

- Wetlands 1.5 km west of the Project Area range from 526-524 masl
- Waterbodies and their surrounding wetlands directly to the east of the SSA are at an elevation of between 506 and 500 masl
- Waterbodies and surrounding wetlands 2 km east of site are approximately between 499 and 497 masl
- Wetlands north of the Project Area and in the vicinity of the proposed air strip range from 514-508 masl.
- Wetlands situated further north of the Project Area in the LSA were at an elevation of approximately 526 masl
- Southern wetlands that will interact with the proposed hydro corridor extension for the mine have an elevation of 491masl
- Most wetland evaluated south of the Project Area had elevations ranging from 491-488 masl

Wetland depth, presence of fish or fish habitat, water quality and sediment quality are not currently available for the non-waterbody wetlands (i.e. those not identified as a lake or watercourse in Section 8 of the EIS). However, Denison is committed to conducting field surveys to collect this data prior to the initiation of construction of the Operation. This will allow for baseline information to be available to compare future changes and assess the success of mitigation measures and the predicted effects or lack thereof.

For the purposes of this assessment the bogs and fens within the area can be assumed to provide supporting fish habitat to the adjacent lake and river water bodies in the vicinity of the LSA.

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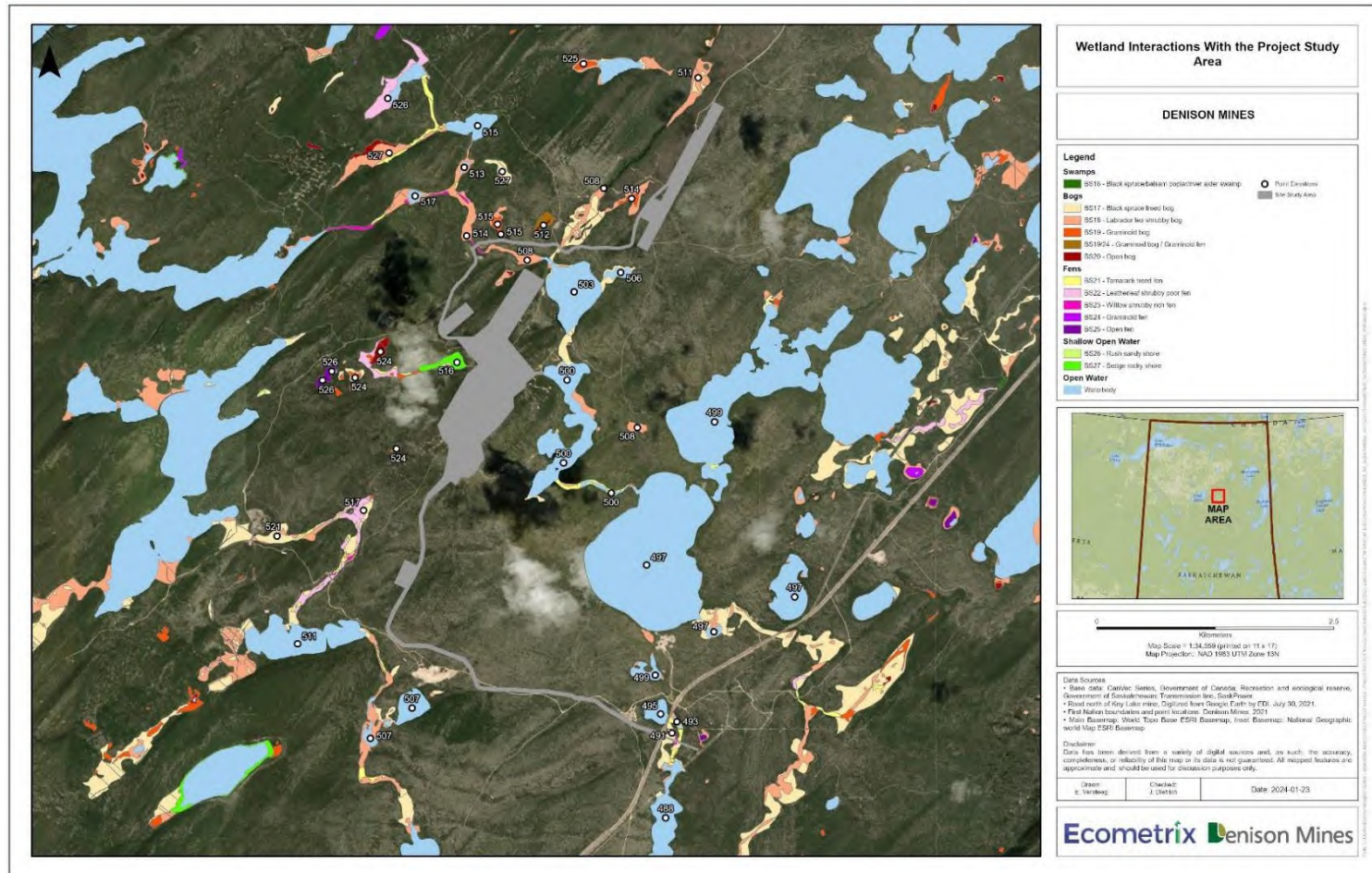


Figure 2: Elevations of wetland features in the LSA

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4.0 Assessment of Project Related Effects

4.1 Potential Interactions Between the Project and Valued Component/Key Indicators

The Project will require the Construction, Operation, and Decommissioning of several components (as described in Section 2 of the EIS). Potential interactions between these Project components and activities and Fish and Fish Habitat in the form of Wetlands and their associated KIs are summarized by Project phase and activity in Table.

Potential interactions in Table are ranked as:

Primary Interaction (✓): Project activity is expected to interact with the VC / KI which may result in an adverse effect on the VC (i.e., a measurable or detectable change in the MP) and is further considered in the effects assessment as the primary contributor to potential adverse effects.

Other Interaction (✓): Project activity is expected to interact with the VC / KI. While the interaction is further considered in the effects assessment, it is not expected to be a primary contributor to potential adverse effects.

No Interaction: Project activity is not expected to interact with the VC or the KI, no adverse effects are expected, and rationale is provided for not considering this potential interaction further.

Table 4: Potential Project Interactions for Wetlands Valued Component

| Project Phase/Activity | Wetlands Valued Component and Key Indicator |
|---|---|
| Development of access roads and air strip | ✓ |
| Site preparation and earthworks; clearing, leveling and grading of the Project Area | ✓ |
| Power generation - generators | ✓ |
| Installation of main substation and distribution of power around site | ✓ |
| Wellfield and freeze hole drilling; ground freezing | ✓ |
| Batch plant operation (concrete); crusher at borrow area | ✓ |
| Development of surface infrastructure (camp, operations centre, plants, ponds, pads and support facilities) | ✓ |
| Waste management (composting, domestic and industrial landfill operation, recycling) | |
| Water management (including treatment and site runoff) | ✓ |
| Groundwater supply | ✓ |

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| Project Phase/Activity | Wetlands Valued Component and Key Indicator |
|---|---|
| Surface water withdrawal | ✓ |
| Fuel management (e.g., propane for comfort heating; vehicle and aircraft fuel) | ✓ |
| On-site and off-site operation of vehicles and transportation of materials | ✓ |
| Air transportation for workers | ✓ |
| Regulatory site inspections | ✓ |
| Engagement – site visit from Interested Parties | ✓ |
| Operation of the ISR wellfield | |
| Wellfield and freeze wall drilling | ✓ |
| Operation and expansion of freeze wall | ✓ |
| Batch plant operation (grout and cement); crusher in borrow area | ✓ |
| Expansion of pond and pads | ✓ |
| Operation of the processing plant and production of uranium concentrate | |
| Water withdrawal from groundwater or surface water body | ✓ |
| Management of surface water (including seepage and site runoff) | ✓ |
| Water treatment, both domestic and industrial | |
| Water release to surface water body | ✓ |
| Waste management (composting, domestic and industrial landfill operation, recycling) | |
| Hazardous waste management (temporary storage, handling, and off-site transportation) | ✓ |
| Storage and disposal of drill waste rock, process precipitates and industrial wastewater treatment plant precipitates | ✓ |
| On-site and off-site operation of vehicles and transport of materials | ✓ |
| Power supply – primarily power from the grid, also generators and back-up generators | ✓ |
| Package and transport of nuclear substances | ✓ |
| Fuel management (e.g., propane for comfort heating; vehicle and aircraft fuel) | ✓ |
| Air transportation for workers | ✓ |
| Progressive decommissioning and reclamation | ✓ |
| Regulatory site inspections | ✓ |

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| Project Phase/Activity | Wetlands Valued Component and Key Indicator |
|--|---|
| Engagement – site visit from Interested Parties | ✓ |
| Site water management, treatment, and release | ✓ |
| Mining horizon remediation and thawing of freeze wall | ✓ |
| Process water treatment and release | ✓ |
| Closure of ISR and freeze wells and related infrastructure | ✓ |
| Decontamination of surface facilities and injection, recovery and monitoring wells | |
| Asset removal (including site power transmission lines and electrical infrastructure) | ✓ |
| Demolition and disposal of non-salvageable surface infrastructure and materials | ✓ |
| Remediation of contaminated areas (wellfield, pads, ponds, domestic wastewater treatment location, and process plant area) | ✓ |
| Generators | ✓ |
| Waste management (composting and landfill operation) | |
| Decommissioning of landfills; hazardous materials management (temporary storage and off-site disposal) | ✓ |
| On-site and off-site operation of vehicles and transportation of materials | ✓ |
| Reclamation of disturbed areas | ✓ |
| Regulatory site inspections | ✓ |
| Engagement – site visit from Interested Parties | ✓ |
| Environmental monitoring | ✓ |
| Regulatory site inspections | ✓ |
| Engagement - Site visit from Interested Parties | ✓ |

1 Operational activities include maintenance.

4.2 Potential Project-related Effects

Based on the timing and nature of the interactions identified in Table 4, the following adverse effects have a potential to occur on the Wetland VC (Table 5). The key indicator of effects to wetlands is the change in areal extent of wetlands in the study area.

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Table 5: Potential Project-related Effects on Wetlands Valued Component During all Project Phases

| Project Phase/Potential Effect | Wetlands Valued Component and Key Indicator |
|--|---|
| Construction | |
| Direct disturbance / Overprinting | ✓ |
| Mobilization of suspended materials | ✓ |
| Introduction and/or Proliferation of Invasive Plants | ✓ |
| Changes in Water Quantity (water levels or flow) | ✓ |
| Edge Effects | ✓ |
| Changes to Water Quantity and Quality | ✓ |
| Dust Deposition | ✓ |
| Operation | |
| Direct disturbance / Overprinting | ✓ |
| Mobilization of suspended materials | ✓ |
| Edge Effects | ✓ |
| Introduction and/or Proliferation of Invasive Plants | ✓ |
| Controlled Discharge | ✓ |
| Changes in Water Quantity (water levels or flow) | ✓ |
| Controlled Discharge / Water Quality | ✓ |
| Dust Deposition | ✓ |
| Decommissioning | |
| Direct disturbance / Overprinting | ✓ |
| Mobilization of suspended materials | ✓ |
| Edge Effects | ✓ |
| Introduction and/or Proliferation of Invasive Plants | ✓ |
| Controlled Discharge | ✓ |
| Changes in Water Quantity (water levels or flow) | ✓ |
| Controlled Discharge / Water Quality | ✓ |
| Dust Deposition | ✓ |
| Post-Decommissioning | |

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| Project Phase/Potential Effect | Wetlands Valued Component and Key Indicator |
|--|---|
| Direct disturbance | ✓ |
| Introduction and/or Proliferation of Invasive Plants | ✓ |
| Edge Effects | ✓ |
| Changes to Water Quantity and Quality | ✓ |
| Dust Deposition | ✓ |

4.3 Mobilization of Suspended Materials

Construction

The primary effect pathway during Construction relates to the mobilization of suspended material into natural surface water features including wetlands as a result of land disturbance and clearing. The mobilization of suspended material into natural surface water features is readily mitigatable by virtue of the mine development plan and through the implementation of standard water management and sediment control practices. Water management infrastructure (e.g., collection ditches, ponds, pumping stations) and various aspects of the water management and sediment control management systems will be put into place coincident with the initiation of construction activities. Waters (e.g., runoff) associated with areas under development will be collected and stored within management infrastructure (e.g., clean waste rock pond, see Figure 2.2-14 in Section 2 of the EIS). In the event that releases to the natural environment are necessary, they would only occur once it is safe to do so (i.e., suspended solid levels in the water would be at acceptable levels). No downstream effects on surface waters, natural sediments, fish and fish habitat including wetlands are expected.

Operation

During Operation, mobilization of suspended materials will be managed through the development and operation of water management infrastructure and implementation of surface water management through the Surface Water Management Program. Releases of contact water to the natural environment will be directed through applicable collection ponds, the IWWTP, and the Effluent Monitoring and Release Ponds. No specific discharge is expected to wetland features in the Project Area. Discharge will only occur once it is safe to do so (i.e., suspended solids levels in the water would be at acceptable levels). Denison may employ active means (e.g., filtering), if required, to achieve low TSS levels in discharge, in addition to passive means, such as settling and clarification in the IWWTP to manage TSS in the effluent stream to low levels. No

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downstream effects on surface waters, natural sediments, or fish and fish habitat including wetlands are expected.

Decommissioning and Post-Decommissioning

During Decommissioning and Post-Decommissioning, the site-wide water management system will continue to operate such that Denison will maintain control of the site aspect affected water through the IWWTP. Surface drainage during Decommissioning activities will continue to be directed to the system of collection ponds, the IWWTP, and the Effluent Monitoring and Release Ponds to facilitate the control of suspended solids and achieve low TSS levels in the discharge, thereby minimizing any potential for adverse changes to water quality, sediment quality, and fish and fish habitat including wetland features.

4.4 Overprinting of Wetlands as Fish Habitat

For the purposes of this assessment the bogs and fens within the area can be assumed to provide supporting fish habitat to the adjacent lake and river water bodies in the vicinity of the LSA.

Bogs are predicted to be the wetland class most affected by the Project, with 0.4 ha (less than 0.1%) of mapped bog ecosystems within the Terrestrial RSA expected to be disturbed within the Project Area during Construction. Fens are the next most affected, with 0.1 ha (0.1%) anticipated to be disturbed during Construction (Figure 3). Less than 0.1 ha (less than 0.1%) of shallow open water wetlands within the Terrestrial RSA are also anticipated to be affected by the Project.

Within these wetland classes, the wetland ecosite expected to be most affected is the willow shrubby rich fen (ecosite BS23) with direct disturbance to 0.1 ha predicted to occur within the Project Area (0.5% of the BS23 ecosite within the Terrestrial RSA). The remaining ecosites anticipated to be directly affected by the Project are locally abundant, with direct disturbance expected to affect <0.1% of these ecosites within the Terrestrial RSA (**Error! Reference source not found. 2**).

Investigation of the potential overprinting of wetland features as a result of the Project it is evident that wetland loss is avoidable. The interaction of the Project with wetlands is isolated to those areas where stream crossings for access roads and hydro-line connections are proposed (Figure 3). With the use of single span bridges and implementation of best management practices, direct wetland disturbance associated with the crossings of Kratchkowsky Creek and Hart Creek is expected to be avoided. It should be noted that SaskPower proposes to tap the existing I3P 138 kV line near Highway 914 and build approximately 4.5 km of new 138 kV line from the I3P tap to the Project site. SaskPower will be responsible for conducting activities such as line routing, environmental studies, and permitting, public consultation, and engineering design work as applicable to the load interconnection. As such, wetland disturbance related to

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the SaskPower Hydro Corridor is expected to be addressed through the SaskPower permitting process.

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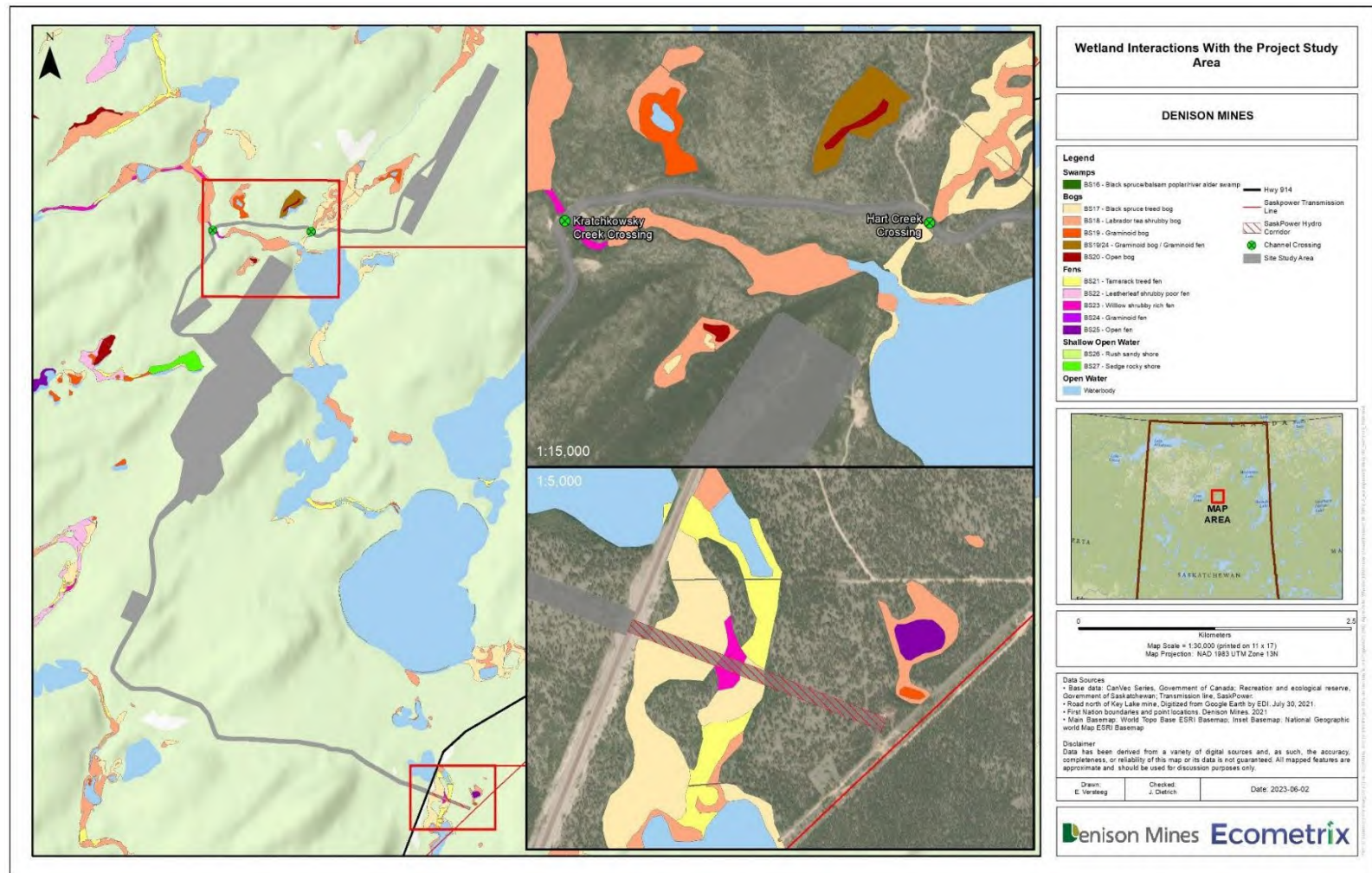


Figure 3: Denison Wheeler River Project Area and Wetland Feature Distribution

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4.5 Controlled Discharge to Receiving Environments

According to the site water balance (Figure 2.2-14 in Section 2 of the EIS), there is no planned discharge to Whitefish Lake during Construction. Other than LA-5 (Whitefish Lake) no other controlled discharge will occur to the natural environment and no wetlands will be impacted as a result.

4.6 Change in Water Levels and Flow

As detailed in Section **Error! Reference source not found.** of the EIS, the projected withdrawal and discharge rates proposed for the Project are the largest influence on the hydrological effects of the Project. The largest predicted change in streamflow rate is -3.1% at the LA-5 and SA-2 nodes (immediately downstream of the Project) during Operation and Decommissioning, as projected against the 5th percentile low flow dataset in March. Lake levels and wetlands are expected to deviate less than ± 0.01 m due to all Project influences. All Project influences on the environment are expected to return to baseline conditions during Post-Decommissioning. These changes are within the range of fluctuation of environmental flows and water levels and are unlikely to affect fish passage or life history environmental cues.

4.7 Introduction and/or Proliferation of Invasive Plants

Vegetation clearing and soil disturbance during Construction are expected to create conditions suitable for the introduction and proliferation of invasive plants. Vehicles and construction equipment can inadvertently transport seeds and other invasive plant propagules in tires or the undercarriage to previously unaffected areas. The effects of invasive plants on native vegetation diversity are well documented and recognized as the second greatest threat to listed species after habitat loss (Enserink 1999). Competition with native species can lead to a reduction in the growth and vigour of native species (including Wetlands), as well as changes in the diversity, structure and function of ecosystems and habitats.

The potential for the introduction and proliferation of invasive plants by transport on vehicles and equipment is expected to continue throughout Operation during wellfield and freeze wall drilling, expansion of ponds and pads, drill waste rock, process precipitates and industrial wastewater treatment plant precipitates, on-site and off-site operation of vehicles and transport of materials, package and transport of nuclear substances, and air transportation for workers (i.e., landing and taking off of airplanes). Progressive decommissioning and reclamation has the potential to introduce invasive plants on vehicles and equipment and if seed used for revegetation is not supplied from a native seed source (Polster 2003) with a certificate of analysis indicating an absence of invasive plant seeds.

The potential for the introduction and proliferation of invasive plants is expected to continue throughout Decommissioning (e.g., during closure of the ISR and freeze wells and infrastructure,

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asset removal, demolition and disposal of non-salvageable surface infrastructure and materials, remediation of contaminated areas, reclamation of disturbed areas, and operation of vehicles and transportation of materials). The potential for the introduction and proliferation of invasive plants is expected to continue throughout Post-Decommissioning, but at lower levels due to reduced vehicle traffic.

4.8 Edge Effects

Edge habitat refers to an area on either side of a border between vegetation communities. Edges between vegetation communities often result in altered microclimatic conditions that can influence environmental conditions further away from the edge (Bannerman 1998). Edge effects are expected to extend into areas of native vegetation and habitats at the interface of disturbed areas and undisturbed native ecosystems, and could include altered microclimatic conditions that can influence quality in habitat away from the edge (Bannerman 1998). Where edge effects occur, Wetlands may experience changes in light intensity, temperature, wind, moisture, relative humidity, and patterns of snow accumulation and melt relative to undisturbed conditions. This can, in turn, affect plant health and alter natural disturbance regimes (e.g., blowdown), plant population persistence, and the structure and function of ecosystems and habitats. If changes to microclimatic conditions or vegetative structure at an edge exceed a species habitat preference or physiological tolerance, then edge habitat may result in lower occupancy or use, reduced survival, or lowered reproductive success.

Edge effects at the interface of disturbed areas and native ecosystems are expected to occur along the edges of the Project Area resulting from vegetation clearing during site preparation and earthworks during Construction. Edge effects are expected to continue throughout Operation, Decommissioning, and Post-Decommissioning, decreasing over time as revegetation and tree growth within reclaimed areas of the Project create a gradual structural transition at forest edges, aided by natural encroachment.

4.9 Long-Term Transport of Groundwater Solutes to Whitefish Lake in Future Centuries

During the 'future centuries' scenario as described in Section 8.3.1.3 of the EIS, remediation works will be completed and the site naturalized, thereby restoring drainage patterns to report to surface waterbodies. As indicated in Section 7 of the EIS, groundwater plumes may develop from residual mass remaining post-mining based on bench-scale lab tests of core flushing, and numerical modelling of reactive fate and transport. The results of this was described in Section 8.3.4.2.5 with respect to Fish and Fish Habitat and therefore wetlands.

The results of the numerical modelling (as provided in Section 7 and Appendix 10-A in Section 10 of the EIS) support the conclusion that with the implementation of appropriate mitigation during the decommissioning and restoration phases of the Project, the residual effects of the

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Project on the intermediate Groundwater VC will not result in an adverse effect on surface water. Dissolved constituent concentrations emanating over hundreds to thousands of years in the future from the deep Ore Zone to Whitefish Lake are expected to remain below fresh water environmental quality criteria in Whitefish Lake.

Although the precise location of the groundwater discharge to the surface is somewhat uncertain, the groundwater transport scenarios that have been evaluated (Appendix 7-C of the EIS) to date suggest groundwater discharge impacted from mining will most likely be relegated to Whitefish Lake. The discharge to Whitefish Lake is generally predicted to occur along the eastern shore of the lake, as this is interpreted to be the eastern edge of the underlying desilicified zone. The Laborador Tea Shrubby Bog habitat located on the eastern shore of Whitefish Lake may be in the zone of influence of groundwater discharge, yet chemically will remain below freshwater environmental quality criteria. Groundwater impacts to other surrounding wetlands will be negligible as groundwater is not predicted to discharge within any area beyond the central portion of Whitefish Lake.

4.10 Indirect Effects

Indirect disturbance associated with the potential to adversely affect BS19/24 includes the introduction and/or proliferation of invasive plants, edge effects, changes to water quantity and quality, and dust deposition during all Project phases (as described in Section **Error! Reference source not found.**). Wetland ecosites BS19/24 (graminoid bog/fen) and BS25 (open fen) are peatland ecosystems typically characterized by high water tables (i.e., a very moist or very wet moisture regime), while ecosite BS27 (sedge rocky shore) is a sparsely vegetated ecosystem predominated by rocky substrates, typically occurring adjacent to lakes and ponds (McLaughlan et al. 2010). Because these ecosystems rely on high water tables and existing waterbodies, alteration of water quantity would be expected to have the highest potential to cause an adverse effect. Therefore, maintenance of wetland hydrology is expected to be the most effective mitigation to sustain these wetland ecosites within the Terrestrial LSA throughout the Project lifespan.

5.0 Mitigation Measures

Mitigation measures specific to the wetlands, discussed in the following subsection are applicable during all Operation phases and expected to be effective immediately following implementation and managed through the EMP.

Disturbance Reduction

- Wherever possible, wetlands will be avoided through Project design and instituting proper buffers.

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- Disturbance to vegetation and soils will be avoided by clearly delineating Project Area boundaries (e.g., with the use of fencing, staking, or flagging), adhering to construction plans and schedules, and by restricting off-site machine use.
- Wetland boundaries in the proximity of planned disturbances will be clearly delineated (e.g., with the use of fencing, staking, or flagging) to facilitate avoidance to the extent practicable.
- Should they occur, areas prone to potential instability and areas in proximity to water bodies and drainage features will be identified and appropriate setbacks will be established and maintained.
- Temporary workspaces or laydown areas will be sited and constructed within existing disturbance or on previously compacted soils, where practicable. In areas requiring clearing only, grubbing will be avoided, and roots and groundcover will be retained to the extent feasible.
- Pre-construction listed plant surveys will be completed within the Project Area.
- Listed plants located adjacent to planned disturbances will be clearly delineated (e.g., with the use of fencing, staking, or flagging) to facilitate avoidance to the extent practicable and reduce the potential for accidental encroachment outside of the Project footprint.
- Should Listed Plants be identified within the Vegetation LSA prior to Construction, site- and species-specific mitigation measures to avoid and/or limit Project effects will be determined by a Qualified Vegetation Ecologist. Specific mitigation measures will depend on the species, its life history characteristics, time of year, and the location of the occurrence in relation to Project activities.
- Herbicide use will be avoided within 100 m of any known listed plant occurrences. Where herbicide use is unavoidable, use will be restricted to direct application instead of broadcast spraying and completed by qualified personnel.

Soil Handling and Reclamation

- Construction activities will be sequenced (i.e., site clearing, grading preparations, major earthworks and construction of infrastructure/facilities) so that surface vegetation, mineral soil and organic matter can be salvaged for later use in Project Decommissioning.
- Soil resources within the Project Area will be stripped/salvaged and stockpiled within the Project Area in accordance with relevant soil management BMPs, i.e., providing guidance on ground-truthing soil conditions, flagging potential hazards and sensitivities, and

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modifying practices in relation to environmental conditions and avoiding or minimizing inadvertent/incidental disturbance.

- A soil monitoring program/protocol (or equivalent) will be undertaken to verify soil salvage volumes and reclamation suitability (Section 9.1.8.2).
- Soil stockpiling locations will be sited to reduce soil handling and travel distances and designed to minimize the potential for soil degradation and downgradient effects, e.g., having defined height and width that optimize soil storage and stockpile stability, and having integrated erosion control measures and surface water management features (if/where necessary). Sediment and erosion control measures will be implemented in accordance with BMPs and commensurate to site conditions and sensitivities.
- Sediment and erosion control measures and surface water management features will be installed and maintained at the Project. Erosion controls (e.g., sediment fencing, check-damns and/or sediment ponds) will be installed as necessary and at the discretion of construction personnel commensurate to site conditions and sensitivities to manage/mitigate erosion and sedimentation.
- Progressive reclamation and ecosystem-based revegetation will be conducted on disturbed areas as soon as practicable with the use of suitable native species and in accordance with the Reclamation and Closure Plan.

Surface Water Management

- Snow melt and runoff will be controlled within the Project Area to prevent the potential release of contaminated runoff from affecting vegetation in adjacent areas.
- Sediment and erosion control measures will be implemented in accordance with the EMS.
- Surface water management features (e.g., culverts and ditches) will be constructed and maintained (as per Project design specification) along access roads and facility sites to facilitate surface drainage continuity and hydrologic connectivity—especially in proximity to wetlands, water crossings, and waterbodies.
- Hydrologic connectivity is expected to be maintained across the Project Area with the engineering, construction, and maintenance of surface water management features (e.g., culverts and ditches) as appropriate and as per Project design specifications along access roads and at facility sites.

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Invasive Plant Management

- Equipment and vehicles will arrive at the Project Area clean, and will be inspected for soil, plant material, and seeds, and cleaned as appropriate, to limit the potential for the introduction of invasive plants and noxious weeds.
- Areas with a high risk for the potential spread of invasive plants and noxious weeds (i.e., within or adjacent to existing infestations) will be avoided to the extent practicable; if work must occur in these areas, invasive plant management will be implemented before starting work.
- Gravel, fill, straw matting, or similar materials to be used for erosion control will be inspected to minimize the potential for seeds or propagules of invasive plants being brought to site.
- All employees and contractors on the Project will receive an employee orientation appropriate to the work they are undertaking, including instruction on the definition of invasive plants and their potential effects, mitigation measures to avoid the introduction and spread of invasive plants, and training on the presence and identification of common invasive plant species and those known to occur within the Project Area.
- Invasive plant monitoring will be conducted periodically by personnel skilled in invasive plant identification during all Project phases to assess, evaluate, and document invasive plant occurrences within the Project Area. Invasive plant surveys will be completed during a biologically appropriate time of year (e.g., when invasive plants can be identified) within areas identified as most susceptible to invasive plant introduction and spread, including roads, ROW, debris and vegetation management areas (e.g., slash piles, timber decks, exposed soil or stockpiles) and other regularly disturbed habitats.
- Three general treatment options may be used alone or in combination to control of invasive plants in the Project Area:
 - mechanical control – involves the physical removal of the plants;
 - chemical control – involves application of synthetic and/or natural herbicides; and,
 - biological control measures – involves use of living organisms (e.g., rusts, insects) to control selected invasive plant species.
- The type of treatment option selected for an invasive plant occurrence will be based on a combination of specific information including the identity of the invasive plant species and its provincial designation, the size and extent of the occurrence, time of year, the proximity of the occurrence to other susceptible areas (e.g., rare plant occurrences, wetlands, waterbodies), and the available control options. Where possible, control of

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invasive plants will be completed in consultation with a qualified professional to minimize potential effects on native vegetation, ecosystems and wetlands.

- Seed used during re-vegetation will be certified weed free, with a valid “Certificate of Seed Analysis”.

6.0 Residual Effects Evaluation

6.1 Residual Effects Characterization

Residual effects on the Vegetation and Ecosystems, Listed Plant Species, and Wetlands VCs have been assessed in relation to the RSA, and characterized in terms of direction, magnitude, geographic extent, frequency, duration, reversibility, context, and likelihood (**Error! Reference source not found.** 6). Residual effect evaluation of residual effects are provided in Tables 7, 8 and 9.

Table 6: Definitions of Effect Characteristics Considered When Determining the Significance of Residual Effects

| Residual Effect Characteristic | Definition | Rating |
|--------------------------------|---|--|
| Direction | Identifies whether the residual effect will be adverse or positive. | Adverse – Negative effect or effect is not desirable. <i>Water Quantity</i> – Effect moves MPs (flow or water level) in a direction detrimental to water quantity relative to baseline conditions. A Project-related increase in surface water flows and levels during flooding, or a decrease in surface water flow below environmental flow requirements. <i>Water Quality</i> – An increase in constituent concentrations attributable to the Project in comparison to baseline conditions and trends. <i>Wetlands / Fish Habitat</i> – A physical loss of available fish habitat (extent of area) in comparison to baseline conditions. Positive – Beneficial effect or effect is desirable. |
| Magnitude | The amount of change in a measurable parameter relative to baseline conditions. | Low <ul style="list-style-type: none">▪ measurable decrease in the spatial extent of Wetlands, but less than a 10% loss; all original wetland classes are present.▪ A measurable change that is not within the variability of baseline conditions but below relevant water quality objectives and criteria. A Project-related change in hydrology (flows or levels) compared to baseline conditions, but where the change is <5% from baseline conditions |

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| Residual Effect Characteristic | Definition | Rating |
|--------------------------------|--|---|
| | | <p>Moderate</p> <ul style="list-style-type: none">▪ measurable decrease in the spatial extent of Wetlands between 10% and 30% loss; measurable changes in the diversity of wetland classes; some original wetland classes may be absent.▪ A measurable change in water quality that is not within the variability of baseline conditions and not within applicable guidelines, legislated requirements, and/or federal and provincial management objectives. A Project-related change in hydrology (flows or levels) compared to baseline conditions, but where the change is >5% from baseline conditions, and could, therefore, have an adverse effect on Fish and Fish Habitat within the LSA. <p>High</p> <ul style="list-style-type: none">▪ measurable decrease in the spatial extent of Wetlands greater than 30% loss; some original wetland classes are absent.▪ monthly flows (>10%), or lake surface elevation (m) in a waterbody or watercourse that is greater than the range of natural variability and large enough that fish can no longer rely on this habitat to carry out one or more of their life processes. A measurable change in water quality that is not within the variability of baseline conditions and not within applicable guidelines, legislated requirements, and/or federal and provincial management objectives and is likely to have an adverse effect on Wetlands (Fish and Fish Habitat) within the LSA, with the effect extending beyond the LSA. |
| Geographic Extent | The geographic area within which the residual effect is expected to occur. | <p>Project Area – Effect is limited to the Project Area.</p> <p>Local – Effect is limited to the Vegetation LSA.</p> <p>Regional – Effect extends beyond the Vegetation LSA into the Terrestrial RSA.</p> <p>Beyond Regional – Effect extends beyond the Terrestrial RSA.</p> |
| Duration | Length of time over which the residual effect is expected to persist. | <p>Short-term – Less than 3 years (i.e., effect happens during Construction only).</p> <p>Medium-term – 3 years to 38 years (i.e., effect happens from Construction through to the end of Post-Decommissioning).</p> <p>Long-term – More than 38 years (i.e., effect extends beyond Post-Decommissioning).</p> |
| Frequency | How often the residual effect is expected to occur. | <p>Infrequent – Effect occurs several times at sporadic intervals.</p> <p>Frequent – Effect occurs many times on a regular basis.</p> <p>Continuous – Effect occurs continuously.</p> |

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| Residual Effect Characteristic | Definition | Rating |
|--------------------------------|--|--|
| Reversibility | Whether or not the residual effect can be reversed once the activity causing the residual effect ceases. | Fully Reversible – A residual effect that diminishes to baseline conditions. Partially Reversible – A residual effect that partially diminishes to baseline conditions. Irreversible – A residual effect that will not diminish to baseline conditions. |
| Context | The extent to which the VC or KI has been affected by past and present environmental and socio-economic processes and conditions, its potential sensitivity to the Project-related residual effect, and its ability to recover from that effect (i.e., resilience) | Low – VC/KI has high resilience to stress or ecological change. This resilience can be a result of the ecological characteristics of the species or ecosystem, and/or a lack of historic and ongoing anthropogenic or natural disturbance. No listed species present. Moderate – VC/KI has moderate resilience to stress or ecological change. This resilience can be a result of the ecological characteristics of the species or ecosystem, and/or an intermediate level of historic or ongoing anthropogenic or natural disturbance with the capacity to assimilate more change. Presence of listed species High – VC/KI has weak resilience to stress or ecological change. This resilience can be a result of the ecological characteristics of the species or ecosystem, and/or a high level of historic or ongoing anthropogenic or natural disturbance. Presence of SARA-listed species |
| Likelihood | Likelihood that the residual effect will occur including consideration of the likelihood that the mitigation will be successful. | Likely – A moderate to high probability that the residual effect will occur. Unlikely – A low probability that the residual effect will occur. |

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Table 7: Wetland Fish and Fish Habitat – Summary of the Residual Effect Characteristics for Surface Water Quality

| Residual Effect Characteristic | Rating | Summary Rationale for Rating |
|--------------------------------|------------------|--|
| Direction | Adverse | The Project (specifically the discharge of effluent to the natural environment) will cause a change in the concentration of constituents, as measured as a mass of a chemical per unit volume in water (e.g., mg/L). Surface water quality in the local receiving environment will be adversely affected by effluent discharge to the aquatic environment, thereby providing a pathway to adversely affect surface waters. However, no discharge is planned to wetlands outside of Whitefish Lake. |
| Magnitude | Low | The magnitude of the residual effect is predicted to be low as constituents that may be introduced as part of Project activities are expected to remain below criteria for the protection of aquatic life and human health. |
| Geographic Extent | Local | The geographic extent of the residual effect is predicted to be confined to the immediate waterbody adjacent to the Project (i.e., Whitefish Lake). The estimated mixing zone is less than 5 m, implementing an effluent discharge configuration that promotes mixing. |
| Duration | Long-term | The residual effect is expected to last between 3 to 38 years (i.e., effect expected during Construction through to the end of Post-Decommissioning). |
| Frequency | Continuous | For the purposes of this EIS, a conservative scenario was identified, with effluent discharge being considered as continuous during Operation and Decommissioning. |
| Reversibility | Fully reversible | Surface water quality is expected to return to pre-development levels following Post-Decommissioning as Project-related sources will cease to operate. |
| Context | Low | Wetland health is expected to be resilient to changes in surface water quality in the context of this assessment, as COPC meet protective criteria even at the extreme low water scenario. Therefore, under applicable mitigative measures and average flow conditions, the contextual resilience of the aquatic system to respond to change is considered to be great. |
| Likelihood | Likely | A high probability exists that a change in water quality from background conditions will occur, but be restricted to Whitefish Lake and not other surrounding wetland features. |

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Table 8: Wetland Fish and Fish Habitat – Summary of the Residual Effect Characteristics for Change in Area Extent

| Residual Effect Characteristic | Rating | Summary Rationale for Rating |
|--------------------------------|----------------------|--|
| Direction | Adverse | Impacts to wetlands in the LSA from physical disturbance or overprinting are expected to be minor in nature and relegated to wetlands located at stream crossings for access roads and the hydro-line corridor. In both cases the approach to design will be one of avoidance and minimal disturbance with clear span bridges and minimal clearing required for hydro-line installation where avoidance of open water areas can be met. |
| Magnitude | Low | The magnitude of the residual effect is predicted to be low. Less than 0.1% of Wetlands within the Terrestrial RSA are predicted to be directly affected as a result of Project Construction, and up to 1.5% may be indirectly affected during all Project phases. |
| Geographic Extent | Local | The residual effect is expected to be limited to the LSA, specifically to wetlands located at stream crossings for access roads and the hydro-line corridor |
| Duration | Long-term | Once natural drainage patterns are re-established following Operation, the structure and function of Wetlands altered as a result of indirect Project effects are expected to re-establish after Post-Decommissioning (more than 38 years). |
| Frequency | Frequent | While direct affects to specific Wetlands will occur over a short time period during Construction, Wetland alteration by indirect effects is anticipated to occur frequently throughout Construction, Operation, and Decommissioning, and infrequently during Post-Decommissioning. |
| Reversibility | Partially Reversible | Wetland effects are predicted to be partially reversible during Decommissioning once natural hydrologic conditions are reinstated. Alterations to wetland extent, structure and/or function as a result of indirect Project effects during all Project phases are predicted to be reversible over time once natural hydrologic conditions are reinstated and edge effects, dust, water quality changes, and invasive plant propagule pressure are reduced at the end of Decommissioning. |
| Context | Moderate | Wetlands can exhibit low resilience and high susceptibility to disturbance; however, disturbance is common within the Terrestrial RSA, and existing Wetlands have been historically disturbed by access roads and exploration activities. |
| Likelihood | Likely | The infrastructure associated with the bridges and the hydro-line are likely to affect the localized area for which they span in a limited way. |

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Table 9: Wetland Fish and Fish Habitat – Summary of the Residual Effect Characteristics for Change in Surface Water Quantity (Hydrology)

| Residual Effect Characteristic | Rating | Summary Rationale for Rating |
|--------------------------------|------------------|--|
| Direction | Adverse | Water quantity (flow and level) will be reduced in LA-5 as a result of the overprinting of its reporting drainage area by mine infrastructure and through site water balance. Water taking has an additional potential to reduce water levels in LA-5 and associated wetlands. |
| Magnitude | Low | The magnitude of the residual effect is predicted to be low. Under all scenarios, the Project-related change in hydrology (flows or levels) compared to baseline conditions is less than 5% of baseline conditions, and generally less than 3%. |
| Geographic Extent | Local | The residual effect is expected to be limited to the LSA, specifically the lakes and wetlands within proximity to the Project site (i.e., LA-5, LA-6, and LA-1). |
| Duration | Moderate | The residual effect is expected to last between 3 to 38 years (i.e., effect expected during Construction through to the end of Post-Decommissioning). |
| Frequency | Continuously | Although the mine is unlikely to require water taking on a continuous basis, this has been assessed as a bounding scenario and, as such, must be considered as a continuous effect. |
| Reversibility | Fully reversible | Surface water hydrology is expected to return to pre-development levels following Post-Decommissioning. |
| Context | Moderate | Surface water flow regimes are variable, and it is this variability that provides for morphological form to be maintained and for ecological reliance (i.e., wetlands, fish habitat). Some change to environmental flows is tolerated by wetland biota. |
| Likelihood | Low | Due to the localized nature and low magnitude of the effect on surface water hydrology, the likelihood of an effect is considered to be very low; therefore, the likelihood of an effect on Wetlands is expected to be low. |

6.2 Significance and Confidence

The residual effect of change in the areal extent of the Wetlands VC as a result of the Project is not expected to result in a change to the wetlands KI that will alter its integrity within the Terrestrial RSA to the point where it is not sustainable or unavailable to contribute to ecological functions.

The threshold for significance for the Wetlands VC relates to predicted changes in the concentrations of water quality parameters, where changes could result in exceedances of

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relevant water quality benchmarks that are protective of aquatic biota in waterbodies that receive mine-affected drainage. The threshold for significance for Wetlands also includes predicted changes in surface water flows greater than baseline environmental flows and direct habitat loss.

The significance of the residual effects on the Wetlands VC has been deemed **not significant**. Following mitigation, the residual effects are not expected to cause a change in Wetland habitat (or associated KIs) to the extent that they might alter the ecological integrity of the VC in the LSA beyond an acceptable level.

The predicted confidence with respect to the Wetlands VC is high as the mobilization of suspended materials can be readily mitigated, making the effects prediction relative to this effect pathway easily understood.

Confidence in the assessment of predicted effects on water levels or flow is quite high due to available hydrological data for the LSA. Uncertainty is minimal with the assumptions that the water withdrawal and discharge scenarios presented herein represent the bounding case, and hydrogeological modelling projections are not changed (Section 8.1 of the EIS).

Potential effects on water quality as a result of Project discharges to local receiving environments were assessed by way of numerical modeling. These predictions are generally considered conservative in nature because the assumptions on which they are based are conservative. For example:

- The assessment is based on a continuous (year-round) discharge at an expected average effluent rate of $0.0101 \text{ m}^3/\text{s}$ ($36.5 \text{ m}^3/\text{hr}$) throughout Construction, Operation, and Decommissioning, despite the likelihood that effluent discharge will not be continuous and will only discharge when site water balance requires, based on water storage capabilities.
- The constituents in effluent discharge have been estimated conservatively. Presented discharge concentrations provided herein include contingency factors of one to three times.
- Baseline water quality is defined by the 95th percentile concentrations of individual constituents. Such an assumption is conservative as it constrains the assimilative capacity associated with the receiving environment. By definition, the assimilative capacity of a receiving environment is equal to the incremental difference between the existing baseline condition and the assessment benchmark (i.e., water quality criterion) on which the evaluation is based. Use of the 95th percentile concentration, rather than a measure

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of central tendency (i.e., 50th percentile, geomean), means that the incremental change in a given constituent concentration that can be assimilated by the receiving environment (whereby use of the receiving environment is protected) is relatively small in magnitude.

Due to the conservative nature of the assumptions on which the numerical assumptions are based, a high degree of confidence can be assumed.

6.3 Summary of Project Related Residual Adverse Effects

The results of the characterizations for these residual effects are summarized in Table 10. The residual effects of the Project on the Wetland KIs were predicted to be **not significant**. Thus, the residual effects of the Project on the Wetlands VC are predicted to be **not significant**.

Table 10: Summary of Project-related Residual Effects

| Valued Component | Residual Effect | Project Phase | Direction | Magnitude | Geographic Extent | Duration | Frequency | Reversibility | Context | Likelihood | Significance |
|------------------|--|---------------|-----------|-----------|-------------------|----------|-----------|---------------|---------|------------|--------------|
| Wetlands | Change in Water Quality | C, O, D | A | L | L | LT | C | FR | L | L | NS |
| | Change in Water Level or Flow | C, O, D | A | L | L | MT | C | FR | L | L | NS |
| | Change in the Areal Extent of Wetlands | C, O, D | A | L | L | LT | F | PR | M | L | NS |

- ¹ Direction: Adverse (A), Positive (P)
- Magnitude: Low (L), Moderate (M), High (H)
- Geographic Extent: Local (L), Regional (R), Beyond Regional (BR)
- Duration: Short-term (ST), Medium-term (MT), Long-term (LT)
- Frequency: Infrequent (IF), Frequent (F), Continuous (C)
- Reversibility: Fully Reversible (FR), Partially Reversible (PR), Irreversible (IR)
- Context: Low (L), Moderate (M), High (H)
- Likelihood: Unlikely (U), Likely (L)
- Significance: Not-Significant (NS), Significant (S)
- Level of Confidence: High (H), Moderate (M), Low (L)

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7.0 Cumulative Effects

The cumulative effects are discussed in detail in Section 9.2.7 of the EIS and are not re-examined herein.

8.0 Summary

Bogs are predicted to be the wetland class most affected by the Project, with 0.4 ha (less than 0.1%) of mapped bog ecosystems within the Terrestrial RSA expected to be disturbed within the Project Area during Construction. Fens are the next most affected, with 0.1 ha (0.1%) anticipated to be disturbed during Construction. Less than 0.1 ha (less than 0.1%) of shallow open water wetlands within the Terrestrial RSA are also anticipated to be affected by the Project.

Within these wetland classes, the wetland ecosite expected to be most affected is the willow shrubby rich fen (ecosite BS23) with direct disturbance to 0.1 ha predicted to occur within the Project Area (0.5% of the BS23 ecosite within the Terrestrial RSA). The remaining ecosites anticipated to be directly affected by the Project are locally abundant, with direct disturbance expected to affect <0.1% of these ecosites within the Terrestrial RSA.

Investigation of the potential overprinting of wetland features as a result of the Project it is evident that wetland loss is avoidable. The interaction of the Project with wetlands is relegated to those areas where stream crossings for access roads and hydro-line connections are proposed.

Avoidance through design as well as mitigation measures to control sedimentation to wetland features during construction, operation and decommissioning phases. Water quantity and quality are not expected to cause impacts to wetlands as the change in surface water feature levels and flow are nearly negligible and water will not be discharged to wetlands save for Whitefish Lake, for which effluent will not be released unless meeting criteria for the protection of aquatic life.

Residual effects on the Wetlands VC resulting from the Project were identified and assessed as **not significant**. Existing provincial legislation (Environmental Management and Protection Act [Government of Saskatchewan 2010] and the Water Security Agency Act [Government of Saskatchewan 2019b]) requires written approval (i.e., Aquatic Habitat Protection Permits) prior to any works within a wetland.

To further supplement existing information that exists for the LSA wetlands, Denison is committed to undertaking wetland surveys including the collection of water quality, sediment quality, benthic invertebrates and fish and fish habitat surveys prior to the construction of the operation to provide an updated baseline for assessing the success of mitigation measures and

DATE: 19 January 2024

TO: Denison Mines – Janna Switzer



REF: Wheeler River Project EIS – Appendix 8-F: Wetland Effects Assessment Report

to assess potential effects of the project on wetlands. These locations will then be further considered as part of the EMP for continued monitoring for these media and biota.

9.0 References

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- Department: ECCC
- Project Effects Link: Fish and fish habitat
- Reference to EIS, appendices, or supporting documentation: Section 8.1.3.4 Climate Change Influenced Extreme Events

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, June 26 2024) |
|--------------|----------------|---|--|---|--|---------------------------------------|--|---|
| IR-103 | - | <p>Context: The Proponent notes that Intensity duration frequency (IDF) curves are used to estimate the size of water management structures around a site and that the IDF curves are often specific to climate monitoring stations.</p> <p>The Proponent used the IDF_CC Tool 5.0 developed by the Institute for Catastrophic Loss Reduction (2021) which generates Intensity Duration Frequency (IDF) curves at ungauged locations in order to estimate future IDF curve values under influences of climate change. This tool generates sub-daily values at ungauged locations by interpolation and distance weighing from gauged locations.</p> <p>Rationale: IDF trends exhibit random behavior at some locations and correlated behavior at other locations. The choice of gauged locations will infer the statistics for the ungauged locations, including the IDF trends. Without identification of the gauged locations, it is not possible to assess if the modelled data is realistic or not. If the modelled data is not accurate the design of water management structures on the site may not be sufficient resulting in the potential for impacts to the Project from flooding or extreme weather events.</p> | <p>Provide the gauged stations used to generate the sub daily duration values found in Table 8.1-6: Baseline of Intensity Duration Frequency data.</p> <p>Technical Discussion Required: Yes</p> | <p>ECCC correctly notes that the tool generates sub daily values at ungauged locations by interpolation and distance weighing from gauged locations. The closest gauged location to the Project is located 35 km south southwest at the Key Lake Mine (KLM) and the IDF values at KLM for historical and future scenarios (Tables 1 and 2 below) are substantially lower than those predicted for the Project. The IDF CC Tool estimated 1:100 year, 24 hour return period events of 79.9 and 88.6 mm during the current and predicted future values, respectively. As per Tables 1 and 2 those values are substantially larger, and more conservative than, the coincident values of 56.4 and 62.0 mm for KLM. The predicted values for the Project are likely strongly influenced by Cree Lake (4061861; 85 km west southwest) and Collins Bay SK (4061620; 130 km northeast). The interpolation may also be influenced by Stony Rapids A (4067PR5; 196 km north). The Cree Lake, Collins Bay SK and Stony Rapids A stations are all substantially higher than KLM; however, the geography, and likely the climate of KLM, is more similar to those of the Project than from the more distant stations.</p> <p>Despite the potential for the IDF_CC Tool to use weighting factors, the estimates provided by the tool for the purposes of assessing impacts of the project on the surface water hydrology are robust and conservative including in consideration of flooding or extreme weather events.</p> <p>IR-103 Table 1: Key Lake (4063753) – Historical IDF</p> <p>IR-103 Table 2: Key Lake (4063753) – 2020 – 2050 Predicted IDF using CMIP6 Raw GCMs and SSP5.85</p> | <p>This response has not been accepted.</p> <p>In the Context and Rationale of AD-15 in the Annex 1 – Denison Response, ECCC recommends that the Proponent consult CSA PLUS 4013:19 (2019) Technical guide: Development, interpretation and use of rainfall intensity- duration-frequency (IDF) information: Guideline for Canadian water resources practitioners regarding the consideration of future changes in short-duration precipitation extremes. In IR-103, ECCC indicated that in order to assess the accuracy of the Intensity duration frequency (IDF) curves, ECCC required that the Proponent provide the gauged stations generating the values for the modelled data. The Proponent provided the closest gauged stations, however, the future short duration precipitation values were based on statistical relationships fitted between local scale observed extreme precipitation and modelled simulations extremes.</p> <p>Additionally, on page 15-19 of the draft EIS states that: “Denison will apply adaptive management that includes monitoring climate factors so that they can proactively mitigate or prevent adverse climate effects on the Project.” Denison did not provide details on how climate factors will be considered within their adaptive management plans.</p> <p>Rationale: Estimates of future short duration precipitation that are based on statistical relationships fitted between local scale observed extreme precipitation and modelled simulations extremes, such as the approach used by the Proponent, are unlikely to provide reliable projections. This is because the amount of information regarding changes in local-scale observed extreme precipitation contained in short records is not sufficient to constrain a regression (model the statistical relationship) between local and larger scale simulations (Li et al., 2019; ECCC 2022). An alternative approach is to base future projections on a comprehensive assessment that integrates climate science understanding and model projections over a large region. The recent Canadian Standards Association (CSA 2019) guidance on IDF for Canadian Water Resources practitioners provides such an assessment.</p> <p>In terms of adaptive management, the Proponent should clearly outline what climate factors will be monitored to mitigate or prevent adverse climate-related effects. This should include information on when and how the climate factors would be monitored and under what circumstances particular adaptive management approaches would be applied.</p> <p>In order to assess the Proponent’s adaptive management strategies for future extreme precipitation events, ECCC requests that the Proponent consult the CSA (2019) guidance when using future IDF projections in the Project design and provide revised estimates of the potential future changes in short-duration precipitation extremes over the Project’s duration.</p> <p>1. Provide revised estimates of the potential future changes in short-duration precipitation extremes over the Project’s duration as relevant to the Project design.</p> <p>2. Demonstrate how the CSA (2019) guidance will be incorporated in the Project design when developing and considering future IDF projections and estimates of the potential future changes in short-duration precipitation extremes.</p> <p>References</p> <p>CSA Group. (2019). Technical guide: Development, interpretation and use of rainfall intensity- duration-frequency (IDF) information: Guideline for Canadian water resources practitioners. CSA PLUS</p> <p>4013 :19. https ://www.csagroup.org/store/product/2703080/</p> <p>ECCC (2022). Draft Technical guide related to the Strategic Assessment of Climate Change: Assessing climate change resilience. https ://www.strategicassessmentclimatechange.ca/28896/widgets/117114/documents/77106</p> <p>Li, C., Zwiers, F., Zhang, X., & Li, G. (2019). How much information is required to well constrain local estimates of future precipitation extremes? Earth’s Future, 11-24.</p> | <p>Please see Attachment IR-103</p> | <p>See AD-73 in the Advice to Proponent table [reference to come].</p> <p>Note to Denison: This IR is conditionally accepted. Denison’s commitment to providing the requested information related to the IDF (1 in 100 year 24-hour rainfall) and demonstrate climate change resilience of the project (conduct climate risk and resilience assessment) during licensing should be captured in the Commitments Register.</p> <p>Once Denison has added a commitment related to updating the IDF (1 in 100 year 24-hour rainfall) and demonstrate climate change resilience of the project (conduct climate risk and resilience assessment) in the Commitments Register, this can be accepted.</p> <p>Proposed rationale text for posting: This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</p> <p>In the Context and Rationale of AD-15 in the Annex 1 – Denison Response, ECCC recommends that the Proponent consult CSA PLUS 4013:19 (2019) Technical guide: Development, interpretation and use of rainfall intensity- duration-frequency (IDF) information: Guideline for Canadian water resources practitioners regarding the consideration of future changes in short-duration precipitation extremes. In IR-103, ECCC indicated that in order to assess the accuracy of the Intensity duration frequency (IDF) curves, ECCC required that the Proponent provide the gauged stations generating the values for the modelled data. The Proponent provided the closest gauged stations, however, the future short duration precipitation values were based on statistical relationships fitted between local scale observed extreme precipitation and modelled simulations extremes.</p> <p>Additionally, REGDOC-2.9.1 (Appendix 1A) stipulates that “The applicant shall also take into account any potential effects of climate change on the project, including an assessment of whether the project might be sensitive to changes in climate conditions during its lifecycle” and Section 5.1.5 of “ECCC’s Strategic Assessment of Climate Change” states “All proponents will be required... to provide information in the Impact Statement on how the project is resilient to and at risk from both the current and future impacts of a changing climate.” CNSC staff review of Section 15.3.2, 15.4.2 and 15.5.3 of the draft EIS show that the vulnerabilities of the project (infrastructures and project activities) and the associated risk (likelihood and consequence) due to potential increase in climate change hazards (in Section 15.3.2 and 15.4.2) due to climate change throughout the life cycle of the project is not presented in detail. It is also not clear from Section 15.4.2 that the mitigation measures in Table 15.4-1 have considered the additional risk due to the impact of climate change. On page 15-19 of the draft EIS states that: “Denison will apply adaptive management that includes monitoring climate factors so that they can proactively mitigate or prevent adverse climate effects on the Project.” Denison did not provide details on how climate factors will be considered within their adaptive management plans.</p> <p>Rationale: Estimates of future short duration precipitation that are based on statistical relationships fitted between local scale observed extreme precipitation and modelled simulations extremes, such as the approach used by the Proponent, are unlikely to provide reliable projections. This is because the amount of information regarding changes in local-scale observed extreme precipitation contained in short records is not sufficient to constrain a regression (model the statistical relationship) between local and larger scale simulations (Li et al., 2019; ECCC 2022). An alternative approach is to base future projections on a comprehensive assessment that integrates climate science understanding and model projections over a large region. The recent Canadian Standards Association (CSA 2019) guidance on IDF for Canadian Water Resources practitioners provides such an assessment.</p> <p>In terms of adaptive management, the Proponent should clearly outline what climate factors will be monitored to mitigate or prevent adverse climate-related effects. This should include information on when and how the climate factors would be monitored and under what circumstances particular adaptive management approaches would be applied. In addition, considering anticipated project life of 37 years, the climate-infrastructure interactions should be assessed to identify climate vulnerabilities of project infrastructures and operations/activities for all phases of the project. This allows climate risk evaluations and propose adaptation measures accordingly. It is difficult to determine how potential changes in future climate will affect project infrastructures and operations/activities and the associated risk (likelihood and consequences) based on the information provided in Section 15.5.3 (p.15-19) of Draft EIS.</p> <p>In order to assess the Proponent’s adaptive management strategies for future extreme precipitation events, ECCC requests that the Proponent consult the CSA (2019) guidance when using future IDF projections in the Project design and provide revised estimates of the potential future changes in short-duration precipitation extremes over the Project’s duration.</p> <p>1. Provide revised estimates of the potential future changes in short-duration precipitation extremes over the Project’s duration as relevant to the Project design.</p> <p>2. Demonstrate how the CSA (2019) guidance will be incorporated in the Project design when developing and considering future IDF projections and estimates of the potential future changes in short-duration precipitation extremes.</p> <p>3. Demonstrate project resilience to climate change (considering all potential climate sensitive natural hazards including hazards in Section 15.3.2 and 15.4.2) by conducting climate change risk and resilience assessment that includes risk treatment/adaptation measures. CNSC staff recommends proponent to utilize “ECCC (2022). Draft technical guide related to the Strategic Assessment of Climate Change: Assessing climate change resilience” as a guide. Other recommended best practice guides include “Infrastructure Canada (2023). Climate Lens General Guidance – Version 2.1. Infrastructure Canada - Investing in Canada Infrastructure Program Climate Lens - General Guidance “and “MAC (2021). Guide on Climate Change Adaption for the Mining Sector. Mining Association of Canada (MAC)”.</p> <p>References</p> <p>CSA Group. (2019). Technical guide: Development, interpretation and use of rainfall intensity- duration-frequency (IDF) information: Guideline for Canadian water resources practitioners. CSA PLUS</p> <p>4013 :19. https://www.csagroup.org/store/product/2703080/, ECCC (2022). Draft Technical guide related to the Strategic Assessment of Climate Change: Assessing climate change resilience. https://www.strategicassessmentclimatechange.ca/28896/widgets/117114/documents/77106</p> <p>Li, C., Zwiers, F., Zhang, X., & Li, G. (2019). How much information is required to well constrain local estimates of future precipitation extremes? Earth’s Future, 11-24.</p> | <p>As noted in the review comment, this IR was conditionally accepted. Denison’s agrees to providing the requested information related to the IDF (1 in 100 year 24-hour rainfall) and demonstrate climate change resilience of the project (conduct climate risk and resilience assessment per REGDOC - 2.9-1) during licensing and will capture this commitment in the Commitments Register.</p> <p>Additional information with respect to the IDF (1 in 100 year, 24-hour rainfall) as discussed through correspondence with CNSC and ECCC is provided in Attachment IR-103-R3. Specifically, the confidence intervals associated with the IDF identified in the EIS are provided.</p> <p>With this further detail, and commitment above, Denison understands that this IR can be deemed accepted for the purposes of the EIS.</p> |

Attachment IR-103 (Round 2 submission)

A review of the CSA Group (2019) document was undertaken and an estimate of the IDF using this guidance was undertaken. The result of this estimate for the Key Lake Mine Station 4063753 using data corresponding to the period 2014 to 2023 was 69.6 mm for the 1:100-year 24 hours storm event. This estimate is greater than the estimate provided by ECCC of 67.2 mm at Key Lake Mine for the period 2011 to 2021 by approximately 4%

(https://climate.weather.gc.ca/prods_servs/engineering_e.html; https://collaboration.cmc.ec.gc.ca/cmc/climate/Engineer_Climate/IDF/). The calculated estimate is greater than the ECCC estimate likely owing to large rain events occurring in northern Saskatchewan in 2022.

The IDF_CC tool Version 5.0 (<https://www.idf-cc-uwo.ca/>) was used to estimate design events at the Project. The previous results reported based on generalized extreme value (GEV) distribution (79.9 mm in current scenario and 88.6 mm in a future scenario). IDF_CC tool Version 7.0 is the new version of the website and now, using GEV, estimates a 79.9 mm current scenario and 94.7 mm future scenario (RCP8.5 for time period 2015-2100). Within IDF_CC tool Version 7.0, the Gumbel distribution yields 80.9 mm in current scenario and 95.8 mm for future scenario (RCP8.5 and 2015-2100). These data, as well as similar estimates for the Project and Key Lake Mine are summarized in the following table where all estimates reflect a 1:100-year 24 hour precipitation event and all future scenarios assume RCP8.5 for 2015-2100. The Key Lake Mine is approximately 35 km south-southeast of the Project area for reference.

| Scenario Description | Statistical Method | Estimated Period | Location | Data Source | Data period (as indicated) | Estimate (mm) |
|--|-----------------------|------------------|--------------------|--|----------------------------|---------------|
| Environment Canada published IDF curves | Gumbel | Current | Key Lake Mine Site | Key Lake climate station (Station 4063753) | 2011-2021 | 67.2 |
| EIS Document | IDF_CC Tool 5.0 – GEV | Current | Project | Interpolated grid data | Not reported | 79.9 |
| EIS Document | IDF_CC Tool 5.0 – GEV | Predicted Future | Project | Interpolated grid data | RCP8.5 2015-2100 | 88.6 |
| Manual Calculation | Gumbel | 2014-2023 | Key Lake Mine Site | Key Lake climate station (Station 4063753) | 2014-2023 | 69.6 |
| IDF_CC Tool 7.0 | GEV | Current | Key Lake Mine | Key Lake climate station (Station 4063753) | 2011-2021 | 56.4 |
| IDF_CC Tool 7.0 | GEV | Predicted Future | Key Lake Mine | Key Lake climate station (Station 4063753) | RCP8.5 2015-2100 | 68.1 |
| IDF_CC Tool 7.0 | Gumbel | Current | Key Lake Mine | Key Lake climate station (Station 4063753) | 2011-2021 | 67.2 |
| IDF_CC Tool 7.0 | Gumbel | Predicted Future | Key Lake Mine | Key Lake climate station (Station 4063753) | RCP8.5 2015-2100 | 73.9 |
| IDF_CC Tool 7.0 | GEV | Current | Project | Interpolated grid data | 2011-2021 | 79.9 |
| IDF_CC Tool 7.0 | GEV | Predicted Future | Project | Interpolated grid data | RCP8.5 2015-2100 | 94.7 |
| IDF_CC Tool 7.0 | Gumbel | Current | Project | Interpolated grid data | 2011-2021 | 80.9 |
| IDF_CC Tool 7.0 | Gumbel | Predicted Future | Project | Interpolated grid data | RCP8.5 2015-2100 | 95.8 |

As seen in the table, a range of 1:100-year 24 hour rainfall events can be estimated using different methods, data sources and timeframes. The predicted future estimate originally presented using IDF_CC Tool 5.0 (Scenario 3) is lower only than those future estimates via Gumbel and GEV estimated for the same timeframe using IDF_CC Tool 7.0. The IDF_CC tools follows the same methodology as that used by ECCC and recommended by the above-referenced CSA document. The IDF_CC tool also makes use of a gridded climate data set and, though Key Lake Mine is only 35 km from the Project, the projected change in rainfall values is substantial. As such, the use of the IDF_CC tool is conservative. Further to that point, site facilities are designed in

consideration of the Probable Maximum Precipitation event of 493 mm. That event is more than 5 times higher the largest predicted scenario by any of the above presented methodologies.

Despite Denison's reiteration that the PMP is adequate for the EA level design basis, Denison is committed to revisiting the estimates of the IDF as per CNSC's recommendations, as applicable, for the licensing phase of the Project.

Attachment IR-103 (Round 3 submission)

Appendix 8-C of the EIS identified an IDF of 88.61 mm for the Rainfall 1:100, 24-hour return period for the period from 2020 to 2050 (see the table below).

| T (years) | 2 | 5 | 10 | 20 | 25 | 50 | 100 |
|-----------|-------|-------|-------|-------|-------|-------|-------|
| 5 min | 4.68 | 7.12 | 9.47 | 12.4 | 13.38 | 17.57 | 22.94 |
| 10 min | 6.94 | 10.46 | 13.8 | 17.94 | 19.31 | 25.14 | 32.51 |
| 15 min | 8.26 | 12.68 | 17.03 | 22.64 | 24.51 | 32.67 | 43.34 |
| 30 min | 10.54 | 15.8 | 20.61 | 26.51 | 28.44 | 36.77 | 47.45 |
| 1 h | 13.28 | 19.2 | 24.62 | 31.26 | 33.42 | 42.88 | 55.11 |
| 2 h | 16.88 | 23.21 | 28.9 | 35.99 | 38.23 | 48.62 | 62.5 |
| 6 h | 26.02 | 33.94 | 40.43 | 47.22 | 49.41 | 57.93 | 67.28 |
| 12 h | 34.15 | 45.42 | 53.8 | 61.9 | 64.37 | 73.75 | 83.31 |
| 24 h | 41.28 | 54.26 | 62.96 | 70.65 | 72.77 | 80.96 | 88.61 |

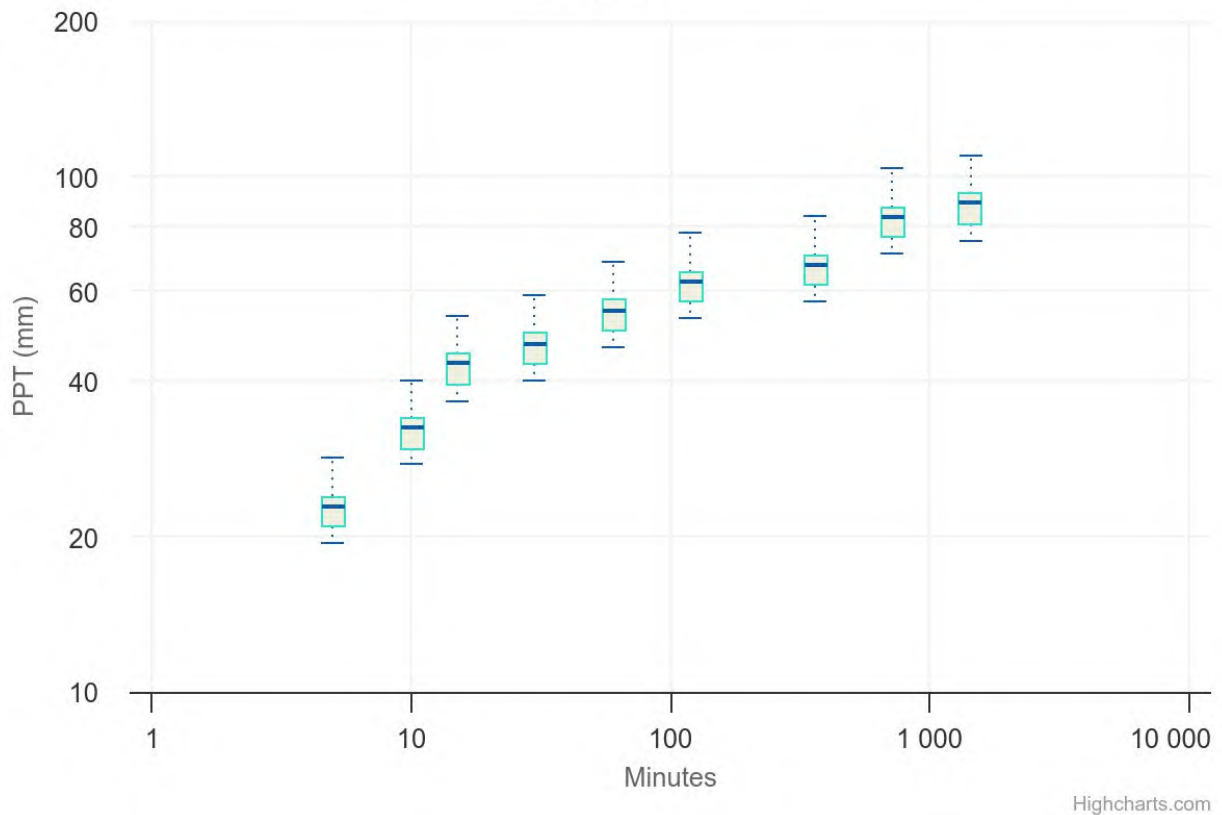
These numbers were generated in the following manner:

- Using the IDF Online tool IDF_CC Tool 5.0 – Institute for Catastrophic Loss Reduction, FIDS – Faculty for Intelligent Decision Support and Western University (2021).
- Using the IDF Curves at ungauged locations option to estimate future IDF curve values under influences from climate change IDF.
- The Ungauged location used corresponds to the Wheeler River Project (latitude and longitude) = 57.51103 N, -105.37622 W
- The predictive period for the climate change scenario was set from 2020 to 2050 which is inclusive of the duration of the project up to the end of decommissioning.
- We examined the 1:100-year, 24-hour return period rainfall events.
- The Raw Global Climate Models (GCMs) were utilized in the predictions for the tool and all available models in this category were included for prediction (24 models).
- We assessed the SSP1.26 (RPC2.6 - Representative Concentration Pathway where radiative forcing peaks at 3 W/m² before 2100, declining to 2.6 W/m² by 2100. RCP 2.6 provides a future concentration scenario that would lead to the lowest climate change severity with respect to solar radiation when compared to scenarios associated with RCP 4.5 and 8.5. This may then account for the scenario of lesser evapotranspiration.

The Box Plot for the 1:100, 24-hour return period as generated by the IDF_CC tool is provided below:

IDF Graph: PPT - GEV - SSP1.26 - BoxPlot

Station: Ungauged IDF for: Lat: 57.51103 °, Lon: -105.37622 °, All models, projection period:
2020 to 2050



The median rainfall 1:100 year, 24 hr return period is 88.61 mm. Additional statistics are provided below for further context with respect to variability in this estimate.

Statistics:

Series T = 100

Duration = 24 hours (1440 min)

Lower bound = 75.16 mm

25th Percentile = 80.89 mm

Median = 88.61 mm

75th Percentile = 92.52 mm

95th Percentile = 104.45

Upper bound = 109.95 mm

- Department: CNSC, ECCC
- Project Effects Link: Aquatic environment
- Reference to EIS, appendices, or supporting documentation: Section 8.2.3.3, Existing Surface Water Quality

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, June 28, 2024) |
|--------------|----------------|---|---|---|---|--|--|--|
| IR-107 | - | <p>Context: Under the methodology and metrics section (8.2.3.1) it is stated baseline water quality was sampled in 2016, 2018, and 2019. Looking at the data in Appendix A of Appendix 8D it seems that some waterbodies have little data available for baseline characterization. For example, Whitefish Lake only has 3 and 5 samples taken between its two sample stations, with sampling frequency seeming intermittent.</p> <p>Rationale: The amount of data available for baseline water quality characterization does not seem sufficient to adequately characterize the baseline and the variation it would experience. An effective baseline characterization is vital to ensure water quality is indeed not being affected by the project. In addition, it is not clear if data quality objectives were applied to determine baseline information was adequate.</p> <p>To meet CEAA 2012 requirements, and CNSC expectations outlined in REGDOC 2.9.1, Environmental Principles Assessments and Protection Measures, the applicant is required to complete a characterization of the baseline environment.</p> <p>As described in REGDOC 2.9.1 Appendix B.2, Characterization of the Baseline Environment for Environmental Assessment Under CEAA 2012, the “baseline information should be sufficient to support the use of an aquatic dispersion model to conduct the site-specific ERA and to support an assessment of the effects of the environment on the facility or activity”</p> <p>In addition, the “applicant or licensee should include an assessment of any limitations or gaps in the quality and extent of baseline data and methods, as well as the method(s) by which they have been addressed.”</p> | <p>Please clarify what data quality objectives were used for the baseline characterization data. Please provide justification whether the number of datapoints collected with inconsistent frequency in baseline surface water characterization is sufficient to meet data quality objectives and to adequately characterize the baseline, and whether Denison is confident that the data collected is enough for a robust water quality baseline characterization.</p> <p>Suggestions for mitigation and follow-up measures: CNSC recommends that additional water samples are collected and analyzed at a consistent frequency to ensure a robust baseline</p> | <p>Surface water quality was sampled through 2016, 2018, and 2019 on a monthly basis which is generally consistent with federal requirements for assessing potential impacts through EA. Hydrological assessment has occurred from 2011 to 2019. Mean Annual Discharge (MAD) (m³/s) as measured at the Water Survey Canada (WSC) Wheeler River Watershed Station (06DA005) during 2016, 2018 and 2019 was 17.07, 17.34 and 19.23, respectively, all of which were slightly above the 43 year (1977 to 2019) average of 16.82. The MAD in 2016 and 2018 can be considered near average, with 2019 being considered an average-high flow year, but well below the maximum observed for the timeseries (27.62 m³/s). Since this period, there have been no land use changes within the area that would constitute a major change in water quality.</p> <p>Baseline water quality samples were collected during years of average to average-high flows in the Wheeler River system and therefore representative of background conditions for assessment of potential impacts in the EIS. Additional conservatism was included in the impact assessment by using the 95th percentile values for baseline parameter concentrations when modelling potential effluent effects. As such, the surface water quality data collected are suitable for the intended purpose of assessing potential impacts and the additional conservativisms that were included as part of the assessment were precautionary.</p> <p>Given the above, Denison feels strongly that the baseline water quality data collected are suitable for the purposes of the EIS and the application of additional conservativisms in the use of the data provide a conservative (i.e., protective) framework for evaluating potential effects.</p> <p>Denison commits to the collection of additional surface water quality baseline data prior to project development starting to ensure updated baseline information is available for identification of any changes that might influence estimates of Project impacts. These data will be used to support permitting and licensing through updates to the ERA.</p> | <p>This response has not been accepted.</p> <p>From the baseline water quality data table (Table A-1 of Appendix 8D) it remains unclear that water quality was sampled on a monthly basis in 2016, 2018, and 2019, mainly due to Table A-1 referring to specific sampling dates, instead of an mean value of 12 samples/year. It is also unclear which federal requirements Denison is referring to using in their response. Staff are supportive of continued baseline monitoring to maintain an accurate dataset of baseline conditions.</p> <p>CNSC and ECCC staff have the following expectations:</p> <p>1. Provide the monthly monitoring data referenced in the response or indicate where it can be found within the EIS and its appendices.</p> <p>2. Confirm which federal requirements were used when assessing potential impacts through EA.</p> <p>3. Confirm which data quality objectives were used to establish the baseline, provide references if available</p> <p>4. Incorporate the additional available baseline data collected into the analysis and conclusions of the finalized EIS and ERA to increase the robustness of the established baseline.</p> | <p>The response to this IR is provided in Attachment IR-107 (below).</p> | <p>Before this IR is accepted, the Proponent is requested to provide the statistical correlation analysis to confirm that data is correlated.</p> <p>Additionally, the four expectations set out in the rationale for status have not been adequately responded to. The Proponent should incorporate the following information into the EIS and ERA:</p> <ol style="list-style-type: none">1. Provide raw baseline data (perhaps in an appendix).2. Provide summary statistics for baseline datasets, which at a minimum should include: mean, standard deviation, 95th percentiles, minimum, maximum, and number of samples. Present summary statistics by season (i.e., freshet, summer, fall and under-ice), and include comparisons to relevant water quality guidelines.3. Identify potential gaps in baseline datasets, and indicate how data gaps will be addressed. Describe the planned baseline monitoring to be conducted including, but not limited to, addressing any data gaps.4. Demonstrate that the combined existing baseline data and planned baseline monitoring will yield dataset(s) that provide robust water quality baseline characterization of seasonal conditions (i.e., freshet, summer, fall, under-ice during winter), including a range of flow conditions. <p>The Proponent should also incorporate the additional baseline data collected into the analysis and conclusions of the finalized EIS and ERA.</p> <p>Concerning the other aspects of the IR, these responses are accepted based on Denison's commitment to conduct periodic sampling prior to construction to strengthen existing environmental data. CNSC staff will review this information to ensure EA predictions remain valid and recommend collecting samples in the fall to spring timeframe, as samples from these seasons is sparse in the current dataset.</p> | <p>Information specific to the statistical correlation or consistency in data between waterbodies during baseline investigations is provided in Attachment IR-107-R3 (below).</p> <p>Additionally, the four expectations outlined by ECCC are discussed herein.</p> <ol style="list-style-type: none">1. All raw baseline data was provided in Appendix A-1 of Appendix 8-D of the EIS.2. Appendix A-1 of Appendix 8-D included the following: mean, SD, 75th percentile, 95th percentile, minimum, maximum, sample size (n) and screening against criteria by date.3. Denison and its SME does not consider that there are data gaps per se, as it concerns the data used for the purpose of the EIS. Denison and its SME feel strongly that the baseline water quality data collected are suitable for the purposes of the EIS and the application of additional conservativisms in the use of the data provide a conservative (i.e., protective) framework for evaluating potential effects. The data are spatially robust (in that they cover various sampling nodes in potentially affected watersheds that at this time are all subject to the same land use (or lack thereof) and samples have been collected during multiple seasons. Denison is in agreement that regular water quality data collection should be instituted and commits (Commitment 8-48 to beginning such periodic sampling prior to construction to provide a more robust dataset and following the CCME Guidance Manual for Optimizing Water Quality Monitoring Program Design (2015). Sampling will be conducted monthly during the open water period and twice under ice. Any new water quality data will be integrated into Denison's application for a licence to operate, along with updated effluent quality data. Additionally, we remind the CNSC that treated mine effluent release does not occur until operational commissioning.4. As noted above, information specific to the statistical correlation or consistency in data between waterbodies during baseline investigations is provided in Attachment IR-107-R3 (below). <p>Given the above (as well as the information provided in Attachment IR-107-R3), Denison and its SME do not feel additional analyses with additional baseline data are needed at this time, as suggested by ECCC, to inform EIS conclusions. Nevertheless, Denison will commit to update the analysis and predictions incorporating any new data collected during pre-construction as part of the operational licensing, however there is no expectation that there would be any change to the EIS conclusions (see IRs 113, 114 and 115 for more detail in this regard).</p> |

Attachment IR-107 (included in Round 2 submission)

Denison's Response:

The water quality sampling for baseline was conducted over several years from 2011 to 2019. In years 2015 and 2017 sampling did not occur. Sampling occurred during the open water period and most consistently in May, June, August, September and October. The reviewer is correct in that sampling did not occur on a monthly basis at each of the sampling locations over all years. The table below provides a summary of the periodicity of sampling as it occurred over the described period at each station.

| Station ID | 2011 | | 2012 | | | 2013 | | 2014 | | 2016 | 2018 | | 2019 | | Total |
|------------|------|-----|------|-----|-----|------|-----|------|-----|------|------|-----|------|-----|-------|
| | May | Jun | May | Aug | Oct | Aug | Oct | Mar | Apr | Sep | Mar | Jul | Jul | Aug | |
| Lakes | | | | | | | | | | | | | | | |
| LA-1 | | 1 | | 1 | | | | 1 | | 1 | 1 | 1 | | | 6 |
| LA-2 | | 1 | | | | | | 1 | | 1 | | | | | 3 |
| LA-3 | | 1 | | | | | | 1 | | 1 | | | | | 3 |
| LA-4 | | | | | | | | 1 | | 1 | | | | | 2 |
| LA-5 | | | | 1 | | | | | 1 | 1 | | | | | 3 |
| LA-6 | | | | 1 | | | | 1 | | 1 | 1 | 1 | | | 5 |
| LA-7 | | | | 1 | | | | 1 | | 3 | | | | | 5 |
| LA-8 | | | | | | | | | | 1 | | | | | 1 |
| LA-9 | | | | | | | | | | 1 | | | | | 1 |
| LAB-1 | | | | 1 | | | | 1 | | 1 | | | | | 3 |
| LAB-2 | | | | | | | | | | 1 | | | | | 1 |
| LB-1 | | | | | | | | | | 1 | | | | | 1 |
| LB-2 | | | | | | | | | 1 | 1 | | | | | 2 |
| LB-3 | | | | 1 | | | | | 1 | 2 | | | | | 4 |
| LA-1 | | | | | | | | | | | 1 | 1 | | | 2 |
| Sub-Total | 0 | 3 | 0 | 6 | 0 | 0 | 0 | 7 | 3 | 17 | 3 | 3 | 0 | 0 | 42 |
| Streams | | | | | | | | | | | | | | | |
| SA-1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | 1 | 1 | 10 |
| SA-2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | 1 | 1 | 10 |
| SA-3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | 1 | 1 | 10 |
| SA-4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | 1 | 1 | 10 |
| SA-5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | 1 | 1 | 10 |
| SA-6 | 1 | | 1 | 1 | 1 | 1 | 1 | | 1 | | | | 1 | 1 | 9 |
| SB-1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | 8 |
| SB-2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | | 7 |
| SB-3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | 8 |
| SB-4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | | 7 |
| SB-5 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | 7 |
| Sub-Total | 11 | 9 | 11 | 11 | 11 | 11 | 11 | 8 | 1 | 0 | 0 | 0 | 6 | 6 | 96 |
| Total | 11 | 12 | 11 | 17 | 11 | 11 | 11 | 15 | 4 | 17 | 3 | 3 | 6 | 6 | 138 |

1. The table above identifies that monthly sampling was not completed at each station on an annual basis.
2. For the purposes of the EA, a statistical analysis was conducted to identify the correlation between the water quality data for LA-1, LA-5, LA-6, and McGowen Lake and the full dataset for the LSA. Datasets were highly correlated and therefore the full dataset for the LSA was used as background concentrations in the IMPACT model. This approach was taken to meet the criteria of REGDOC 2.9.1 Appendix B.2, Characterization of the Baseline Environment for Environmental Assessment Under CEAA 2012, the “baseline information should be sufficient to support the use

of an aquatic dispersion model to conduct the site-specific ERA and to support an assessment of the effects of the environment on the facility or activity”.

3. Samples were collected following applicable field protocols and analysis was conducted by CALA accredited laboratories. The conceptualization of sampling in this remote location loosely followed the CCME Guidance Manual for Optimizing Water Quality Monitoring Program Design (2015). However, due to the remote nature during the baseline sampling, monthly sampling was not deemed feasible.
4. There are no additional data to add to the analysis at this time for either the near-field or far-field water quality models. It is noted that some additional sampling occurred at Whitefish Lake offshore in the general, vicinity of the proposed discharge (diffuser) location in 2022 and continued in 2023. The concentration of constituents from samples collected in 2022 and 2023 were in the range of those measured previously and as a result no changes to the outcomes of the analyses presented in the Draft EIS and its supporting documents would be expected. Denison agrees that regular water quality data collection at a wider range of sampling stations should be instituted and commits to beginning such periodic sampling prior to construction to provide a more robust dataset and following the CCME Guidance Manual for Optimizing Water Quality Monitoring Program Design (2015). These data would be used to support the licensing process and contribute to the longer term data records for the site.

Attachment IR-107 (Round 3 submission)

Water quality of the waterbodies within the local study area (LSA) of the Wheeler River Project was surveyed over the period 2011 through 2019 as part of the aquatic environment baseline studies. Generally, surface waters within the LSA are soft and have typically low levels of alkalinity, nutrients (nitrate and phosphorus), total dissolved solids, and total suspended solids. The pH of surface waters within the LSA is slightly acidic to neutral. The concentrations of metals and metalloids are similar throughout the study area. Radionuclide concentrations are low, with the majority of measurements lower than their respective laboratory detection limits.

To determine which dataset was more appropriate to be used as baseline concentrations in the IMPACT model for the purposes of the Environmental Assessment, a statistical analysis of water quality data was undertaken to identify the correlation between the water quality data for only the key assessed lakes (LA-1, LA-5, LA-6, LA-7, and Russell Lake) and the full dataset for all waterbodies surveyed within the LSA.

For the purposes of the Environmental Assessment, a statistical analysis was undertaken to identify the correlation between water quality data from the key assessed lakes (LA-1, LA-5, LA-6, LA-7 and Russell Lake) and from the full dataset for the local study area (LSA), to determine which dataset was more appropriate for use as background concentrations in the IMPACT model.

The following provides methods and results and a summary of findings of this analysis.

Water quality data for lakes and creeks in the LSA were obtained for multiple monitoring events from June 2011 to September 2019. The data consisted of measurements of chemical parameters including physical tests (e.g., major ions and metals concentrations), nutrient tests (e.g., ammonia), and radionuclides (e.g., Pb-210). Data were inputted into the Ecometrix database software Environmental Monitoring Modeling Application (EMMA) and contained indicators for when measurements were less than the reported detection limit (RDL). The parameters examined herein are those chemicals of potential concern (COPC) for purposes of the Environmental Assessment (Table 1).

For the comparison, summary statistics were generated for two datasets: the full dataset and a subset of the key assessed lakes and creeks that link the key assessed lakes. The summary statistics including the number of measured samples (N), the number of measured samples below the reported detection limit (N<RDL), the minimum, the 95th percentiles, the maximum, and the geometric mean and standard deviation were calculated for both datasets using EMMA. For measurements below RDL, the detection limit value was used when generating summary statistics. Finally, the percent difference between geometric mean values of the two datasets were calculated per COPC.

The mean percent difference of key assessed lakes relative to the full LSA dataset across all COPC's was 0% (n = 24) with a minimum absolute percent difference of 0% and an absolute maximum percent difference of 16%. There were 20/24 (83%) with an absolute maximum percent difference of 5% and 22/24 (92%) with an absolute maximum percent difference of 10% (Table 1).

These low percent differences indicated that the datasets are highly correlated and because the full dataset also contained more datapoints and waterbodies, the full dataset for all waterbodies surveyed within the LSA was deemed most appropriate to be used as baseline concentrations in the IMPACT model.

Table 1 Summary statistics and percent difference calculations for COPC water quality parameters in the full LSA dataset (shaded) and key assessed lakes (unshaded).

| Category | Parameter | Units | N | N <RDL | N | N <RDL | Minimum | Minimum | 95 th Percentile | 95 th Percentile | Maximum | Maximum | Geometric Mean | Geometric Mean | Geometric SD | Geometric SD | Δ% (Geometric Mean) |
|----------------|----------------------------|-------|-----|--------|-----|--------|-----------|-----------|-----------------------------|-----------------------------|---------|---------|----------------|----------------|--------------|--------------|---------------------|
| Physical Tests | Specific Conductivity | µS/cm | 156 | 0 | 100 | 0 | 8 | 8 | 26 | 26.2 | 47 | 47 | 17.31 | 17.095 | 1.3065 | 1.3474 | -1 |
| | Calcium | mg/L | 142 | 0 | 86 | 0 | 1 | 1.1 | 2. | 2.075 | 3.9 | 3.9 | 1.4077 | 1.4296 | 1.2471 | 1.2782 | 2 |
| | Chloride | mg/L | 142 | 7 | 86 | 1 | <0.1 | <0.1 | 0.7 | 0.6 | 0.9 | 0.7 | <0.3223 | <0.38561 | 1.7409 | 1.4232 | 16 |
| | Magnesium | mg/L | 142 | 1 | 86 | 0 | <0.1 | 0.2 | 0.6 | 0.575 | 0.7 | 0.7 | <0.39237 | 0.39888 | 1.2924 | 1.2429 | 2 |
| | Sodium | mg/L | 142 | 0 | 86 | 0 | 0.9 | 1.2 | 1.8 | 1.8 | 2.1 | 2.1 | 1.4632 | 1.5212 | 1.1545 | 1.1145 | 4 |
| | Sulphate | mg/L | 142 | 1 | 86 | 1 | <0.2 | <0.2 | 1.1 | 0.9 | 8.3 | 8.3 | <0.68732 | <0.67743 | 1.6206 | 1.7778 | -1 |
| | Arsenic | mg/L | 142 | 53 | 86 | 33 | <0.0001 | <0.0001 | 0.0001 | 0.0001 | 0.0003 | 0.0002 | <0.00010327 | <0.00010081 | 1.1697 | 1.0776 | -2 |
| | Cadmium | mg/L | 142 | 90 | 86 | 58 | <1.00E-05 | <1.00E-05 | 0.00003 | 0.00003 | 0.00007 | 0.00007 | <0.000012007 | <0.000012025 | 1.4949 | 1.5272 | 0 |
| | Chromium | mg/L | 142 | 142 | 86 | 86 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 1. | 1. | 0 |
| | Cobalt | mg/L | 142 | 138 | 86 | 86 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0002 | <0.0001 | <0.00010098 | <0.0001 | 1.0854 | 1. | -1 |
| | Copper | mg/L | 142 | 139 | 86 | 84 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0008 | 0.0008 | <0.00020394 | <0.00020489 | 1.1522 | 1.181 | 0 |
| | Lead | mg/L | 142 | 135 | 86 | 83 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0012 | 0.0012 | <0.0001055 | <0.00010595 | 1.3574 | 1.385 | 0 |
| | Molybdenum | mg/L | 142 | 136 | 86 | 81 | <0.0001 | <0.0001 | <0.0001 | <0.000175 | 0.0013 | 0.0013 | <0.00010684 | <0.00011065 | 1.4246 | 1.5624 | 3 |
| | Nickel | mg/L | 142 | 101 | 86 | 79 | <0.0001 | <0.0001 | <0.0003 | <0.0001 | 0.0006 | 0.0004 | <0.00011447 | <0.00010376 | 1.4116 | 1.2247 | -10 |
| | Selenium | mg/L | 142 | 140 | 86 | 85 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0002 | 0.0002 | <0.00010049 | <0.00010081 | 1.0599 | 1.0776 | 0 |
| | Uranium | mg/L | 142 | 141 | 86 | 86 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0002 | <0.0001 | <0.00010049 | <0.0001 | 1.0599 | 1. | 0 |
| | Vanadium | mg/L | 142 | 110 | 86 | 78 | <0.0001 | <0.0001 | <0.0002 | <0.0001 | 0.0005 | 0.0003 | <0.00010733 | <0.00010129 | 1.2805 | 1.1258 | -6 |
| | Zinc | mg/L | 142 | 95 | 86 | 58 | <0.0005 | <0.0005 | <0.00278 | <0.00235 | 0.02 | 0.02 | <0.00068059 | <0.00069751 | 1.8847 | 1.9699 | 2 |
| Nutrients | Ammonia as N | mg/L | 142 | 104 | 86 | 59 | <0.01 | <0.01 | <0.0595 | <0.05 | 1.2 | 0.91 | <0.014626 | <0.014875 | 2.2367 | 2.1715 | 2 |
| | Nitrate | mg/L | 103 | 70 | 63 | 45 | <0.04 | <0.04 | <0.436 | <0.35 | 0.66 | 0.6 | <0.067313 | <0.0661 | 2.4855 | 2.4298 | -2 |
| Radionuclides | Lead-210 | Bq/L | 142 | 136 | 86 | 81 | <0.02 | <0.02 | <0.02 | <0.02 | 0.05 | 0.05 | <0.020402 | <0.020502 | 1.1181 | 1.1306 | 0 |
| | Polonium-210 | Bq/L | 142 | 112 | 86 | 75 | <0.005 | <0.005 | <0.008 | <0.007 | 0.02 | 0.01 | <0.0053637 | <0.0051995 | 1.2182 | 1.1453 | -3 |
| | Radium-226 | Bq/L | 142 | 98 | 86 | 59 | <0.005 | <0.005 | <0.00995 | <0.00975 | 0.01 | 0.01 | <0.0055717 | <0.0055727 | 1.2272 | 1.2315 | 0 |
| | Thorium-230 | Bq/L | 142 | 138 | 86 | 82 | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | 0.02 | <0.010098 | <0.010163 | 1.0854 | 1.1108 | 1 |
| | Full LSA dataset | | | | | | | | | | | | | | | | |
| | Key assessed lakes dataset | | | | | | | | | | | | | | | | |

Notes: N is number of lakes/creek sampling locations; SD is standard deviation.

- Department: ECCC
- Project Effects Link: Change to an environmental component due to hazardous contaminants
- Reference to EIS, appendices, or supporting documentation: Section 8.2.3.3 Aquatic Environment

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, June 28, 2024) |
|--------------|----------------|---|--|---|---|--|--|---|
| IR-108 | - | <p>Context: Tables 8.2-2 and 8.2-3 provide summaries of the baseline surface water quality in the LSA. No justifications for the selection of water quality guidelines have been provided. COPCs that require calculations based on other parameters such as hardness, pH, or temperature to derive guidelines (i.e., ammonia, cobalt, zinc, etc.) should be indicated within the table, with a note specifying the parameter values used in the calculations, so that thresholds may be confirmed. No baseline data for un-ionized ammonia has been provided, which is a Schedule 4 substance requiring monitoring under the MDMER. For cobalt, manganese, and vanadium, Federal Environmental Quality Guidelines (FEQGs) and/or CCME Canadian Water Quality Guidelines (CWQGs) for the Protection of Aquatic Life have not been included. A guideline of 26 mg/L has been provided for molybdenum as a Saskatchewan Environmental Quality Guidelines (SEQG), however the actual SEQG is 31 mg/L and the CCME CWQG is 0.073 mg/L.</p> <p>Rationale: In order to assess potential changes to surface water quality from Project related activities, ECCC requires that data on all parameters that require MDMER effluent and receiving environment monitoring be provided for assessment, including accurate water quality guidelines where available.</p> | <p>1. Update Tables 8.2-2 and 8.2-3 to include all COPCs that require effluent characterization and receiving environment monitoring under the MDMER.</p> <p>2. Update Tables 8.2-2 and 8.2-3 to include missing or corrected water quality guidance thresholds, and information on values used to derive thresholds for COPCs that are dependent on general parameters.</p> | Please see Attachment IR-108. | <p>This response has not been accepted.</p> <p>There are incorrect guidelines remaining in the updated tables, and the supporting information on parameter values used to derive benchmarks has not been provided. This information is required to understand potential changes to surface water quality from Project related activities and facilitate threshold confirmation. Use of the incorrect threshold could allow for effluent to be discharged at concentrations exceeding MDMER limits.</p> <p>See also follow-up IR-108-R1.</p> | Please see response to IR-108 and Attachment IR-108. | <p>The IR has only been partially resolved. In item one, temperature is still missing from updated tables in attachment IR-108, 8.2-2 and 8.2-3. The Proponent should add this to the tables.</p> <p>In item two, Tables 8.2-2 and 8.2-3 still contain numerous incorrect guidelines. Additionally, the information on values used to derive thresholds for COPCs that are dependent on general parameters contain inconsistencies which should be corrected or explained.</p> <p>The table does not specify if metal concentrations are total or dissolved. The long-term benchmark column includes both guidelines for dissolved metals (e.g. aluminum, manganese) and total metals (e.g. iron, selenium). The table should be updated to clarify if metal concentrations are total or dissolved and include the appropriate benchmarks.</p> <p>For metal parameters, for which guidelines are dependent on environmental modifying parameters, site specific environmental parameters should be used to select the most appropriate guideline. Specific inconsistencies noted are:</p> <ul style="list-style-type: none">• Aluminum – guideline may change depending on site specific pH.• Ammonia (as N) – should be calculated at site specific pH and water temperature reached during the summer.• Ammonia (un-ionized) – The CCME long-term guideline is 0.019 mg/L, so the reference is incorrect.• Boron – The CCME has both short- and long-term guidelines for total boron (29 & 1.5 mg/L) which should be included in the tables.• Chromium – The type of chromium should be specified. The benchmark specified is the CCME guideline for hexavalent chromium, it is not clear if this was also used for the measured concentrations.• Cobalt – The FEQG added as a benchmark includes a specific hardness range and does not apply to the soft waters found on site and should be removed. The guideline is for water with hardness between 52-396 mg/L and table footnote #2 states: “<i>Site-specific hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6).</i>”• Copper - the CCME guideline applied for copper is out-dated (1987) and does not reflect the current state of science. The FEQG for copper (2021) reflects the current science utilizing the biotic ligand model and is a more appropriate screening criterion.• Dissolved phosphorous & phosphorous – Table footnote #17 states the guidelines for a meso-eutrophic waterbody were used. Use of this guideline should be justified because all sample locations except one had non-detectable phosphorous and dissolved phosphorous concentrations with a detection limit on the upper end of the oligotrophic cutoff, indicating oligotrophic status. Though dissolved phosphorous concentrations were detected at site LB-2, phosphorous concentrations at this site were not detectable, which suggests issues with the measurements. These measurements are therefore not reliable enough to base a trophic status for the region.• Manganese – Table footnote #3 states pH of 7.5 and hardness of 15 mg/L were used to calculate the benchmark for dissolved manganese. Justification is required for using a hardness above the site-specific hardness used in footnote #2 (5.26 mg/L) and site-specific pH should be used.• Nickel – The long-term benchmark has been changed from the CCME guideline of 0.025 mg/L total nickel to the WHO drinking water guideline of 0.070 mg/L. It is noted that a drinking water quality guideline may not be protective of aquatic life and the more stringent CCME guideline for the protection of aquatic life is the more appropriate benchmark for the receiving environment so the original benchmark should be retained.• Strontium – The guideline added for strontium (205 mg/L) is incorrect. The FEQG for dissolved strontium is 2.5 mg/L | <p>Please refer to Attachment IR-108 / 108-R1 which provides EIS table updates specific to this IR Round 3. Denison and its SME reiterate that any clarifications made in the EIS in response to this IR would not change the conclusions of the assessment.</p> <p>For reference the following are noted:</p> <p>Temperature has been added to both tables.</p> <p>All metal parameter values listed are total metals. The concentrations of metal constituents in total form can only be equal to or greater than dissolved constituent concentrations. There use of dissolved water quality criteria in some instances is therefore a conservative approach, since the comparison to the dissolved criterion is with the measured total concentration.</p> <p>For metal parameters that are listed in the third round IR, please see the updated tables, including updated notes per below.</p> <ul style="list-style-type: none">• Aluminum - Long-term criterion for aluminum based on CCME/SEQG of 0.1 mg/L for dissolved aluminum when pH is greater than 6.5.• Ammonia (as N)- Total ammonia-N calculated from the total ammonia guideline for an average annual temperature of 15°C and a pH of 7.0,• Ammonia (Un-ionized) changed to 0.019 mg/L• Boron – criteria added• Chromium – Measured concentrations were Total Chromium, therefore conservative screening as total chromium would be higher in water than only the hexavalent concentration.• Cobalt was retained in the table using the lowest hardness of 52 mg/L from the FEQG equation for the purposes of consistency with the ERA and to ensure a guideline is available for comparison. We acknowledge that there is some uncertainty with this extrapolation.• Copper was recalculated using the BLM tool (2021) see table notes for further detail, and was used for screening purposes of background concentrations. <p>In certain instances, background copper concentrations were above the BLM calculated screening criteria. However, N288.6 Section 7.2.5.3.2 identifies; <i>Screening criteria should not be set below a reasonable upper end of background.</i> <i>Note: Upper end of background concentrations may be taken from literature sources or determined locally from analysis of measurements in reference areas. In Ontario, OMECP (1993) has defined the upper end of background concentrations for many contaminants in soil.</i></p> <p>For this reasoning, subsequent screening of copper in effluent and in the receiving environment was kept consistent at the CCME guideline of 0.002 mg/L.</p> <ul style="list-style-type: none">• Dissolved phosphorus changed to the oligotrophic benchmark.• Manganese benchmark changed using the consistent modifying factors as used for other parameters (see notes).• Nickel benchmark changed back to 0.025 mg/L which is the more stringent CCME guideline for the protection of aquatic life.• Strontium benchmark was a typo and the correct benchmark has been included as 2.5 mg/L (FEQG). |
| IR-108 | IR-108-R1 | <p>Context: Incorrect benchmark environmental quality guidelines and guidelines that cannot be verified remain within the updated Tables 8.2-2 and 8.2-3 provided in the Proponent's response. The Proponent provided an Aluminum Saskatchewan Environmental Quality Guidelines (SEQG) value of 0.005 mg/L in both tables. This is incorrect and appears to</p> | n/a | n/a | <p>1. Update Tables 8.2-2 and 8.2-3 to include footnotes with the concentrations of environmental modifying parameters such as pH, hardness and DOC used to derive guidelines for Aluminum, Cadmium, Copper, Lead,</p> | Please see response to IR-108 and Attachment IR-108. | <p>Item one has been partially addressed, but additional corrections to the footnotes of Tables 8.2-2 and 8.2-3 are needed for copper, manganese, nickel and zinc. Additionally, table footnote #9 does not specify the DOC, pH or hardness values used to calculate the dissolved zinc benchmark. The Proponent should provide the corrections to Tables 8.2-2 and 8.2-3, as well as specify the DOC, pH and hardness values used to calculate the dissolved zinc benchmark. Follow up to items two and three can be found under IR-108.</p> | <p>Please see Attachment 108-R3 for updates to the table notes, which provide the updated information requested.</p> |

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, June 28, 2024) |
|--------------|----------------|--|--------------------------|---|--|---------------------------------------|----------------------------|---|
| | | <p>be the guideline for irrigation, not the guideline for protection of aquatic biota. The Proponent provided a Molybdenum SEQG of 26 mg/L in both tables.</p> <p>This value is incorrect. The correct SEQG for Molybdenum is 31 mg/L and the Canadian Water Quality Guideline (CWQG) is 0.073 mg/L. The Proponent provided a Nitrate SEQG of 13.29 mg/L in both tables. This value is incorrect. The correct SEQG for Nitrate is 3 mg/L and the CWQG is 13 mg/L.</p> <p>Rationale: In order to verify the benchmark environmental quality guidelines that are calculated based on environmental modifying factors such as pH, hardness and dissolved organic carbon (DOC), the specific concentrations of these environmental modifying parameters used in the calculations must be provided. Additionally, incorrect benchmarks for Aluminum, Molybdenum, and Nitrate remain within the updated tables provided by the Proponent. No benchmark was provided for Manganese. It is not clear if Total Chromium or Hexavalent Chromium was measured as the table does not specify, and the benchmark provided was for Hexavalent Chromium. This information is required to understand potential changes to surface water quality from Project related activities and facilitate threshold confirmation. Use of the incorrect threshold could allow for effluent to be discharged at the wrong concentration.</p> | | | <p>Manganese, Nickel and Zinc.</p> <p>2. Update Tables 8.2-2 and 8.2-3 to include the correct benchmark guideline value for Aluminum, Molybdenum and Nitrate. Include the concentrations of environmental modifying parameters needed for deriving guidelines. If the most stringent guideline value is not selected for use, provide a rationale for use of the chosen guideline.</p> <p>3. Update Tables 8.2-2 and 8.2-3 to include the calculated guideline value for manganese and the environmental modifying parameter concentrations used to calculate the guideline. A benchmark environmental quality guideline has not been provided for Manganese, however a chronic CWQG guideline exists that can be derived based on environmental modifying parameter concentrations.</p> <p>Update Tables 8.2-2 and 8.2-3 to specify if Total Chromium or Hexavalent Chromium was measured.</p> <p>See also related IR-115-R1.</p> | | | |

Attachment: IR-108 (included in Round 1 submission)

Response:

Tables 8.2-2 and 8.2-3 will be updated in the final EIS to include 1) all COPCs that require effluent characterization and receiving environment monitoring under the MDMER and 2) missing or corrected water quality guidance thresholds, and information on values used to derive thresholds for COPCs that are dependent on general parameters. The updated EIS tables are provided below for completeness.

Table 8.2-2: Baseline Surface Water Quality in Local Study Area Lakes and Russell Lake (Updated)

| Parameter | Units | Benchmark | | McGowan Lake (LA-1) | | | Whitefish Lake South (LA-5) | | | Whitefish Lake North (LA-6) | | |
|---------------------|-------|-----------|-----------|---------------------|---------------|----------|-----------------------------|---------------|---------------|-----------------------------|---------------|---------------|
| | | Value | Reference | Minimum | Maximum | Mean | Minimum | Maximum | Mean | Minimum | Maximum | Mean |
| Alkalinity | mg/L | | | 2 | 10 | 6 | 3 | 13 | 7.7 | 3 | 38 | 15 |
| Aluminum | mg/L | 0.005 | SEQG | 0.001 | 0.0051 | 0.0034 | 0.0048 | 0.0078 | 0.0061 | 0.005 | 0.073 | 0.0201 |
| Ammonia as N | mg/L | 5.7 | SEQG | <0.01 | 0.09 | 0.0266 | <0.01 | 0.07 | 0.043 | <0.01 | 0.05 | 0.026 |
| Ammonia, *unionized | ug/L | 19 | CWQG | 0.008 | 0.072 | 0.0229 | 0.013 | 0.105 | 0.0543 | 0.005 | 0.036 | 0.0164 |
| Antimony | mg/L | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0003 | 0.000233 | <0.0002 | <0.0002 | <0.0002 |
| Arsenic | mg/L | 0.005 | SEQG | <0.0001 | <0.0001 | <0.0001 | 0.0001 | 0.0001 | <0.0001 | 0.0001 | 0.0001 | <0.0001 |
| Barium | mg/L | | | 0.0023 | 0.0038 | 0.003 | 0.0021 | 0.0032 | 0.0027 | 0.0024 | 0.0051 | 0.00328 |
| Beryllium | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Bicarbonate | mg/L | | | 2 | 12 | 7.8 | 4 | 16 | 9.3 | 4 | 46 | 13.4 |
| Boron | mg/L | 1.5 | CWQG | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Cadmium | mg/L | 0.00004 | CWQG | <0.00001 | 0.00003 | 0.000015 | <0.00001 | 0.00002 | 0.000013 | <0.00001 | 0.00004 | 0.000016 |
| Calcium | mg/L | | | 1.1 | 1.7 | 1.35 | 1.2 | 1.6 | 1.4 | 1.1 | 1.5 | 1.24 |
| Carbonate | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Chloride | mg/L | 120 | CWQG | 0.4 | 0.5 | 0.43 | 0.3 | 0.4 | 0.33 | 0.3 | 0.4 | 0.32 |
| Chromium | mg/L | 0.001 | CWQG | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Cobalt | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Copper | mg/L | 0.002 | CWQG | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0004 | 0.00024 |
| DOC | mg/L | | | 2 | 2.6 | 2.23 | 2 | 2.5 | 2.2 | 2 | 2.5 | 2.22 |
| Diss. Phosphorus | mg/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Fluoride | mg/L | 0.12 | CWQG | <0.01 | 0.08 | 0.03166 | 0.02 | 0.07 | 0.037 | 0.02 | 0.08 | 0.042 |
| Hardness | mg/L | | | 5 | 6 | 5.5 | 5 | 6 | 5.3 | 5 | 5 | 5 |
| Hydroxide | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Iron | mg/L | 0.3 | SEQG | 0.037 | 0.27 | 0.12 | 0.04 | 0.19 | 0.11 | 0.031 | 0.21 | 0.1064 |
| Lead | mg/L | 0.001 | CWQG | <0.0001 | 0.0004 | 0.00015 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0012 | 0.00032 |
| Lead-210 | Bq/L | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Magnesium | mg/L | | | 0.3 | 0.5 | 0.42 | 0.4 | 0.4 | 0.4 | 0.2 | 0.4 | 0.36 |
| Manganese | mg/L | | | 0.0039 | 0.029 | 0.016 | 0.0046 | 0.02 | 0.0142 | 0.0024 | 0.019 | 0.01232 |

| Parameter | Units | Benchmark | | McGowan Lake (LA-1) | | | Whitefish Lake South (LA-5) | | | Whitefish Lake North (LA-6) | | |
|---------------|-------|-----------|-----------|---------------------|----------|----------|-----------------------------|----------|-----------|-----------------------------|----------|----------|
| | | Value | Reference | Minimum | Maximum | Mean | Minimum | Maximum | Mean | Minimum | Maximum | Mean |
| Mercury | mg/L | 2.60E-05 | CWQG | 1.00E-07 | 1.00E-05 | 6.00E-06 | 1.00E-06 | 1.00E-05 | 7.00E-06 | 1.00E-07 | 1.00E-05 | 6.00E-06 |
| Molybdenum | mg/L | 26 | SEQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Nickel | mg/L | 0.025 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0004 | 0.00016 |
| Nitrate | mg/L | 13.29 | SEQG | <0.04 | 0.49 | 0.18 | <0.04 | 0.26 | 0.15 | <0.04 | 0.31 | 0.1725 |
| P. Alkalinity | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| pH | units | 6.5–9 | CWQG | 6.52 | 6.94 | 6.77 | 6.6 | 7 | 6.8 | 5.71 | 6.79 | 6.502 |
| Phosphorus | mg/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Polonium-210 | Bq/L | | | <0.005 | <0.005 | <0.005 | <0.005 | 0.008 | 0.006 | <0.005 | <0.005 | <0.005 |
| Potassium | mg/L | | | 0.2 | 0.5 | 0.37 | 0.2 | 0.4 | 0.33 | 0.2 | 0.4 | 0.32 |
| Radium-226 | Bq/L | 0.11 | SSWQO | <0.005 | <0.005 | <0.005 | <0.005 | 0.01 | 0.0076667 | <0.005 | <0.005 | <0.005 |
| Selenium | mg/L | 0.001 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Silver | mg/L | 0.0001 | CWQG | <0.00005 | <0.00005 | <0.00005 | 0.00005 | 0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Sodium | mg/L | | | 1.4 | 1.8 | 1.5 | 1.4 | 1.7 | 1.5 | 1.4 | 1.8 | 1.52 |
| Conductivity | µS/cm | | | 9 | 24 | 16.8 | 16 | 22 | 19 | 9 | 21 | 15.2 |
| Strontium | mg/L | | | 0.012 | 0.016 | 0.014 | 0.012 | 0.015 | 0.013 | 0.011 | 0.014 | 0.0126 |
| Sulphate | mg/L | 128 | SEQG | 0.7 | 0.8 | 0.75 | 0.6 | 0.7 | 0.63 | 0.5 | 0.7 | 0.64 |
| Sum of Ions | | | | 6 | 18 | 12.5 | 8 | 22 | 14 | 8 | 51 | 18 |
| Thallium | mg/L | 0.0008 | CWQG | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Thorium-228 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-230 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | 0.0133 | <0.01 | <0.01 | <0.01 |
| Thorium-232 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tin | mg/L | | | <0.0001 | 0.0013 | 0.0004 | <0.0001 | 0.0008 | 0.00033 | <0.0001 | 0.0011 | 0.0003 |
| Titanium | mg/L | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| TDS | mg/L | | | 18 | 26 | 22.167 | 22 | 29 | 24 | 14 | 29 | 22.2 |
| TKN | mg/L | | | 0.17 | 0.38 | 0.27333 | 0.14 | 0.34 | 0.22 | 0.24 | 0.43 | 0.306 |
| TOC | mg/L | | | 2.2 | 2.6 | 2.3667 | 1.9 | 4.3 | 2.8 | 2.2 | 2.9 | 2.36 |
| TSS | mg/L | | | <1 | 4 | 2.5 | <1 | 4 | 2.66 | <1 | 4 | 2 |
| Uranium | mg/L | 0.015 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |

| Parameter | Units | Benchmark | | McGowan Lake (LA-1) | | | Whitefish Lake South (LA-5) | | | Whitefish Lake North (LA-6) | | |
|-----------|-------|-----------|-----------|---------------------|---------|---------|-----------------------------|---------|---------|-----------------------------|---------|---------|
| | | Value | Reference | Minimum | Maximum | Mean | Minimum | Maximum | Mean | Minimum | Maximum | Mean |
| Vanadium | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Zinc | mg/L | 0.03 | CWQG | <0.0005 | 0.001 | 0.00058 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.02 | 0.00474 |

Table 8.2-2 (Continued)

| Parameter | Units | Benchmark | | Russell Lake (LAB-1) | | | Russell Lake (LAB-2) | | | LB-2 | | |
|---------------------|-------|-----------|-----------|----------------------|----------|-----------|----------------------|----------|----------|---------------|---------------|---------------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean | Min | Max | Mean |
| Alkalinity | mg/L | | | 2 | 14 | 7.7 | 8 | 8 | 8 | 7 | 12 | 9.5 |
| Aluminum | mg/L | 0.005 | SEQG | 0.0023 | 0.0025 | 0.0024 | 0.0029 | 0.0029 | 0.0029 | 0.0067 | 0.0096 | 0.0082 |
| Ammonia as N | mg/L | 5.7 | SEQG | <0.01 | 0.05 | 0.0233 | <0.01 | <0.01 | <0.01 | <0.01 | 0.04 | 0.025 |
| Ammonia, *unionized | ug/L | | | 0.016 | 0.055 | 0.0303 | 0.033 | 0.033 | 0.033 | 0.011 | 0.028 | 0.0195 |
| Antimony | mg/L | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Arsenic | mg/L | 0.005 | SEQG | 0.0001 | 0.0001 | <0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Barium | mg/L | | | 0.0033 | 0.0039 | 0.0036 | 0.0034 | 0.0034 | 0.0034 | 0.0033 | 0.0046 | 0.004 |
| Beryllium | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Bicarbonate | mg/L | | | 2 | 17 | 9 | 10 | 10 | 10 | 8 | 15 | 12 |
| Boron | mg/L | 1.5 | CWQG | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Cadmium | mg/L | 0.00004 | CWQG | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 |
| Calcium | mg/L | | | 2.7 | 3.9 | 3.5 | 3.5 | 3.5 | 3.5 | 1.3 | 1.8 | 1.6 |
| Carbonate | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Chloride | mg/L | 120 | CWQG | <0.1 | 0.5 | 0.3333333 | 0.4 | 0.4 | 0.4 | 0.2 | 0.2 | 0.2 |
| Chromium | mg/L | 0.001 | CWQG | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Cobalt | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Copper | mg/L | 0.002 | CWQG | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| DOC | mg/L | | | 2.1 | 2.5 | 2.3 | 2.2 | 2.2 | 2.2 | 2.6 | 3.5 | 3.1 |
| Diss. Phosphorus | mg/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.03 | 0.02 |
| Fluoride | mg/L | 0.12 | CWQG | 0.02 | 0.07 | 0.04 | 0.03 | 0.03 | 0.03 | <0.01 | 0.07 | 0.04 |
| Hardness | mg/L | | | 9 | 13 | 11 | 12 | 12 | 12 | 5 | 6 | 5.5 |

| Parameter | Units | Benchmark | | Russell Lake (LAB-1) | | | Russell Lake (LAB-2) | | | LB-2 | | |
|---------------|-------|-----------|-----------|----------------------|----------|-----------|----------------------|----------|----------|----------|----------|----------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean | Min | Max | Mean |
| Hydroxide | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Iron | mg/L | 0.3 | SEQG | 0.056 | 0.08 | 0.070667 | 0.039 | 0.039 | 0.039 | 0.15 | 0.15 | 0.15 |
| Lead | mg/L | 0.001 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Lead-210 | Bq/L | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Magnesium | mg/L | | | 0.5 | 0.7 | 0.6 | 0.7 | 0.7 | 0.7 | 0.4 | 0.4 | 0.4 |
| Manganese | mg/L | | | 0.029 | 0.064 | 0.045 | 0.019 | 0.019 | 0.019 | 0.0094 | 0.037 | 0.0232 |
| Mercury | mg/L | 2.60E-05 | CWQG | 1.00E-06 | 1.00E-05 | 7.00E-06 | 1.00E-07 | 1.00E-07 | 1.00E-07 | 1.00E-06 | 1.00E-05 | 5.50E-06 |
| Molybdenum | mg/L | 26 | SEQG | 0.0003 | 0.0013 | 0.00077 | 0.0011 | 0.0011 | 0.0011 | <0.0001 | <0.0001 | <0.0001 |
| Nickel | mg/L | 0.025 | CWQG | 0.0001 | 0.0001 | <0.0001 | 0.0003 | 0.0003 | 0.0003 | 0.0001 | 0.0002 | 0.00015 |
| Nitrate | mg/L | 13.29 | SEQG | 0.05 | 0.44 | 0.25 | 0.05 | 0.05 | 0.05 | <0.04 | 0.66 | 0.35 |
| P. Alkalinity | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| pH | units | 6.5–9 | CWQG | 6.7 | 7 | 6.9 | 7.2 | 7.2 | 7.2 | 6.7 | 6.8 | 6.8 |
| Phosphorus | mg/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Polonium-210 | Bq/L | | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Potassium | mg/L | | | 0.3 | 0.6 | 0.5 | 0.8 | 0.8 | 0.8 | 0.2 | 0.4 | 0.3 |
| Radium-226 | Bq/L | 0.11 | SSWQO | <0.005 | 0.006 | 0.0053333 | 0.007 | 0.007 | 0.007 | <0.005 | 0.008 | 0.0065 |
| Selenium | mg/L | 0.001 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Silver | mg/L | 0.0001 | CWQG | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Sodium | mg/L | | | 1.7 | 2 | 1.8 | 1.7 | 1.7 | 1.7 | 1.4 | 1.6 | 1.5 |
| Conductivity | µS/cm | | | 30 | 47 | 38 | 42 | 42 | 42 | 20 | 22 | 21 |
| Strontium | mg/L | | | 0.017 | 0.018 | 0.017 | 0.016 | 0.016 | 0.016 | 0.013 | 0.016 | 0.0145 |
| Sulphate | mg/L | 128 | SEQG | 3.7 | 8.1 | 6.5 | 8.3 | 8.3 | 8.3 | 0.5 | 0.8 | 0.65 |
| Sum of Ions | | | | 18 | 28 | 23 | 25 | 25 | 25 | 12 | 21 | 16.5 |
| Thallium | mg/L | 0.0008 | CWQG | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Thorium-228 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-230 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-232 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tin | mg/L | | | <0.0001 | 0.001 | 0.0004 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0008 | 0.00045 |

| Parameter | Units | Benchmark | | Russell Lake (LAB-1) | | | Russell Lake (LAB-2) | | | LB-2 | | |
|-----------|-------|-----------|-----------|----------------------|---------|---------|----------------------|---------|---------|---------|---------|---------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean | Min | Max | Mean |
| Titanium | mg/L | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| TDS | mg/L | | | 30 | 35 | 32 | 35 | 35 | 35 | 19 | 30 | 24.5 |
| TKN | mg/L | | | 0.14 | 0.22 | 0.17 | 0.29 | 0.29 | 0.29 | 0.13 | 0.35 | 0.24 |
| TOC | mg/L | | | 2.2 | 2.6 | 2.4 | 2.2 | 2.2 | 2.2 | 2.7 | 3.6 | 3.2 |
| TSS | mg/L | | | 1 | 1 | <1.0 | 4 | 4 | 4 | <1 | <1 | <1 |
| Uranium | mg/L | 0.015 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Vanadium | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Zinc | mg/L | 0.03 | CWQG | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0018 | 0.00115 |

Notes:

Green-highlighted cells indicate values that fall below the analysis detection limit.

Bold values indicate metrics that exceed benchmark values.

Italicized values include a temperature point estimated from an adjacent water body taken in the same season

Blank cells in the "benchmark" column indicate parameters without a prescribed benchmark at this time

SEQG – Saskatchewan Environmental Quality Guidelines – Water Quality Guidelines for Freshwater Aquatic Life.

CWQG – Canadian Council of Ministers of the Environment – Canadian Water Quality Guidelines for the Protection of Aquatic Life.

SSWQO – Saskatchewan Surface Water Quality Objectives.

DOC – Dissolved organic carbon.

TDS – Total dissolved solids.

TKN – Total Kjeldahl Nitrogen.

TOC – Total organic carbon.

TSS – Total suspended solids.

Table 8.2-3: Baseline Surface Water Quality in Local Study Area Watercourses (Updated)

| Parameter | Units | Benchmark | | Icelander River (SA-1) | | | SA-2 | | | SA-3 | |
|---------------------|-------|-----------|-----------|------------------------|---------------|----------|----------|--------------|--------------|----------|--------------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean | Min | Max |
| Alkalinity | mg/L | | | 2 | 13 | 5.5 | 2 | 11 | 6.75 | 1 | 23 |
| Aluminum | mg/L | 0.005 | SEQG | 0.0022 | 0.0056 | 0.0037 | 0.0039 | 0.081 | 0.015 | 0.0013 | 0.006 |
| Ammonia as N | mg/L | 5.7 | SEQG | <0.01 | 0.04 | 0.014 | <0.01 | 0.04 | 0.01375 | <0.01 | 0.04 |
| Ammonia, *unionized | ug/L | 19 | CWQG | 0.005 | 0.036 | 0.0143 | 0.006 | 0.024 | 0.013 | 0.004 | 0.036 |
| Antimony | mg/L | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Arsenic | mg/L | 0.005 | SEQG | <0.0001 | <0.0001 | <0.0001 | 0.0001 | 0.0001 | <0.0001 | 0.0001 | 0.0001 |
| Barium | mg/L | | | 0.0022 | 0.0035 | 0.00267 | 0.0019 | 0.0041 | 0.0026625 | 0.0025 | 0.004 |
| Beryllium | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Bicarbonate | mg/L | | | 2 | 16 | 6.7 | 2 | 13 | 8.125 | 1 | 28 |
| Boron | mg/L | 1.5 | CWQG | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Cadmium | mg/L | 0.00004 | CWQG | <1.0E-05 | 0.00002 | 0.000012 | <1.0E-05 | 0.00002 | 0.0000125 | 1.00E-05 | 0.00002 |
| Calcium | mg/L | | | 1.3 | 1.7 | 1.4 | 1.2 | 1.7 | 1.3375 | 1.5 | 1.9 |
| Carbonate | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Chloride | mg/L | 120 | CWQG | 0.4 | 0.6 | 0.45 | 0.2 | 0.4 | 0.3125 | 0.5 | 0.7 |
| Chromium | mg/L | 0.001 | CWQG | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Cobalt | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Copper | mg/L | 0.002 | CWQG | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0008 | 0.000275 | <0.0002 | <0.0002 |
| DOC | mg/L | | | 1.7 | 2.4 | 2.13 | 1.9 | 2.5 | 2.225 | 1.7 | 2.6 |
| Diss. Phosphorus | mg/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Fluoride | mg/L | 0.12 | CWQG | 0.01 | 0.07 | 0.026 | 0.01 | 0.03 | 0.01625 | <0.01 | 0.07 |
| Hardness | mg/L | | | 5 | 6 | 5.3 | 4 | 6 | 4.75 | 5 | 7 |
| Hydroxide | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Iron | mg/L | 0.3 | SEQG | 0.031 | 0.31 | 0.1215 | 0.041 | 0.11 | 0.073875 | 0.036 | 0.13 |
| Lead | mg/L | 0.001 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0003 | 0.000125 | <0.0001 | <0.0001 |
| Lead-210 | Bq/L | | | <0.02 | <0.02 | <0.02 | <0.02 | 0.05 | 0.02375 | <0.02 | 0.03 |
| Magnesium | mg/L | | | 0.3 | 0.7 | 0.43 | 0.3 | 0.6 | 0.375 | 0.4 | 0.5 |
| Manganese | mg/L | | | 0.0041 | 0.025 | 0.01467 | 0.0044 | 0.017 | 0.010325 | 0.0066 | 0.023 |

| Parameter | Units | Benchmark | | Icelander River (SA-1) | | | SA-2 | | | SA-3 | |
|---------------|-------|-----------|-----------|------------------------|----------|-----------|----------|----------|----------|-------------|----------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean | Min | Max |
| Mercury | mg/L | 2.60E-05 | CWQG | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 |
| Molybdenum | mg/L | 26 | SEQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Nickel | mg/L | 0.025 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Nitrate | mg/L | 13.29 | SEQG | <0.04 | 0.26 | 0.0714286 | <0.04 | 0.31 | 0.094 | <0.04 | 0.26 |
| P. Alkalinity | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| pH | units | 6.5–9 | CWQG | 6.34 | 6.99 | 6.75 | 6.58 | 7.01 | 6.7775 | 6.42 | 7.02 |
| Phosphorus | mg/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Polonium-210 | Bq/L | | | <0.005 | 0.01 | 0.0054999 | <0.005 | <0.005 | <0.005 | <0.005 | 0.01 |
| Potassium | mg/L | | | 0.2 | 0.5 | 0.36 | 0.1 | 0.4 | 0.3375 | 0.3 | 0.5 |
| Radium-226 | Bq/L | 0.11 | SEQG | <0.005 | 0.009 | 0.0061 | <0.005 | 0.01 | 0.006125 | <0.005 | 0.01 |
| Selenium | mg/L | 0.001 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Silver | mg/L | 0.0001 | CWQG | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Sodium | mg/L | | | 1.4 | 1.7 | 1.53 | 1.2 | 1.8 | 1.45 | 1.4 | 1.8 |
| Conductivity | µS/cm | | | 16 | 22 | 18.2 | 14 | 22 | 17 | 18 | 24 |
| Strontium | mg/L | | | 0.011 | 0.015 | 0.0127 | 0.011 | 0.015 | 0.012125 | 0.013 | 0.018 |
| Sulphate | mg/L | 128 | SSWQO | 0.4 | 0.9 | 0.71 | <0.2 | 0.7 | 0.5875 | 0.4 | 0.8 |
| Sum of Ions | | | | 6 | 22 | 11.5 | 6 | 19 | 12.5 | 6 | 33 |
| Thallium | mg/L | 0.0008 | CWQG | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Thorium-228 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-230 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | 0.01125 | <0.01 | <0.01 |
| Thorium-232 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tin | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Titanium | mg/L | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0015 | 0.000375 | <0.0002 | <0.0002 |
| TDS | mg/L | | | 18 | 25 | 21.7 | 13 | 30 | 21.25 | 17 | 26 |
| TKN | mg/L | | | 0.11 | 0.3 | 0.241 | <0.05 | 0.31 | <0.195 | 0.13 | 0.3 |
| TOC | mg/L | | | 1.8 | 2.6 | 2.25 | 2.1 | 2.4 | 2.2875 | 1.8 | 2.6 |
| TSS | mg/L | | | <1 | 3 | 2.2 | 1 | 3 | 1.5 | <1 | 2 |
| Uranium | mg/L | 0.015 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |

| Parameter | Units | Benchmark | | Icelander River (SA-1) | | | SA-2 | | | SA-3 | |
|-----------|-------|-----------|-----------|------------------------|---------|---------|---------|---------|----------|---------|---------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean | Min | Max |
| Vanadium | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Zinc | mg/L | 0.03 | CWQG | <0.0005 | 0.0028 | 0.00074 | <0.0005 | 0.0096 | 0.001675 | <0.0005 | 0.0011 |

Table 8.2-3 (Continued)

| Parameter | Units | Benchmark | | SA-4 | | | SA-5 | | | SA-6 | |
|---------------------|-------|-----------|-----------|----------|----------------|---------------|----------|--------------|---------------|----------|----------------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean | Min | Max |
| Alkalinity | mg/L | | | 2 | 15 | 7.5 | 2 | 8 | 5.2222 | 3 | 13 |
| Aluminum | mg/L | 0.005 | SEQG | 0.0025 | 0.0099 | 0.0053 | 0.004 | 0.014 | 0.0065 | 0.0032 | 0.02 |
| Ammonia as N | mg/L | 5.7 | SEQG | <0.01 | 0.05 | 0.015 | <0.01 | 0.05 | 0.01444 | <0.01 | 0.04 |
| Ammonia, *unionized | ug/L | 19 | CWQG | 0.007 | 0.065 | 0.0194 | 0.002 | 0.04 | 0.0137 | 0.006 | 0.04 |
| Antimony | mg/L | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Arsenic | mg/L | 0.005 | SEQG | 0.0001 | 0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0001 | 0.0001 |
| Barium | mg/L | | | 0.0021 | 0.0032 | 0.0025625 | 0.0021 | 0.0031 | 0.0025556 | 0.0023 | 0.0032 |
| Beryllium | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Bicarbonate | mg/L | | | 2 | 18 | 9.125 | 2 | 10 | 6.2222 | 4 | 16 |
| Boron | mg/L | 1.5 | CWQG | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Cadmium | mg/L | 0.00004 | CWQG | 1.00E-05 | 0.00007 | 0.0000175 | 1.00E-05 | 0.00004 | 1.44E-05 | 1.00E-05 | 0.00005 |
| Calcium | mg/L | | | 1.3 | 2 | 1.5625 | 1.2 | 1.4 | 1.2444 | 1.2 | 1.8 |
| Carbonate | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Chloride | mg/L | 120 | CWQG | 0.4 | 0.6 | 0.45 | 0.2 | 0.3 | 0.23333 | 0.3 | 0.5 |
| Chromium | mg/L | 0.001 | CWQG | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Cobalt | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Copper | mg/L | 0.002 | CWQG | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| DOC | mg/L | | | 2 | 2.4 | 2.275 | 1.8 | 2.5 | 2.2667 | 1.9 | 2.5 |
| Diss. Phosphorus | mg/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Fluoride | mg/L | 0.12 | CWQG | 0.01 | 0.07 | 0.02625 | 0.01 | 0.08 | 0.0233 | <0.01 | 0.07 |
| Hardness | mg/L | | | 5 | 7 | 5.625 | 4 | 5 | 4.56 | 4 | 6 |

| Parameter | Units | Benchmark | | SA-4 | | | SA-5 | | | SA-6 | |
|---------------|-------|-----------|-----------|----------|----------|-----------|-------------|----------|-----------|-------------|----------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean | Min | Max |
| Hydroxide | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Iron | mg/L | 0.3 | SEQG | 0.034 | 0.13 | 0.077375 | 0.03 | 0.11 | 0.071222 | 0.036 | 0.16 |
| Lead | mg/L | 0.001 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Lead-210 | Bq/L | | | <0.02 | 0.03 | 0.02125 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Magnesium | mg/L | | | 0.4 | 0.6 | 0.4375 | 0.2 | 0.4 | 0.33333 | 0.3 | 0.5 |
| Manganese | mg/L | | | 0.0029 | 0.019 | 0.010625 | 0.0025 | 0.018 | 0.0083333 | 0.0037 | 0.029 |
| Mercury | mg/L | 2.60E-05 | CWQG | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 |
| Molybdenum | mg/L | 26 | SEQG | <0.0001 | 0.0002 | 0.00011 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Nickel | mg/L | 0.025 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Nitrate | mg/L | 13.29 | SEQG | <0.04 | 0.35 | 0.112 | <0.04 | 0.31 | 0.093 | <0.04 | 0.35 |
| P. Alkalinity | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| pH | units | 6.5–9 | CWQG | 6.58 | 7.16 | 6.8488 | 6.17 | 6.97 | 6.7233 | 6.48 | 7.07 |
| Phosphorus | mg/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Polonium-210 | Bq/L | | | <0.005 | 0.007 | 0.0052 | <0.005 | <0.005 | <0.005 | <0.005 | 0.006 |
| Potassium | mg/L | | | 0.2 | 0.6 | 0.375 | 0.2 | 0.4 | 0.32222 | 0.2 | 0.4 |
| Radium-226 | Bq/L | 0.11 | SEQG | <0.005 | 0.009 | 0.00625 | <0.005 | 0.007 | 0.00544 | <0.005 | <0.005 |
| Selenium | mg/L | 0.001 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Silver | mg/L | 0.0001 | CWQG | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Sodium | mg/L | | | 1.4 | 2.1 | 1.63 | 1.3 | 1.6 | 1.41 | 1.3 | 1.9 |
| Conductivity | µS/cm | | | 17 | 25 | 19.375 | 14 | 20 | 16.111 | 14 | 23 |
| Strontium | mg/L | | | 0.012 | 0.018 | 0.0141 | 0.011 | 0.013 | 0.0113 | 0.011 | 0.016 |
| Sulphate | mg/L | 128 | SSWQO | 0.4 | 0.7 | 0.525 | 0.4 | 0.8 | 0.63333 | 0.3 | 0.8 |
| Sum of Ions | | | | 7 | 25 | 14.125 | 6 | 14 | 10.667 | 8 | 22 |
| Thallium | mg/L | 0.0008 | CWQG | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Thorium-228 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-230 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-232 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tin | mg/L | | | <0.0001 | 0.0002 | 0.0001125 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |

| Parameter | Units | Benchmark | | SA-4 | | | SA-5 | | | SA-6 | |
|-----------|-------|-----------|-----------|---------|---------|---------|---------|---------|-----------|---------|---------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean | Min | Max |
| Titanium | mg/L | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0003 |
| TDS | mg/L | | | 21 | 32 | 25 | 13 | 28 | 20 | 15 | 28 |
| TKN | mg/L | | | 0.13 | 0.3 | 0.215 | 0.11 | 0.29 | 0.213 | 0.15 | 0.41 |
| TOC | mg/L | | | 2 | 2.6 | 2.325 | 1.9 | 2.7 | 2.3111 | 1.9 | 2.6 |
| TSS | mg/L | | | 1 | 3 | 2 | <1 | 3 | 1.89 | 1 | 6 |
| Uranium | mg/L | 0.015 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Vanadium | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Zinc | mg/L | 0.03 | CWQG | <0.0005 | 0.0012 | 0.0006 | <0.0005 | 0.0017 | 0.0007445 | <0.0005 | 0.0006 |

Table 8.2-3 (Continued)

| Parameter | Units | Benchmark | | SB-3 | | | SB-5 | | |
|---------------------|-------|-----------|-----------|---------------|--------------|---------------|----------|---------------|---------------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean |
| Alkalinity | mg/L | | | <1 | 24 | <6.7778 | 3 | 13 | 7.375 |
| Aluminum | mg/L | 0.005 | SEQG | 0.0052 | 0.012 | 0.0089 | 0.0016 | 0.0086 | 0.0054 |
| Ammonia as N | mg/L | 5.7 | SEQG | <0.01 | 0.04 | 0.01333 | <0.01 | 0.04 | 0.0138 |
| Ammonia, *unionized | ug/L | | | 0.003 | 0.024 | 0.012 | 0.005 | 0.032 | 0.0134 |
| Antimony | mg/L | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Arsenic | mg/L | 0.005 | SEQG | <0.0001 | <0.0001 | <0.0001 | 0.0001 | 0.0001 | <0.0001 |
| Barium | mg/L | | | 0.0025 | 0.0041 | 0.0031111 | 0.0026 | 0.004 | 0.0030625 |
| Beryllium | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Bicarbonate | mg/L | | | <1 | 29 | <8.3333 | 4 | 16 | 9 |
| Boron | mg/L | 1.5 | CWQG | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Cadmium | mg/L | 0.00004 | CWQG | <1.0E-05 | 0.00002 | 1.11E-05 | <1.0E-05 | 0.00004 | 0.000016 |
| Calcium | mg/L | | | 1.1 | 1.7 | 1.3778 | 1.2 | 1.7 | 1.3625 |
| Carbonate | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 |
| Chloride | mg/L | 120 | CWQG | 0.1 | 0.2 | 0.17778 | <0.1 | 0.2 | <0.175 |
| Chromium | mg/L | 0.001 | CWQG | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |

| Parameter | Units | Benchmark | | SB-3 | | | SB-5 | | |
|------------------|-------|-----------|-----------|-------------|----------|----------|-------------|----------|----------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean |
| Cobalt | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Copper | mg/L | 0.002 | CWQG | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| DOC | mg/L | | | 2.2 | 3.4 | 3.0222 | 2.6 | 3.2 | 2.975 |
| Diss. Phosphorus | mg/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Fluoride | mg/L | 0.12 | CWQG | 0.01 | 0.07 | 0.023333 | 0.01 | 0.07 | 0.02375 |
| Hardness | mg/L | | | 4 | 6 | 5.11 | 4 | 6 | 4.88 |
| Hydroxide | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 |
| Iron | mg/L | 0.3 | SEQG | 0.042 | 0.22 | 0.095111 | 0.036 | 0.16 | 0.098375 |
| Lead | mg/L | 0.001 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Lead-210 | Bq/L | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Magnesium | mg/L | | | 0.3 | 0.5 | 0.38889 | 0.2 | 0.5 | 0.375 |
| Manganese | mg/L | | | 0.0053 | 0.02 | 0.010633 | 0.0071 | 0.016 | 0.010325 |
| Mercury | mg/L | 2.60E-05 | CWQG | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 |
| Molybdenum | mg/L | 26 | SEQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Nickel | mg/L | 0.025 | CWQG | 0.0001 | 0.0002 | 0.00011 | <0.0001 | <0.0001 | <0.0001 |
| Nitrate | mg/L | 13.29 | SEQG | <0.04 | 0.4 | 0.115 | <0.04 | 0.4 | 0.13 |
| P. Alkalinity | mg/L | | | <1 | <1 | <1 | <1 | <1 | <1 |
| pH | units | 6.5–9 | CWQG | 6.18 | 6.99 | 6.7044 | 6.47 | 6.99 | 6.7288 |
| Phosphorus | mg/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Polonium-210 | Bq/L | | | <0.005 | 0.008 | 0.0058 | <0.005 | <0.005 | <0.005 |
| Potassium | mg/L | | | 0.2 | 0.5 | 0.33333 | 0.2 | 0.5 | 0.3625 |
| Radium-226 | Bq/L | 0.11 | SEQG | <0.005 | 0.01 | 0.0059 | <0.005 | 0.006 | 0.0051 |
| Selenium | mg/L | 0.001 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Silver | mg/L | 0.0001 | CWQG | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Sodium | mg/L | | | 1.2 | 1.7 | 1.4 | 1.3 | 1.7 | 1.44 |
| Conductivity | µS/cm | | | 15 | 22 | 16.778 | 15 | 23 | 17.25 |
| Strontium | mg/L | | | 0.011 | 0.015 | 0.0124 | 0.011 | 0.015 | 0.0119 |
| Sulphate | mg/L | 128 | SSWQO | 0.3 | 0.9 | 0.68889 | 0.5 | 1 | 0.725 |

| Parameter | Units | Benchmark | | SB-3 | | | SB-5 | | |
|-------------|-------|-----------|-----------|---------|---------|---------|---------|---------|---------|
| | | Value | Reference | Min | Max | Mean | Min | Max | Mean |
| Sum of Ions | | | | 4 | 34 | 12.667 | 8 | 22 | 13.375 |
| Thallium | mg/L | 0.0008 | CWQG | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Thorium-228 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-230 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-232 | Bq/L | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tin | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Titanium | mg/L | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| TDS | mg/L | | | 14 | 26 | 20.556 | 16 | 26 | 20.125 |
| TKN | mg/L | | | 0.16 | 0.34 | 0.256 | 0.18 | 0.33 | 0.27 |
| TOC | mg/L | | | 2.4 | 3.6 | 3.1111 | 2.7 | 3.2 | 3 |
| TSS | mg/L | | | <1 | 4 | 2.56 | <1 | 3 | 1.875 |
| Uranium | mg/L | 0.015 | CWQG | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Vanadium | mg/L | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Zinc | mg/L | 0.03 | CWQG | <0.0005 | 0.0012 | 0.00059 | <0.0005 | 0.0016 | 0.00065 |

Notes:

Green-highlighted cells indicate values that fall below the analysis detection limit.

Bold values indicate metrics that exceed benchmark values.

Italicized values include a temperature point estimated from an adjacent water body taken in the same season

Blank cells in the "benchmark" column indicate parameters without a prescribed benchmark at this time

SEQG – Saskatchewan Environmental Quality Guidelines – Water Quality Guidelines for Freshwater Aquatic Life.

CWQG – Canadian Council of Ministers of the Environment – Canadian Water Quality Guidelines for the Protection of Aquatic Life.

SSWQO – Saskatchewan Surface Water Quality Objectives.

DOC – Dissolved organic carbon.

TDS – Total dissolved solids.

TKN – Total Kjeldahl Nitrogen.

TOC – Total organic carbon.

TSS – Total suspended solids.

Attachment: IR-108 / IR – 108-R1 (included in Round 2 submission)

Response:

Tables 8.2-2 and 8.2-3 have been updated as requested and are provided below and updated in the EIS in their respective sections.

Table 8.2-2: Baseline Surface Water Quality in Local Study Area Lakes and Russell Lake

| Parameter | Units | Short-term Benchmark | | | Long-term Benchmark | | | McGowan Lake (LA-1) | | | Whitefish Lake South (LA-5) | | | Whitefish Lake North (LA-6) | | |
|---------------------|-------|----------------------|-----------|-------|---------------------|-----------|-------|---------------------|---------|----------|-----------------------------|---------|----------|-----------------------------|----------------|----------|
| | | Value | Reference | Notes | Value | Reference | Notes | Minimum | Maximum | Mean | Minimum | Maximum | Mean | Minimum | Maximum | Mean |
| Alkalinity | mg/L | | | | | | | 2 | 10 | 6 | 3 | 13 | 7.7 | 3 | 38 | 15 |
| Aluminum | mg/L | | | | 0.1 | SEQG/CCME | (5) | 0.001 | 0.0051 | 0.0034 | 0.0048 | 0.0078 | 0.0061 | 0.005 | 0.073 | 0.0201 |
| Ammonia as N | mg/L | | | | 5.74 | SEQG/CCME | (4) | <0.01 | 0.09 | 0.0266 | <0.01 | 0.07 | 0.043 | <0.01 | 0.05 | 0.026 |
| Ammonia, *unionized | ug/L | | | | 6.98 | SEQG/CCME | (4) | 0.008 | 0.072 | 0.0229 | 0.013 | 0.105 | 0.0543 | 0.005 | 0.036 | 0.0164 |
| Antimony | mg/L | | | | | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0003 | 0.000233 | <0.0002 | <0.0002 | <0.0002 |
| Arsenic | mg/L | | | | 0.005 | SEQG/CCME | | <0.0001 | <0.0001 | <0.0001 | 0.0001 | 0.0001 | <0.0001 | 0.0001 | 0.0001 | <0.0001 |
| Barium | mg/L | | | | | | | 0.0023 | 0.0038 | 0.003 | 0.0021 | 0.0032 | 0.0027 | 0.0024 | 0.0051 | 0.00328 |
| Beryllium | mg/L | | | | | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Bicarbonate | mg/L | | | | | | | 2 | 12 | 7.8 | 4 | 16 | 9.3 | 4 | 46 | 13.4 |
| Boron | mg/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Cadmium | mg/L | 0.00011 | SEQG/CCME | (18) | 0.00004 | SEQG/CCME | (18) | <0.00001 | 0.00003 | 0.000015 | <0.00001 | 0.00002 | 0.000013 | <0.00001 | 0.00004 | 0.000016 |
| Calcium | mg/L | | | | | | | 1.1 | 1.7 | 1.35 | 1.2 | 1.6 | 1.4 | 1.1 | 1.5 | 1.24 |
| Carbonate | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Chloride | mg/L | 640 | SEQG/CCME | (6) | 120 | SEQG/CCME | (6) | 0.4 | 0.5 | 0.43 | 0.3 | 0.4 | 0.33 | 0.3 | 0.4 | 0.32 |
| Chromium | mg/L | | | | 0.001 | SEQG/CCME | | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Cobalt | mg/L | | | | 0.000295 | FEQG | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Copper | mg/L | 0.0009 | SEQG | (19) | 0.002 | CCME | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0004 | 0.00024 |
| DOC | mg/L | | | | | | | 2 | 2.6 | 2.23 | 2 | 2.5 | 2.2 | 2 | 2.5 | 2.22 |
| Diss. Phosphorus | mg/L | | | | 0.02 - 0.035 | CCME | (17) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Fluoride | mg/L | | | | | | | <0.01 | 0.08 | 0.03166 | 0.02 | 0.07 | 0.037 | 0.02 | 0.08 | 0.042 |
| Hardness | mg/L | | | | | | | 5 | 6 | 5.5 | 5 | 6 | 5.3 | 5 | 5 | 5 |
| Hydroxide | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Iron | mg/L | | | | 0.3 | SEQG/CCME | | 0.037 | 0.27 | 0.12 | 0.04 | 0.19 | 0.11 | 0.031 | 0.21 | 0.1064 |
| Lead | mg/L | | | | 0.001 | SEQG/CCME | (8) | <0.0001 | 0.0004 | 0.00015 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0012 | 0.00032 |
| Lead-210 | Bq/L | | | | 0.2 | HC | (14) | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Magnesium | mg/L | | | | | | | 0.3 | 0.5 | 0.42 | 0.4 | 0.4 | 0.4 | 0.2 | 0.4 | 0.36 |
| Manganese | mg/L | 0.501 | CCME | (3) | 0.26 | SEQG/CCME | (3) | 0.0039 | 0.029 | 0.016 | 0.0046 | 0.02 | 0.0142 | 0.0024 | 0.019 | 0.01232 |

| Parameter | Units | Short-term Benchmark | | | Long-term Benchmark | | | McGowan Lake (LA-1) | | | Whitefish Lake South (LA-5) | | | Whitefish Lake North (LA-6) | | |
|---------------|-------|----------------------|------------------|-------|---------------------|-----------|-------|---------------------|----------|----------|-----------------------------|----------|-----------|-----------------------------|----------|----------|
| | | Value | Reference | Notes | Value | Reference | Notes | Minimum | Maximum | Mean | Minimum | Maximum | Mean | Minimum | Maximum | Mean |
| Mercury | mg/L | | | | 0.000026 | CCME | | 1.00E-07 | 1.00E-05 | 6.00E-06 | 1.00E-06 | 1.00E-05 | 7.00E-06 | 1.00E-07 | 1.00E-05 | 6.00E-06 |
| Molybdenum | mg/L | | | | 0.07 | WHO | (16) | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Nickel | mg/L | | | | 0.07 | WHO | (16) | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0004 | 0.00016 |
| Nitrate | mg/L | 550 | CCME | | 3.0 | SEQG | | <0.04 | 0.49 | 0.18 | <0.04 | 0.26 | 0.15 | <0.04 | 0.31 | 0.1725 |
| P. Alkalinity | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| pH | units | | | | 6.5-9.0 | SEQG/CCME | (1) | 6.52 | 6.94 | 6.77 | 6.60 | 7.00 | 6.80 | 5.71 | 6.79 | 6.50 |
| Phosphorus | mg/L | | | | 0.02 - 0.035 | CCME | (17) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Polonium-210 | Bq/L | | | | 0.1 | HC | | <0.005 | <0.005 | <0.005 | <0.005 | 0.008 | 0.006 | <0.005 | <0.005 | <0.005 |
| Potassium | mg/L | | | | | | | 0.2 | 0.5 | 0.37 | 0.2 | 0.4 | 0.33 | 0.2 | 0.4 | 0.32 |
| Radium-226 | Bq/L | | | | 0.11 | SEQG | | <0.005 | <0.005 | <0.005 | <0.005 | 0.01 | 0.0076667 | <0.005 | <0.005 | <0.005 |
| Selenium | mg/L | | | | 0.001 | CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Silver | mg/L | | | | 0.25 | CCME | | <0.00005 | <0.00005 | <0.00005 | 0.00005 | 0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Sodium | mg/L | | | | | | | 1.4 | 1.8 | 1.5 | 1.4 | 1.7 | 1.5 | 1.4 | 1.8 | 1.52 |
| Conductivity | µS/cm | | | | | | | 9 | 24 | 16.8 | 16 | 22 | 19 | 9 | 21 | 15.2 |
| Strontium | mg/L | | | | 205 | FEQG | (11) | 0.012 | 0.016 | 0.014 | 0.012 | 0.015 | 0.013 | 0.011 | 0.014 | 0.0126 |
| Sulphate | mg/L | | | | 128 | BC MOE | (12) | 0.7 | 0.8 | 0.75 | 0.6 | 0.7 | 0.63 | 0.5 | 0.7 | 0.64 |
| Sum of Ions | | | | | | | | 6 | 18 | 12.5 | 8 | 22 | 14 | 8 | 51 | 18 |
| Thallium | mg/L | | | | 0.0008 | SEQG/CCME | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Thorium-228 | Bq/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-230 | Bq/L | | | | 0.6 | HC | (14) | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | 0.0133 | <0.01 | <0.01 | <0.01 |
| Thorium-232 | Bq/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tin | mg/L | | | | | | | <0.0001 | 0.0013 | 0.0004 | <0.0001 | 0.0008 | 0.00033 | <0.0001 | 0.0011 | 0.0003 |
| Titanium | mg/L | | | | | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| TDS | mg/L | | | | | | | 18 | 26 | 22.167 | 22 | 29 | 24 | 14 | 29 | 22.2 |
| TKN | mg/L | | | | | | | 0.17 | 0.38 | 0.27333 | 0.14 | 0.34 | 0.22 | 0.24 | 0.43 | 0.306 |
| TOC | mg/L | | | | | | | 2.2 | 2.6 | 2.3667 | 1.9 | 4.3 | 2.8 | 2.2 | 2.9 | 2.36 |
| TSS | mg/L | 15 | MDMER Schedule 4 | (22) | background + 5 mg/L | CCME | | <1 | 4 | 2.5 | <1 | 4 | 2.66 | <1 | 4 | 2 |
| Uranium | mg/L | 0.033 | CCME | | 0.015 | SEQG/CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Vanadium | mg/L | | | | 0.12 | FEQG | (13) | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Zinc | mg/L | 0.008 | CCME | (9) | 0.007 | CCME | (9) | <0.0005 | 0.001 | 0.00058 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.02 | 0.00474 |

Table 8.2-2 (Continued)

| Parameter | Units | Short-term Benchmark | | | Long-term Benchmark | | | Russell Lake (LAB-1) | | | Russell Lake (LAB-2) | | | LB-2 | | |
|---------------------|-------|----------------------|-----------|-------|---------------------|-----------|-------|----------------------|----------|-----------|----------------------|----------|----------|----------|----------|----------|
| | | Value | Reference | Notes | Value | Reference | Notes | Min | Max | Mean | Min | Max | Mean | Min | Max | Mean |
| Alkalinity | mg/L | | | | | | | 2 | 14 | 7.7 | 8 | 8 | 8 | 7 | 12 | 9.5 |
| Aluminum | mg/L | | | | 0.1 | SEQG/CCME | (5) | 0.0023 | 0.0025 | 0.0024 | 0.0029 | 0.0029 | 0.0029 | 0.0067 | 0.0096 | 0.0082 |
| Ammonia as N | mg/L | | | | 5.74 | SEQG/CCME | (4) | <0.01 | 0.05 | 0.0233 | <0.01 | <0.01 | <0.01 | <0.01 | 0.04 | 0.025 |
| Ammonia, *unionized | ug/L | | | | 6.98 | SEQG/CCME | (4) | 0.016 | 0.055 | 0.0303 | 0.033 | 0.033 | 0.033 | 0.011 | 0.028 | 0.0195 |
| Antimony | mg/L | | | | | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Arsenic | mg/L | | | | 0.005 | SEQG/CCME | | 0.0001 | 0.0001 | <0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Barium | mg/L | | | | | | | 0.0033 | 0.0039 | 0.0036 | 0.0034 | 0.0034 | 0.0034 | 0.0033 | 0.0046 | 0.004 |
| Beryllium | mg/L | | | | | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Bicarbonate | mg/L | | | | | | | 2 | 17 | 9 | 10 | 10 | 10 | 8 | 15 | 12 |
| Boron | mg/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Cadmium | mg/L | 0.00011 | SEQG/CCME | (18) | 0.00004 | SEQG/CCME | (18) | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 |
| Calcium | mg/L | | | | | | | 2.7 | 3.9 | 3.5 | 3.5 | 3.5 | 3.5 | 1.3 | 1.8 | 1.6 |
| Carbonate | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Chloride | mg/L | 640 | SEQG/CCME | (6) | 120 | SEQG/CCME | (6) | <0.1 | 0.5 | 0.3333333 | 0.4 | 0.4 | 0.4 | 0.2 | 0.2 | 0.2 |
| Chromium | mg/L | | | | 0.001 | SEQG/CCME | | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Cobalt | mg/L | | | | 0.000295 | FEQG | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Copper | mg/L | 0.0009 | SEQG | (19) | 0.002 | CCME | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| DOC | mg/L | | | | | | | 2.1 | 2.5 | 2.3 | 2.2 | 2.2 | 2.2 | 2.6 | 3.5 | 3.1 |
| Diss. Phosphorus | mg/L | | | | 0.02 - 0.035 | CCME | (17) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.03 | 0.02 |
| Fluoride | mg/L | | | | | | | 0.02 | 0.07 | 0.04 | 0.03 | 0.03 | 0.03 | <0.01 | 0.07 | 0.04 |
| Hardness | mg/L | | | | | | | 9 | 13 | 11 | 12 | 12 | 12 | 5 | 6 | 5.5 |
| Hydroxide | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Iron | mg/L | | | | 0.3 | SEQG/CCME | | 0.056 | 0.08 | 0.070667 | 0.039 | 0.039 | 0.039 | 0.15 | 0.15 | 0.15 |
| Lead | mg/L | | | | 0.001 | SEQG/CCME | (8) | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Lead-210 | Bq/L | | | | 0.2 | HC | (14) | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Magnesium | mg/L | | | | | | | 0.5 | 0.7 | 0.6 | 0.7 | 0.7 | 0.7 | 0.4 | 0.4 | 0.4 |
| Manganese | mg/L | 0.501 | CCME | (3) | 0.26 | SEQG/CCME | (3) | 0.029 | 0.064 | 0.045 | 0.019 | 0.019 | 0.019 | 0.0094 | 0.037 | 0.0232 |

| Parameter | Units | Short-term Benchmark | | | Long-term Benchmark | | | Russell Lake (LAB-1) | | | Russell Lake (LAB-2) | | | LB-2 | | |
|---------------|-------|----------------------|------------------|-------|---------------------|-----------|-------|----------------------|----------|-----------|----------------------|----------|----------|----------|----------|----------|
| | | Value | Reference | Notes | Value | Reference | Notes | Min | Max | Mean | Min | Max | Mean | Min | Max | Mean |
| Mercury | mg/L | | | | 0.000026 | CCME | | 1.00E-06 | 1.00E-05 | 7.00E-06 | 1.00E-07 | 1.00E-07 | 1.00E-07 | 1.00E-06 | 1.00E-05 | 5.50E-06 |
| Molybdenum | mg/L | | | | 0.07 | WHO | (16) | 0.0003 | 0.0013 | 0.00077 | 0.0011 | 0.0011 | 0.0011 | <0.0001 | <0.0001 | <0.0001 |
| Nickel | mg/L | | | | 0.07 | WHO | (16) | 0.0001 | 0.0001 | <0.0001 | 0.0003 | 0.0003 | 0.0003 | 0.0001 | 0.0002 | 0.00015 |
| Nitrate | mg/L | 550 | CCME | | 3.0 | SEQG | | 0.05 | 0.44 | 0.25 | 0.05 | 0.05 | 0.05 | <0.04 | 0.66 | 0.35 |
| P. Alkalinity | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| pH | units | | | | 6.5-9.0 | SEQG/CCME | (1) | 6.70 | 7.00 | 6.90 | 7.20 | 7.20 | 7.20 | 6.70 | 6.80 | 6.80 |
| Phosphorus | mg/L | | | | 0.02 - 0.035 | CCME | (17) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Polonium-210 | Bq/L | | | | 0.1 | HC | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Potassium | mg/L | | | | | | | 0.3 | 0.6 | 0.5 | 0.8 | 0.8 | 0.8 | 0.2 | 0.4 | 0.3 |
| Radium-226 | Bq/L | | | | 0.11 | SEQG | | <0.005 | 0.006 | 0.0053333 | 0.007 | 0.007 | 0.007 | <0.005 | 0.008 | 0.0065 |
| Selenium | mg/L | | | | 0.001 | CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Silver | mg/L | | | | 0.25 | CCME | | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Sodium | mg/L | | | | | | | 1.7 | 2 | 1.8 | 1.7 | 1.7 | 1.7 | 1.4 | 1.6 | 1.5 |
| Conductivity | µS/cm | | | | | | | 30 | 47 | 38 | 42 | 42 | 42 | 20 | 22 | 21 |
| Strontium | mg/L | | | | 205 | FEQG | (11) | 0.017 | 0.018 | 0.017 | 0.016 | 0.016 | 0.016 | 0.013 | 0.016 | 0.0145 |
| Sulphate | mg/L | | | | 128 | BC MOE | (12) | 3.7 | 8.1 | 6.5 | 8.3 | 8.3 | 8.3 | 0.5 | 0.8 | 0.65 |
| Sum of Ions | | | | | | | | 18 | 28 | 23 | 25 | 25 | 25 | 12 | 21 | 16.5 |
| Thallium | mg/L | | | | 0.0008 | SEQG/CCME | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Thorium-228 | Bq/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-230 | Bq/L | | | | 0.6 | HC | (14) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-232 | Bq/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tin | mg/L | | | | | | | <0.0001 | 0.001 | 0.0004 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0008 | 0.00045 |
| Titanium | mg/L | | | | | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| TDS | mg/L | | | | | | | 30 | 35 | 32 | 35 | 35 | 35 | 19 | 30 | 24.5 |
| TKN | mg/L | | | | | | | 0.14 | 0.22 | 0.17 | 0.29 | 0.29 | 0.29 | 0.13 | 0.35 | 0.24 |
| TOC | mg/L | | | | | | | 2.2 | 2.6 | 2.4 | 2.2 | 2.2 | 2.2 | 2.7 | 3.6 | 3.2 |
| TSS | mg/L | 15 | MDMER Schedule 4 | (22) | background + 5 mg/L | CCME | | 1 | 1 | <1 | 4 | 4 | 4 | <1 | <1 | <1 |
| Uranium | mg/L | 0.033 | CCME | | 0.015 | SEQG/CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Vanadium | mg/L | | | | 0.12 | FEQG | (13) | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Zinc | mg/L | 0.008 | CCME | (9) | 0.007 | CCME | (9) | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0018 | 0.00115 |

Notes:

- (1) Saskatchewan Water Quality Objectives, SEQG on-line (<https://envbrportal.crm.saskatchewan.ca/seqg-search/>), SEQG for the protection of aquatic life were selected, based on total concentrations, a temperature of 15°C and a pH of 7.0.
- (2) Hardness dependent WQOs are for very soft water (hardness <25 mg CaCO₃/L). Site-specific hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6).
- (3) Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life - Manganese, Appendix B - Canadian Water Quality Guidelines Calculator (pH = 7.5, hardness = 15 mg/L). Guideline is based on dissolved manganese. Benchmark = $\exp(0.878[\ln(\text{hardness})] + 4.76)$ where the benchmark is expressed in dissolved manganese concentration (µg/L), and hardness is measured as CaCO₃ equivalents in mg/L.
- (4) Total ammonia-N calculated from the total ammonia guideline for a temperature of 15°C and a pH of 7.0, Un-ionized Ammonia from Table 1 of temperature and pH Canadian Water Quality Guidelines for the Protection of Aquatic Life - Ammonia (<https://ccme.ca/en/res/ammonia-en-canadian-water-quality-guidelines-for-the-protection-of-aquatic-life.pdf>)
- (5) Based on a pH of >6.5.
- (6) Based on water hardness >0 to <17 mg/L.
- (7) Based on water hardness >0 to <82 mg/L.
- (8) Based on water hardness >0 to ≤60 mg/L equation used at hardness of 5.26. At hardness >180 mg/L, the CWQG is 7 µg/L
- (9) Guideline is based on dissolved zinc.
- (10) Environment Canada 2017. Federal Environmental Quality Guidelines, Cobalt, May. Based on equation and site-specific baseline hardness of 15 mg/L.
- (11) ECCC 2020. Federal Environmental Quality Guidelines Strontium. July.
- (12) BC MECCS 2021. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture. https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf
- (13) Environment Canada 2016. Federal Environmental Quality Guidelines, Vanadium. May.
- (14) Health Canada 2020. Guidelines for Canadian Drinking Water Quality Summary Table. September. https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/water-eau/sum_guide-res_recom/summary-table-EN-2020-02-11.pdf
- (15) BC MECCS 2020. Source Drinking Water Quality Guidelines, Guideline Summary Ministry of Environment & Climate Change Strategy Water Protection & Sustainability Branch .
- (16) WHO 2017. Guidelines for Drinking Water Quality. Fourth Edition Incorporating The First Addendum.
- (17) Framework - guideline for meso-eutrophic waterbody 20-35 µg/L
- (18) Based on water hardness of >0 to <5.3 mg/L
- (19) Based on hardness of 5 mg/L (Short-term equation is $(e^{(0.979123[\ln(\text{hardness})] - 8.64497)}) * 1000$ (SEQG via AEP 1996b)
- (20) Based on benchmark = $\exp(0.833[\ln(\text{hardness mg·L}^{-1})] + 0.240[\ln(\text{DOC mg·L}^{-1})] + 0.526)$. Site-specific background hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6). Site-specific DOC is 2.2 (arithmetic mean for LA-5 and LA-6), induced hardness of 250.5 used as upper limit of extrapolation available.
- (21) based on water hardness of > 250 mg/L (CaCO₃)
(251 mg/L)
- (22) MDMER Schedule 4 - maximum authorized montly mean concentration
- (23) Bold numbers indicate exceedance of long-term criteria
- SEQG – Saskatchewan Environmental Quality Guidelines – Water Quality Guidelines for Freshwater Aquatic Life.
- CWQG – Canadian Council of Ministers of the Environment – Canadian Water Quality Guidelines for the Protection of Aquatic Life.
- SSWQO – Saskatchewan Surface Water Quality Objectives.
- DOC – Dissolved organic carbon.
- TDS – Total dissolved solids.

TKN – Total Kjeldahl Nitrogen.

TOC – Total organic carbon.

TSS – Total suspended solids.

Table 8.2-3: Baseline Surface Water Quality in Local Study Area Watercourses

| Parameter | Units | Short-term Benchmark | | | Long-term Benchmark | | | Icelander River (SA-1) | | | SA-2 | | | SA-3 | |
|---------------------|-------|----------------------|-----------|-------|---------------------|-----------|-------|------------------------|---------|----------|----------|---------|-----------|----------|---------|
| | | Value | Reference | Notes | Value | Reference | Notes | Min | Max | Mean | Min | Max | Mean | Min | Max |
| Alkalinity | mg/L | | | | | | | 2 | 13 | 5.5 | 2 | 11 | 6.75 | 1 | 23 |
| Aluminum | mg/L | | | | 0.1 | SEQG/CCME | (5) | 0.0022 | 0.0056 | 0.0037 | 0.0039 | 0.081 | 0.015 | 0.0013 | 0.006 |
| Ammonia as N | mg/L | | | | 5.74 | SEQG/CCME | (4) | <0.01 | 0.04 | 0.014 | <0.01 | 0.04 | 0.01375 | <0.01 | 0.04 |
| Ammonia, *unionized | ug/L | | | | 6.98 | SEQG/CCME | (4) | 0.005 | 0.036 | 0.0143 | 0.006 | 0.024 | 0.013 | 0.004 | 0.036 |
| Antimony | mg/L | | | | | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Arsenic | mg/L | | | | 0.005 | SEQG/CCME | | <0.0001 | <0.0001 | <0.0001 | 0.0001 | 0.0001 | <0.0001 | 0.0001 | 0.0001 |
| Barium | mg/L | | | | | | | 0.0022 | 0.0035 | 0.00267 | 0.0019 | 0.0041 | 0.0026625 | 0.0025 | 0.004 |
| Beryllium | mg/L | | | | | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Bicarbonate | mg/L | | | | | | | 2 | 16 | 6.7 | 2 | 13 | 8.125 | 1 | 28 |
| Boron | mg/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Cadmium | mg/L | 0.00011 | SEQG/CCME | (18) | 0.00004 | SEQG/CCME | (18) | <1.0E-05 | 0.00002 | 0.000012 | <1.0E-05 | 0.00002 | 0.0000125 | 1.00E-05 | 0.00002 |
| Calcium | mg/L | | | | | | | 1.3 | 1.7 | 1.4 | 1.2 | 1.7 | 1.3375 | 1.5 | 1.9 |
| Carbonate | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Chloride | mg/L | 640 | SEQG/CCME | (6) | 120 | SEQG/CCME | (6) | 0.4 | 0.6 | 0.45 | 0.2 | 0.4 | 0.3125 | 0.5 | 0.7 |
| Chromium | mg/L | | | | 0.001 | SEQG/CCME | | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Cobalt | mg/L | | | | 0.000295 | FEQG | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Copper | mg/L | 0.0009 | SEQG | (19) | 0.002 | CCME | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0008 | 0.000275 | <0.0002 | <0.0002 |
| DOC | mg/L | | | | | | | 1.7 | 2.4 | 2.13 | 1.9 | 2.5 | 2.225 | 1.7 | 2.6 |
| Diss. Phosphorus | mg/L | | | | 0.02 - 0.035 | CCME | (17) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Fluoride | mg/L | | | | | | | 0.01 | 0.07 | 0.026 | 0.01 | 0.03 | 0.01625 | <0.01 | 0.07 |
| Hardness | mg/L | | | | | | | 5 | 6 | 5.3 | 4 | 6 | 4.75 | 5 | 7 |
| Hydroxide | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Iron | mg/L | | | | 0.3 | SEQG/CCME | | 0.031 | 0.31 | 0.1215 | 0.041 | 0.11 | 0.073875 | 0.036 | 0.13 |
| Lead | mg/L | | | | 0.001 | SEQG/CCME | (8) | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0003 | 0.000125 | <0.0001 | <0.0001 |
| Lead-210 | Bq/L | | | | 0.2 | HC | (14) | <0.02 | <0.02 | <0.02 | <0.02 | 0.05 | 0.02375 | <0.02 | 0.03 |

| Parameter | Units | Short-term Benchmark | | | Long-term Benchmark | | | Icelander River (SA-1) | | | SA-2 | | | SA-3 | |
|---------------|-------|----------------------|------------------|-------|---------------------|-----------|-------|------------------------|-------------|-----------|----------|----------|----------|-------------|-------------|
| | | Value | Reference | Notes | Value | Reference | Notes | Min | Max | Mean | Min | Max | Mean | Min | Max |
| Magnesium | mg/L | | | | | | | 0.3 | 0.7 | 0.43 | 0.3 | 0.6 | 0.375 | 0.4 | 0.5 |
| Manganese | mg/L | 0.501 | CCME | (3) | 0.26 | SEQG/CCME | (3) | 0.0041 | 0.025 | 0.01467 | 0.0044 | 0.017 | 0.010325 | 0.0066 | 0.023 |
| Mercury | mg/L | | | | 0.000026 | CCME | | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 |
| Molybdenum | mg/L | | | | 0.07 | WHO | (16) | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Nickel | mg/L | | | | 0.07 | WHO | (16) | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Nitrate | mg/L | 550 | CCME | | 3.0 | SEQG | | <0.04 | 0.26 | 0.0714286 | <0.04 | 0.31 | 0.094 | <0.04 | 0.26 |
| P. Alkalinity | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| pH | units | | | | 6.5-9.0 | SEQG/CCME | (1) | 6.34 | 6.99 | 6.75 | 6.58 | 7.01 | 6.78 | 6.42 | 7.02 |
| Phosphorus | mg/L | | | | 0.02 - 0.035 | CCME | (17) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Polonium-210 | Bq/L | | | | 0.1 | HC | | <0.005 | 0.01 | 0.0054999 | <0.005 | <0.005 | <0.005 | <0.005 | 0.01 |
| Potassium | mg/L | | | | | | | 0.2 | 0.5 | 0.36 | 0.1 | 0.4 | 0.3375 | 0.3 | 0.5 |
| Radium-226 | Bq/L | | | | 0.11 | SEQG | | <0.005 | 0.009 | 0.0061 | <0.005 | 0.01 | 0.006125 | <0.005 | 0.01 |
| Selenium | mg/L | | | | 0.001 | CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Silver | mg/L | | | | 0.25 | CCME | | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Sodium | mg/L | | | | | | | 1.4 | 1.7 | 1.53 | 1.2 | 1.8 | 1.45 | 1.4 | 1.8 |
| Conductivity | µS/cm | | | | | | | 16 | 22 | 18.2 | 14 | 22 | 17 | 18 | 24 |
| Strontium | mg/L | | | | 205 | FEQG | (11) | 0.011 | 0.015 | 0.0127 | 0.011 | 0.015 | 0.012125 | 0.013 | 0.018 |
| Sulphate | mg/L | | | | 128 | BC MOE | (12) | 0.4 | 0.9 | 0.71 | <0.2 | 0.7 | 0.5875 | 0.4 | 0.8 |
| Sum of Ions | | | | | | | | 6 | 22 | 11.5 | 6 | 19 | 12.5 | 6 | 33 |
| Thallium | mg/L | | | | 0.0008 | SEQG/CCME | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Thorium-228 | Bq/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-230 | Bq/L | | | | 0.6 | HC | (14) | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | 0.01125 | <0.01 | <0.01 |
| Thorium-232 | Bq/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tin | mg/L | | | | | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Titanium | mg/L | | | | | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0015 | 0.000375 | <0.0002 | <0.0002 |
| TDS | mg/L | | | | | | | 18 | 25 | 21.7 | 13 | 30 | 21.25 | 17 | 26 |
| TKN | mg/L | | | | | | | 0.11 | 0.3 | 0.241 | <0.05 | 0.31 | <0.195 | 0.13 | 0.3 |
| TOC | mg/L | | | | | | | 1.8 | 2.6 | 2.25 | 2.1 | 2.4 | 2.2875 | 1.8 | 2.6 |
| TSS | mg/L | 15 | MDMER Schedule 4 | (22) | background + 5 mg/L | CCME | | <1 | 3 | 2.2 | 1 | 3 | 1.5 | <1 | 2 |
| Uranium | mg/L | 0.033 | CCME | | 0.015 | SEQG/CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |

| Parameter | Units | Short-term Benchmark | | | Long-term Benchmark | | | Icelander River (SA-1) | | | SA-2 | | | SA-3 | |
|-----------|-------|----------------------|-----------|-------|---------------------|-----------|-------|------------------------|---------|---------|---------|---------|----------|---------|---------|
| | | Value | Reference | Notes | Value | Reference | Notes | Min | Max | Mean | Min | Max | Mean | Min | Max |
| Vanadium | mg/L | | | | 0.12 | FEQG | (13) | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Zinc | mg/L | 0.008 | CCME | (9) | 0.007 | CCME | (9) | <0.0005 | 0.0028 | 0.00074 | <0.0005 | 0.0096 | 0.001675 | <0.0005 | 0.0011 |

Table 8.2-3 (Continued)

| Parameter | Units | Short-term Benchmark | | | Long-term Benchmark | | | SA-4 | | | SA-5 | | | SA-6 | |
|---------------------|-------|----------------------|-----------|-------|---------------------|-----------|-------|----------|---------|-----------|----------|----------------|-----------|----------|---------|
| | | Value | Reference | Notes | Value | Reference | Notes | Min | Max | Mean | Min | Max | Mean | Min | Max |
| Alkalinity | mg/L | | | | | | | 2 | 15 | 7.5 | 2 | 8 | 5.2 | 3 | 13 |
| Aluminum | mg/L | | | | 0.1 | SEQG/CCME | (5) | 0.0025 | 0.0099 | 0.0053 | 0.004 | 0.014 | 0.0065 | 0.0032 | 0.02 |
| Ammonia as N | mg/L | | | | 5.74 | SEQG/CCME | (4) | <0.01 | 0.05 | 0.015 | <0.01 | 0.05 | 0.01444 | <0.01 | 0.04 |
| Ammonia, *unionized | ug/L | | | | 6.98 | SEQG/CCME | (4) | 0.007 | 0.065 | 0.0194 | 0.002 | 0.04 | 0.0137 | 0.006 | 0.04 |
| Antimony | mg/L | | | | | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Arsenic | mg/L | | | | 0.005 | SEQG/CCME | | 0.0001 | 0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0001 | 0.0001 |
| Barium | mg/L | | | | | | | 0.0021 | 0.0032 | 0.0025625 | 0.0021 | 0.0031 | 0.0025556 | 0.0023 | 0.0032 |
| Beryllium | mg/L | | | | | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Bicarbonate | mg/L | | | | | | | 2 | 18 | 9.125 | 2 | 10 | 6.2222 | 4 | 16 |
| Boron | mg/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Cadmium | mg/L | 0.00011 | SEQG/CCME | (18) | 0.00004 | SEQG/CCME | (18) | 1.00E-05 | 0.00007 | 0.0000175 | 1.00E-05 | 0.00004 | 1.44E-05 | 1.00E-05 | 0.00005 |
| Calcium | mg/L | | | | | | | 1.3 | 2 | 1.5625 | 1.2 | 1.4 | 1.2444 | 1.2 | 1.8 |
| Carbonate | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Chloride | mg/L | 640 | SEQG/CCME | (6) | 120 | SEQG/CCME | (6) | 0.4 | 0.6 | 0.45 | 0.2 | 0.3 | 0.23333 | 0.3 | 0.5 |
| Chromium | mg/L | | | | 0.001 | SEQG/CCME | | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Cobalt | mg/L | | | | 0.000295 | FEQG | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Copper | mg/L | 0.0009 | SEQG | (19) | 0.002 | CCME | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| DOC | mg/L | | | | | | | 2 | 2.4 | 2.275 | 1.8 | 2.5 | 2.2667 | 1.9 | 2.5 |
| Diss. Phosphorus | mg/L | | | | 0.02 - 0.035 | CCME | (17) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Fluoride | mg/L | | | | | | | 0.01 | 0.07 | 0.02625 | 0.01 | 0.08 | 0.0233 | <0.01 | 0.07 |
| Hardness | mg/L | | | | | | | 5 | 7 | 5.625 | 4 | 5 | 4.56 | 4 | 6 |
| Hydroxide | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Iron | mg/L | | | | 0.3 | SEQG/CCME | | 0.034 | 0.13 | 0.077375 | 0.03 | 0.11 | 0.071222 | 0.036 | 0.16 |

| Parameter | Units | Short-term Benchmark | | | Long-term Benchmark | | | SA-4 | | | SA-5 | | | SA-6 | |
|---------------|-------|----------------------|-----------|-------|---------------------|-----------|-------|----------|----------|-----------|-------------|----------|-----------|-------------|----------|
| | | Value | Reference | Notes | Value | Reference | Notes | Min | Max | Mean | Min | Max | Mean | Min | Max |
| Lead | mg/L | | | | 0.001 | SEQG/CCME | (8) | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Lead-210 | Bq/L | | | | 0.2 | HC | (14) | <0.02 | 0.03 | 0.02125 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Magnesium | mg/L | | | | | | | 0.4 | 0.6 | 0.4375 | 0.2 | 0.4 | 0.33333 | 0.3 | 0.5 |
| Manganese | mg/L | 0.501 | CCME | (3) | 0.26 | SEQG/CCME | (3) | 0.0029 | 0.019 | 0.010625 | 0.0025 | 0.018 | 0.0083333 | 0.0037 | 0.029 |
| Mercury | mg/L | | | | 0.000026 | CCME | | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 |
| Molybdenum | mg/L | | | | 0.07 | WHO | (16) | <0.0001 | 0.0002 | 0.00011 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Nickel | mg/L | | | | 0.07 | WHO | (16) | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Nitrate | mg/L | 550 | CCME | | 3.0 | SEQG | | <0.04 | 0.35 | 0.112 | <0.04 | 0.31 | 0.093 | <0.04 | 0.35 |
| P. Alkalinity | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| pH | units | | | | 6.5-9.0 | SEQG/CCME | (1) | 6.58 | 7.16 | 6.85 | 6.17 | 6.97 | 6.72 | 6.48 | 7.07 |
| Phosphorus | mg/L | | | | 0.02 - 0.035 | CCME | (17) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Polonium-210 | Bq/L | | | | 0.1 | HC | | <0.005 | 0.007 | 0.0052 | <0.005 | <0.005 | <0.005 | <0.005 | 0.006 |
| Potassium | mg/L | | | | | | | 0.2 | 0.6 | 0.375 | 0.2 | 0.4 | 0.32222 | 0.2 | 0.4 |
| Radium-226 | Bq/L | | | | 0.11 | SEQG | | <0.005 | 0.009 | 0.00625 | <0.005 | 0.007 | 0.00544 | <0.005 | <0.005 |
| Selenium | mg/L | | | | 0.001 | CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Silver | mg/L | | | | 0.25 | CCME | | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Sodium | mg/L | | | | | | | 1.4 | 2.1 | 1.63 | 1.3 | 1.6 | 1.41 | 1.3 | 1.9 |
| Conductivity | µS/cm | | | | | | | 17 | 25 | 19.375 | 14 | 20 | 16.111 | 14 | 23 |
| Strontium | mg/L | | | | 205 | FEQG | (11) | 0.012 | 0.018 | 0.0141 | 0.011 | 0.013 | 0.0113 | 0.011 | 0.016 |
| Sulphate | mg/L | | | | 128 | BC MOE | (12) | 0.4 | 0.7 | 0.525 | 0.4 | 0.8 | 0.63333 | 0.3 | 0.8 |
| Sum of Ions | | | | | | | | 7 | 25 | 14.125 | 6 | 14 | 10.667 | 8 | 22 |
| Thallium | mg/L | | | | 0.0008 | SEQG/CCME | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Thorium-228 | Bq/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-230 | Bq/L | | | | 0.6 | HC | (14) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-232 | Bq/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tin | mg/L | | | | | | | <0.0001 | 0.0002 | 0.0001125 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Titanium | mg/L | | | | | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0003 |
| TDS | mg/L | | | | | | | 21 | 32 | 25 | 13 | 28 | 20 | 15 | 28 |
| TKN | mg/L | | | | | | | 0.13 | 0.3 | 0.215 | 0.11 | 0.29 | 0.213 | 0.15 | 0.41 |
| TOC | mg/L | | | | | | | 2 | 2.6 | 2.325 | 1.9 | 2.7 | 2.3111 | 1.9 | 2.6 |

| Parameter | Units | Short-term Benchmark | | | Long-term Benchmark | | | SA-4 | | | SA-5 | | | SA-6 | |
|-----------|-------|----------------------|------------------|-------|---------------------|-----------|-------|---------|---------|---------|---------|---------|-----------|---------|---------|
| | | Value | Reference | Notes | Value | Reference | Notes | Min | Max | Mean | Min | Max | Mean | Min | Max |
| TSS | mg/L | 15 | MDMER Schedule 4 | (22) | background + 5 mg/L | CCME | | 1 | 3 | 2 | <1 | 3 | 1.89 | 1 | 6 |
| Uranium | mg/L | 0.033 | CCME | | 0.015 | SEQG/CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Vanadium | mg/L | | | | 0.12 | FEQG | (13) | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Zinc | mg/L | 0.008 | CCME | (9) | 0.007 | CCME | (9) | <0.0005 | 0.0012 | 0.0006 | <0.0005 | 0.0017 | 0.0007445 | <0.0005 | 0.0006 |

Table 8.2-3 (Continued)

| Parameter | Units | Short-term Benchmark | | | Long-term Benchmark | | | SB-3 | | | SB-5 | | |
|---------------------|-------|----------------------|-----------|-------|---------------------|-----------|-------|----------|---------|-----------|----------|----------------|-----------|
| | | Value | Reference | Notes | Value | Reference | Notes | Min | Max | Mean | Min | Max | Mean |
| Alkalinity | mg/L | | | | | | | <1 | 24 | <6.7778 | 3 | 13 | 7.375 |
| Aluminum | mg/L | | | | 0.1 | SEQG/CCME | (5) | 0.0052 | 0.012 | 0.0089 | 0.0016 | 0.0086 | 0.0054 |
| Ammonia as N | mg/L | | | | 5.74 | SEQG/CCME | (4) | <0.01 | 0.04 | 0.01333 | <0.01 | 0.04 | 0.0138 |
| Ammonia, *unionized | ug/L | | | | 6.98 | SEQG/CCME | (4) | 0.003 | 0.024 | 0.012 | 0.005 | 0.032 | 0.0134 |
| Antimony | mg/L | | | | | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Arsenic | mg/L | | | | 0.005 | SEQG/CCME | | <0.0001 | <0.0001 | <0.0001 | 0.0001 | 0.0001 | <0.0001 |
| Barium | mg/L | | | | | | | 0.0025 | 0.0041 | 0.0031111 | 0.0026 | 0.004 | 0.0030625 |
| Beryllium | mg/L | | | | | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Bicarbonate | mg/L | | | | | | | <1 | 29 | <8.3333 | 4 | 16 | 9 |
| Boron | mg/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Cadmium | mg/L | 0.00011 | SEQG/CCME | (18) | 0.00004 | SEQG/CCME | (18) | <1.0E-05 | 0.00002 | 1.11E-05 | <1.0E-05 | 0.00004 | 0.000016 |
| Calcium | mg/L | | | | | | | 1.1 | 1.7 | 1.3778 | 1.2 | 1.7 | 1.3625 |
| Carbonate | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 |
| Chloride | mg/L | 640 | SEQG/CCME | (6) | 120 | SEQG/CCME | (6) | 0.1 | 0.2 | 0.17778 | <0.1 | 0.2 | <0.175 |
| Chromium | mg/L | | | | 0.001 | SEQG/CCME | | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Cobalt | mg/L | | | | 0.000295 | FEQG | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Copper | mg/L | 0.0009 | SEQG | (19) | 0.002 | CCME | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| DOC | mg/L | | | | | | | 2.2 | 3.4 | 3.0222 | 2.6 | 3.2 | 2.975 |
| Diss. Phosphorus | mg/L | | | | 0.02 - 0.035 | CCME | (17) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Fluoride | mg/L | | | | | | | 0.01 | 0.07 | 0.023333 | 0.01 | 0.07 | 0.02375 |
| Hardness | mg/L | | | | | | | 4 | 6 | 5.11 | 4 | 6 | 4.88 |

| Parameter | Units | Short-term Benchmark | | | Long-term Benchmark | | | SB-3 | | | SB-5 | | |
|---------------|-------|----------------------|-----------|-------|---------------------|-----------|-------|-------------|----------|----------|-------------|----------|----------|
| | | Value | Reference | Notes | Value | Reference | Notes | Min | Max | Mean | Min | Max | Mean |
| Hydroxide | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 |
| Iron | mg/L | | | | 0.3 | SEQG/CCME | | 0.042 | 0.22 | 0.095111 | 0.036 | 0.16 | 0.098375 |
| Lead | mg/L | | | | 0.001 | SEQG/CCME | (8) | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Lead-210 | Bq/L | | | | 0.2 | HC | (14) | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Magnesium | mg/L | | | | | | | 0.3 | 0.5 | 0.38889 | 0.2 | 0.5 | 0.375 |
| Manganese | mg/L | 0.501 | CCME | (3) | 0.26 | SEQG/CCME | (3) | 0.0053 | 0.02 | 0.010633 | 0.0071 | 0.016 | 0.010325 |
| Mercury | mg/L | | | | 0.000026 | CCME | | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 |
| Molybdenum | mg/L | | | | 0.07 | WHO | (16) | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Nickel | mg/L | | | | 0.07 | WHO | (16) | 0.0001 | 0.0002 | 0.00011 | <0.0001 | <0.0001 | <0.0001 |
| Nitrate | mg/L | 550 | CCME | | 3.0 | SEQG | | <0.04 | 0.4 | 0.115 | <0.04 | 0.4 | 0.13 |
| P. Alkalinity | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 |
| pH | units | | | | 6.5-9.0 | SEQG/CCME | (1) | 6.18 | 6.99 | 6.70 | 6.47 | 6.99 | 6.73 |
| Phosphorus | mg/L | | | | 0.02 - 0.035 | CCME | (17) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Polonium-210 | Bq/L | | | | 0.1 | HC | | <0.005 | 0.008 | 0.0058 | <0.005 | <0.005 | <0.005 |
| Potassium | mg/L | | | | | | | 0.2 | 0.5 | 0.33333 | 0.2 | 0.5 | 0.3625 |
| Radium-226 | Bq/L | | | | 0.11 | SEQG | | <0.005 | 0.01 | 0.0059 | <0.005 | 0.006 | 0.0051 |
| Selenium | mg/L | | | | 0.001 | CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Silver | mg/L | | | | 0.25 | CCME | | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Sodium | mg/L | | | | | | | 1.2 | 1.7 | 1.4 | 1.3 | 1.7 | 1.44 |
| Conductivity | µS/cm | | | | | | | 15 | 22 | 16.778 | 15 | 23 | 17.25 |
| Strontium | mg/L | | | | 205 | FEQG | (11) | 0.011 | 0.015 | 0.0124 | 0.011 | 0.015 | 0.0119 |
| Sulphate | mg/L | | | | 128 | BC MOE | (12) | 0.3 | 0.9 | 0.68889 | 0.5 | 1 | 0.725 |
| Sum of Ions | | | | | | | | 4 | 34 | 12.667 | 8 | 22 | 13.375 |
| Thallium | mg/L | | | | 0.0008 | SEQG/CCME | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Thorium-228 | Bq/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-230 | Bq/L | | | | 0.6 | HC | (14) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-232 | Bq/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tin | mg/L | | | | | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Titanium | mg/L | | | | | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| TDS | mg/L | | | | | | | 14 | 26 | 20.556 | 16 | 26 | 20.125 |
| TKN | mg/L | | | | | | | 0.16 | 0.34 | 0.256 | 0.18 | 0.33 | 0.27 |

| Parameter | Units | Short-term Benchmark | | | Long-term Benchmark | | | SB-3 | | | SB-5 | | |
|-----------|-------|----------------------|------------------|-------|---------------------|-----------|-------|---------|---------|---------|---------|---------|---------|
| | | Value | Reference | Notes | Value | Reference | Notes | Min | Max | Mean | Min | Max | Mean |
| TOC | mg/L | | | | | | | 2.4 | 3.6 | 3.1111 | 2.7 | 3.2 | 3 |
| TSS | mg/L | 15 | MDMER Schedule 4 | (22) | background + 5 mg/L | CCME | | <1 | 4 | 2.56 | <1 | 3 | 1.875 |
| Uranium | mg/L | 0.033 | CCME | | 0.015 | SEQG/CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Vanadium | mg/L | | | | 0.12 | FEQG | (13) | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Zinc | mg/L | 0.008 | CCME | (9) | 0.007 | CCME | (9) | <0.0005 | 0.0012 | 0.00059 | <0.0005 | 0.0016 | 0.00065 |

Notes:

(1) Saskatchewan Water Quality Objectives, SEQG on-line (<https://envrbrportal.crm.saskatchewan.ca/seqg-search/>), SEQG for the protection of aquatic life were selected, based on total concentrations, a temperature of 15°C and a pH of 7.0.

(2) Hardness dependent WQOs are for very soft water (hardness <25 mg CaCO₃/L). Site-specific hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6).

(3) Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life - Manganese, Appendix B - Canadian Water Quality Guidelines Calculator (pH = 7.5, hardness = 15 mg/L). Guideline is based on dissolved manganese. Benchmark = $\exp(0.878[\ln(\text{hardness})] + 4.76)$ where the benchmark is expressed in dissolved manganese concentration (µg/L), and hardness is measured as CaCO₃ equivalents in mg/L.

(4) Total ammonia-N calculated from the total ammonia guideline for a temperature of 15°C and a pH of 7.0, Un-ionized Ammonia from Table 1 of temperature and pH Canadian Water Quality Guidelines for the Protection of Aquatic Life - Ammonia (<https://ccme.ca/en/res/ammonia-en-canadian-water-quality-guidelines-for-the-protection-of-aquatic-life.pdf>)

(5) Based on a pH of >6.5.

(6) Based on water hardness >0 to <17 mg/L.

(7) Based on water hardness >0 to <82 mg/L.

(8) Based on water hardness >0 to ≤60 mg/L equation used at hardness of 5.26. At hardness >180 mg/L, the CWQG is 7 µg/L

(9) Guideline is based on dissolved zinc.

(10) Environment Canada 2017. Federal Environmental Quality Guidelines, Cobalt, May. Based on equation and site-specific baseline hardness of 15 mg/L.

(11) ECCC 2020. Federal Environmental Quality Guidelines Strontium. July.

(12) BC MECCS 2021. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture. https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf

(13) Environment Canada 2016. Federal Environmental Quality Guidelines, Vanadium. May.

(14) Health Canada 2020. Guidelines for Canadian Drinking Water Quality Summary Table. September. https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/water-eau/sum_guide-res_recom/summary-table-EN-2020-02-11.pdf

(15) BC MECCS 2020. Source Drinking Water Quality Guidelines, Guideline Summary Ministry of Environment & Climate Change Strategy Water Protection & Sustainability Branch .

(16) WHO 2017. Guidelines for Drinking Water Quality. Fourth Edition Incorporating The First Addendum.

(17) Framework - guideline for meso-eutrophic waterbody 20-35 µg/L

(18) Based on water hardness of >0 to <5.3 mg/L

(19) Based on hardness of 5 mg/L (Short-term equation is $(e^{(0.979123[\ln(\text{hardness})] - 8.64497)}) * 1000$ (SEQQ via AEP 1996b)

(20) Based on benchmark = $\exp(0.833[\ln(\text{hardness mg-L}^{-1})] + 0.240[\ln(\text{DOC mg-L}^{-1})] + 0.526)$. Site-specific background hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6). Site-specific DOC is 2.2 (arithmetic mean for LA-5 and LA-6), induced hardness of 250.5 used as upper limit of extrapolation available.

(21) based on water hardness of > 250 mg/L (CaCO_3) (251 mg/L)

(22) MDMER Schedule 4 - maximum authorized monthly mean concentration

(23) Bold numbers indicate exceedance of long-term criteria

SEQG – Saskatchewan Environmental Quality Guidelines – Water Quality Guidelines for Freshwater Aquatic Life.

CWQG – Canadian Council of Ministers of the Environment – Canadian Water Quality Guidelines for the Protection of Aquatic Life.

SSWQO – Saskatchewan Surface Water Quality Objectives.

DOC – Dissolved organic carbon.

TDS – Total dissolved solids.

TKN – Total Kjeldahl Nitrogen.

TOC – Total organic carbon.

TSS – Total suspended solids.

Attachment: IR-108 / IR – 108-R1 (Round 3 submission)

Response:

Tables 8.2-2 and 8.2-3 have been updated as requested and are provided below. The updated versions of the tables have also been inserted into the final EIS in their respective sections.

Table 8.2-2: Baseline Surface Water Quality in Local Study Area Lakes and Russell Lake

| Parameter | Units | Short-term Benchmark | | | Long-term Benchmark | | | McGowan Lake (LA-1) | | | Whitefish Lake South (LA-5) | | | Whitefish Lake North (LA-6) | | |
|---------------------|-------|----------------------|-----------|-------|---------------------|-----------|-------|---------------------|----------|----------|-----------------------------|----------|----------|-----------------------------|----------------|----------------|
| | | Value | Reference | Notes | Value | Reference | Notes | Min | Max | Mean | Min | Max | Mean | Min | Max | Mean |
| Alkalinity | mg/L | | | | | | | 2 | 10 | 6 | 3 | 13 | 7.7 | 3 | 38 | 15 |
| Aluminum | mg/L | | | | 0.1 | SEQG/CCME | (1) | 0.001 | 0.0051 | 0.0034 | 0.0048 | 0.0078 | 0.0061 | 0.005 | 0.073 | 0.0201 |
| Ammonia as N | mg/L | | | | 5.74 | SEQG/CCME | (2) | <0.01 | 0.09 | 0.0266 | <0.01 | 0.07 | 0.043 | <0.01 | 0.05 | 0.026 |
| Ammonia, *unionized | mg/L | | | | 0.019 | SEQG/CCME | | 1.84E-05 | 1.66E-04 | 4.89E-05 | 1.84E-05 | 1.29E-04 | 7.91E-05 | 1.84E-05 | 9.20E-05 | 4.78E-05 |
| Antimony | mg/L | | | | | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0003 | 0.000233 | <0.0002 | <0.0002 | <0.0002 |
| Arsenic | mg/L | | | | 0.005 | SEQG/CCME | | <0.0001 | <0.0001 | <0.0001 | 0.0001 | 0.0001 | <0.0001 | 0.0001 | 0.0001 | <0.0001 |
| Barium | mg/L | | | | | | | 0.0023 | 0.0038 | 0.003 | 0.0021 | 0.0032 | 0.0027 | 0.0024 | 0.0051 | 0.00328 |
| Beryllium | mg/L | | | | | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Bicarbonate | mg/L | | | | | | | 2 | 12 | 7.8 | 4 | 16 | 9.3 | 4 | 46 | 13.4 |
| Boron | mg/L | 29 | CCME | | 1.5 | SEQG/CCME | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Cadmium | mg/L | 0.00011 | SEQG/CCME | (3) | 0.00004 | SEQG/CCME | | <0.00001 | 0.00003 | 0.000015 | <0.00001 | 0.00002 | 0.000013 | <0.00001 | 0.00004 | 0.000016 |
| Calcium | mg/L | | | | | | | 1.1 | 1.7 | 1.35 | 1.2 | 1.6 | 1.4 | 1.1 | 1.5 | 1.24 |
| Carbonate | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Chloride | mg/L | 640 | SEQG/CCME | (4) | 120 | SEQG/CCME | | 0.4 | 0.5 | 0.43 | 0.3 | 0.4 | 0.33 | 0.3 | 0.4 | 0.32 |
| Chromium | mg/L | | | | 0.001 | SEQG/CCME | (5) | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Cobalt | mg/L | | | | 0.00078 | FEQG | (15) | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Copper | mg/L | 0.0009 | SEQG | (6) | 0.0002 | FEQG | (7) | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0004 | 0.00024 |
| DOC | mg/L | | | | | | | 2 | 2.6 | 2.23 | 2 | 2.5 | 2.2 | 2 | 2.5 | 2.22 |
| Fluoride | mg/L | | | | | | | <0.01 | 0.08 | 0.03166 | 0.02 | 0.07 | 0.037 | 0.02 | 0.08 | 0.042 |
| Hardness | mg/L | | | | | | | 5 | 6 | 5.5 | 5 | 6 | 5.3 | 5 | 5 | 5 |
| Hydroxide | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Iron | mg/L | | | | 0.3 | SEQG/CCME | | 0.037 | 0.27 | 0.12 | 0.04 | 0.19 | 0.11 | 0.031 | 0.21 | 0.1064 |
| Lead | mg/L | | | | 0.001 | SEQG/CCME | | <0.0001 | 0.0004 | 0.00015 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0012 | 0.00032 |
| Lead-210 | Bq/L | | | | 0.2 | HC | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Magnesium | mg/L | | | | | | | 0.3 | 0.5 | 0.42 | 0.4 | 0.4 | 0.4 | 0.2 | 0.4 | 0.36 |
| Manganese | mg/L | 0.501 | CCME | (8) | 0.21 | SEQG/CCME | (9) | 0.0039 | 0.029 | 0.016 | 0.0046 | 0.02 | 0.0142 | 0.0024 | 0.019 | 0.01232 |
| Mercury | mg/L | | | | 0.000026 | CCME | | 1.00E-07 | 1.00E-05 | 6.00E-06 | 1.00E-06 | 1.00E-05 | 7.00E-06 | 1.00E-07 | 1.00E-05 | 6.00E-06 |
| Molybdenum | mg/L | | | | 0.07 | WHO | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |

| Parameter | Units | Short-term Benchmark | | | Long-term Benchmark | | | McGowan Lake (LA-1) | | | Whitefish Lake South (LA-5) | | | Whitefish Lake North (LA-6) | | |
|--------------|-------|----------------------|------------------|----------|---------------------|-----------|-------|---------------------|----------|----------|-----------------------------|---------|-----------|-----------------------------|-------------|----------|
| | | Value | Reference | Notes | Value | Reference | Notes | Min | Max | Mean | Min | Max | Mean | Min | Max | Mean |
| Nickel | mg/L | | | | 0.025 | CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0004 | 0.00016 |
| Nitrate | mg/L | 550 | CCME | | 3.0 | SEQG | | <0.04 | 0.49 | 0.18 | <0.04 | 0.26 | 0.15 | <0.04 | 0.31 | 0.1725 |
| pH | units | | | | 6.5-9.0 | SEQG/CCME | | 6.52 | 6.94 | 6.77 | 6.60 | 7.00 | 6.80 | 5.71 | 6.79 | 6.50 |
| Phosphorus | mg/L | | | | 0.004 - 0.01 | CCME | (10) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Polonium-210 | Bq/L | | | | 0.1 | HC | | <0.005 | <0.005 | <0.005 | <0.005 | 0.008 | 0.006 | <0.005 | <0.005 | <0.005 |
| Potassium | mg/L | | | | | | | 0.2 | 0.5 | 0.37 | 0.2 | 0.4 | 0.33 | 0.2 | 0.4 | 0.32 |
| Radium-226 | Bq/L | | | | 0.11 | SEQG | | <0.005 | <0.005 | <0.005 | <0.005 | 0.01 | 0.0076667 | <0.005 | <0.005 | <0.005 |
| Selenium | mg/L | | | | 0.001 | CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Silver | mg/L | | | | 0.25 | CCME | | <0.00005 | <0.00005 | <0.00005 | 0.00005 | 0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Sodium | mg/L | | | | | | | 1.4 | 1.8 | 1.5 | 1.4 | 1.7 | 1.5 | 1.4 | 1.8 | 1.52 |
| Conductivity | µS/cm | | | | | | | 9 | 24 | 16.8 | 16 | 22 | 19 | 9 | 21 | 15.2 |
| Strontium | mg/L | | | | 2.5 | FEQG | | 0.012 | 0.016 | 0.014 | 0.012 | 0.015 | 0.013 | 0.011 | 0.014 | 0.0126 |
| Sulphate | mg/L | | | | 128 | BC MOE | | 0.7 | 0.8 | 0.75 | 0.6 | 0.7 | 0.63 | 0.5 | 0.7 | 0.64 |
| Sum of Ions | | | | | | | | 6 | 18 | 12.5 | 8 | 22 | 14 | 8 | 51 | 18 |
| Temperature | °C | Narrative | CCME | | Narrative | CCME | | 11.6 | 11.7 | 11.7 | 9.8 | 15.5 | 13.1 | 13.7 | 13.8 | 13.8 |
| Thallium | mg/L | | | | 0.0008 | SEQG/CCME | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Thorium-228 | Bq/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-230 | Bq/L | | | | 0.6 | HC | | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | 0.0133 | <0.01 | <0.01 | <0.01 |
| Thorium-232 | Bq/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tin | mg/L | | | | | | | <0.0001 | 0.0013 | 0.0004 | <0.0001 | 0.0008 | 0.00033 | <0.0001 | 0.0011 | 0.0003 |
| Titanium | mg/L | | | | | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| TDS | mg/L | | | | | | | 18 | 26 | 22.167 | 22 | 29 | 24 | 14 | 29 | 22.2 |
| TKN | mg/L | | | | | | | 0.17 | 0.38 | 0.27333 | 0.14 | 0.34 | 0.22 | 0.24 | 0.43 | 0.306 |
| TOC | mg/L | | | | | | | 2.2 | 2.6 | 2.3667 | 1.9 | 4.3 | 2.8 | 2.2 | 2.9 | 2.36 |
| TSS | mg/L | 15 | MDMER Schedule 4 | (11) | background + 5 mg/L | CCME | | <1 | 4 | 2.5 | <1 | 4 | 2.66 | <1 | 4 | 2 |
| Uranium | mg/L | 0.033 | CCME | | 0.015 | SEQG/CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Vanadium | mg/L | | | | 0.12 | FEQG | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Zinc | mg/L | 0.008 | CCME | (12)(13) | 0.013 | CCME | (14) | <0.0005 | 0.001 | 0.00058 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.02 | 0.00474 |

Table 8.2-2 (Continued)

| Parameter | Units | Short-term Benchmark | | | Long-term Benchmark | | | Russell Lake (LAB-1) | | | Russell Lake (LAB-2) | | | LB-2 | | |
|---------------------|-------|----------------------|-----------|-------|---------------------|-----------|-------|----------------------|----------|-----------|----------------------|----------|----------|----------|----------|----------|
| | | Value | Reference | Notes | Value | Reference | Notes | Min | Max | Mean | Min | Max | Mean | Min | Max | Mean |
| Alkalinity | mg/L | | | | | | | 2 | 14 | 7.7 | 8 | 8 | 8 | 7 | 12 | 9.5 |
| Aluminum | mg/L | | | | 0.1 | SEQG/CCME | (1) | 0.0023 | 0.0025 | 0.0024 | 0.0029 | 0.0029 | 0.0029 | 0.0067 | 0.0096 | 0.0082 |
| Ammonia as N | mg/L | | | | 5.74 | SEQG/CCME | (2) | <0.01 | 0.05 | 0.0233 | <0.01 | <0.01 | <0.01 | <0.01 | 0.04 | 0.025 |
| Ammonia, *unionized | ug/L | | | | 6.98 | SEQG/CCME | (2) | 1.84E-05 | 9.20E-05 | 4.29E-05 | 1.84E-05 | 1.84E-05 | 1.84E-05 | 1.84E-05 | 7.36E-05 | 4.60E-05 |
| Antimony | mg/L | | | | | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Arsenic | mg/L | | | | 0.005 | SEQG/CCME | | 0.0001 | 0.0001 | <0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Barium | mg/L | | | | | | | 0.0033 | 0.0039 | 0.0036 | 0.0034 | 0.0034 | 0.0034 | 0.0033 | 0.0046 | 0.004 |
| Beryllium | mg/L | | | | | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Bicarbonate | mg/L | | | | | | | 2 | 17 | 9 | 10 | 10 | 10 | 8 | 15 | 12 |
| Boron | mg/L | 29 | CCME | | 1.5 | SEQG/CCME | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Cadmium | mg/L | 0.00011 | SEQG/CCME | (3) | 0.00004 | SEQG/CCME | | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 |
| Calcium | mg/L | | | | | | | 2.7 | 3.9 | 3.5 | 3.5 | 3.5 | 3.5 | 1.3 | 1.8 | 1.6 |
| Carbonate | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Chloride | mg/L | 640 | SEQG/CCME | (4) | 120 | SEQG/CCME | | <0.1 | 0.5 | 0.3333333 | 0.4 | 0.4 | 0.4 | 0.2 | 0.2 | 0.2 |
| Chromium | mg/L | | | | 0.001 | SEQG/CCME | (5) | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Cobalt | mg/L | | | | 0.00078 | FEQG | (15) | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Copper | mg/L | 0.0009 | SEQG | (6) | 0.0002 | FEQG | (7) | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| DOC | mg/L | | | | | | | 2.1 | 2.5 | 2.3 | 2.2 | 2.2 | 2.2 | 2.6 | 3.5 | 3.1 |
| Fluoride | mg/L | | | | | | | 0.02 | 0.07 | 0.04 | 0.03 | 0.03 | 0.03 | <0.01 | 0.07 | 0.04 |
| Hardness | mg/L | | | | | | | 9 | 13 | 11 | 12 | 12 | 12 | 5 | 6 | 5.5 |
| Hydroxide | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Iron | mg/L | | | | 0.3 | SEQG/CCME | | 0.056 | 0.08 | 0.070667 | 0.039 | 0.039 | 0.039 | 0.15 | 0.15 | 0.15 |
| Lead | mg/L | | | | 0.001 | SEQG/CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Lead-210 | Bq/L | | | | 0.2 | HC | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Magnesium | mg/L | | | | | | | 0.5 | 0.7 | 0.6 | 0.7 | 0.7 | 0.7 | 0.4 | 0.4 | 0.4 |
| Manganese | mg/L | 0.501 | CCME | (8) | 0.21 | SEQG/CCME | (9) | 0.029 | 0.064 | 0.045 | 0.019 | 0.019 | 0.019 | 0.0094 | 0.037 | 0.0232 |
| Mercury | mg/L | | | | 0.000026 | CCME | | 1.00E-06 | 1.00E-05 | 7.00E-06 | 1.00E-07 | 1.00E-07 | 1.00E-07 | 1.00E-06 | 1.00E-05 | 5.50E-06 |
| Molybdenum | mg/L | | | | 0.07 | WHO | | 0.0003 | 0.0013 | 0.00077 | 0.0011 | 0.0011 | 0.0011 | <0.0001 | <0.0001 | <0.0001 |
| Nickel | mg/L | | | | 0.025 | CCME | | 0.0001 | 0.0001 | <0.0001 | 0.0003 | 0.0003 | 0.0003 | 0.0001 | 0.0002 | 0.00015 |

| Parameter | Units | Short-term Benchmark | | | Long-term Benchmark | | | Russell Lake (LAB-1) | | | Russell Lake (LAB-2) | | | LB-2 | | |
|--------------|-------|----------------------|------------------|----------|---------------------|-----------|-------|----------------------|----------|-----------|----------------------|----------|----------|----------|----------|----------|
| | | Value | Reference | Notes | Value | Reference | Notes | Min | Max | Mean | Min | Max | Mean | Min | Max | Mean |
| Nitrate | mg/L | 550 | CCME | | 3.0 | SEQG | | 0.05 | 0.44 | 0.25 | 0.05 | 0.05 | 0.05 | <0.04 | 0.66 | 0.35 |
| pH | units | | | | 6.5-9.0 | SEQG/CCME | | 6.70 | 7.00 | 6.90 | 7.20 | 7.20 | 7.20 | 6.70 | 6.80 | 6.80 |
| Phosphorus | mg/L | | | | 0.004 - 0.01 | CCME | (10) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Polonium-210 | Bq/L | | | | 0.1 | HC | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Potassium | mg/L | | | | | | | 0.3 | 0.6 | 0.5 | 0.8 | 0.8 | 0.8 | 0.2 | 0.4 | 0.3 |
| Radium-226 | Bq/L | | | | 0.11 | SEQG | | <0.005 | 0.006 | 0.0053333 | 0.007 | 0.007 | 0.007 | <0.005 | 0.008 | 0.0065 |
| Selenium | mg/L | | | | 0.001 | CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Silver | mg/L | | | | 0.25 | CCME | | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Sodium | mg/L | | | | | | | 1.7 | 2 | 1.8 | 1.7 | 1.7 | 1.7 | 1.4 | 1.6 | 1.5 |
| Conductivity | µS/cm | | | | | | | 30 | 47 | 38 | 42 | 42 | 42 | 20 | 22 | 21 |
| Strontium | mg/L | | | | 2.5 | FEQG | | 0.017 | 0.018 | 0.017 | 0.016 | 0.016 | 0.016 | 0.013 | 0.016 | 0.0145 |
| Sulphate | mg/L | | | | 128 | BC MOE | | 3.7 | 8.1 | 6.5 | 8.3 | 8.3 | 8.3 | 0.5 | 0.8 | 0.65 |
| Sum of Ions | | | | | | | | 18 | 28 | 23 | 25 | 25 | 25 | 12 | 21 | 16.5 |
| Temperature | °C | Narrative | CCME | | Narrative | CCME | | 11.6 | 11.4 | 11.5 | 10.2 | 15.5 | 13.6 | 12.1 | 15.3 | 14.1 |
| Thallium | mg/L | | | | 0.0008 | SEQG/CCME | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Thorium-228 | Bq/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-230 | Bq/L | | | | 0.6 | HC | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-232 | Bq/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tin | mg/L | | | | | | | <0.0001 | 0.001 | 0.0004 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0008 | 0.00045 |
| Titanium | mg/L | | | | | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| TDS | mg/L | | | | | | | 30 | 35 | 32 | 35 | 35 | 35 | 19 | 30 | 24.5 |
| TKN | mg/L | | | | | | | 0.14 | 0.22 | 0.17 | 0.29 | 0.29 | 0.29 | 0.13 | 0.35 | 0.24 |
| TOC | mg/L | | | | | | | 2.2 | 2.6 | 2.4 | 2.2 | 2.2 | 2.2 | 2.7 | 3.6 | 3.2 |
| TSS | mg/L | 15 | MDMER Schedule 4 | (11) | background + 5 mg/L | CCME | | 1 | 1 | <1 | 4 | 4 | 4 | <1 | <1 | <1 |
| Uranium | mg/L | 0.033 | CCME | | 0.015 | SEQG/CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Vanadium | mg/L | | | | 0.12 | FEQG | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Zinc | mg/L | 0.008 | CCME | (12)(13) | 0.013 | CCME | (14) | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0018 | 0.00115 |

Notes:

All parameters listed as total concentrations unless otherwise specified.

Saskatchewan Water Quality Objectives, SEQG on-line (<https://envrbrportal.crm.saskatchewan.ca/seqg-search/>), SEQG for the protection of aquatic life were selected, based on total concentrations.

Bold numbers indicate exceedance of a long-term criterion.

Bold and italicized indicate exceedance of the short-term criterion and long-term criterion.

SEQG – Saskatchewan Environmental Quality Guidelines – Water Quality Guidelines for Freshwater Aquatic Life.

CWQG – Canadian Council of Ministers of the Environment – Canadian Water Quality Guidelines for the Protection of Aquatic Life.

SSWQO – Saskatchewan Surface Water Quality Objectives.

DOC – Dissolved organic carbon.

TDS – Total dissolved solids.

TKN – Total Kjeldahl Nitrogen.

TOC – Total organic carbon.

TSS – Total suspended solids.

Temperature - Maximum Weekly Average Temperature: Thermal additions to receiving waters should be such that the maximum weekly average temperature is not exceeded. Short-term Exposure to Extreme Temperature: Thermal additions to receiving waters should be such that the short-term exposures to maximum temperatures are not exceeded. Exposures should not be so lengthy or frequent as to adversely affect the important species.

pH of 7 and a temperature of 15°C were assumed to convert total ammonia to un-ionized ammonia in accordance with CCME (2002).

- (1) Long-term criterion for aluminum based on CCME/SEQG of 0.1 mg/L for dissolved aluminum when pH is greater than 6.5.
- (2) Total ammonia-N calculated from the total ammonia guideline for an average annual temperature of 15°C and a pH of 7.0, Un-ionized Ammonia from Table 1 of temperature and pH, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Ammonia (<https://ccme.ca/en/res/ammonia-en-canadian-water-quality-guidelines-for-the-protection-of-aquatic-life.pdf>).
- (3) Based on water hardness of >0 to <5.3 mg/L (Site-specific background hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6).
- (4) Based on water hardness >0 to <17 mg/L.
- (5) Guideline specific to Chromium VI for conservative comparison to baseline water quality
- (6) Based on hardness of 5.26 mg/L (Short-term equation is $(e^{(0.979123[\ln(\text{hardness})]-8.64497)}) * 1000$ (SEQG via AEP 1996b)
- (7) Federal Water Quality Guideline for Copper Biotic Ligand Model (BLM) Tool and User Manual, (Site-specific background hardness is 5.26 mg/L, DOC is 2.24 mg/L, pH is 6.61 (95th percentile of LA-5 and LA-6)
- (8) Short Term Guideline is based on dissolved manganese. Benchmark = $\exp(0.878[\ln(\text{hardness})] + 4.76)$ where the benchmark is expressed in dissolved manganese concentration (µg/L), and hardness is measured as CaCO₃ equivalents in mg/L. (Site-specific hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6).
- (9) Long-term guideline for manganese based on Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life - Manganese, Appendix B - Canadian Water Quality Guidelines Calculator (pH = 6.61, hardness = 5.26 mg/L).

- (10) Framework provides Trigger Ranges for Total Phosphorus ($\mu\text{g/L}$) - guideline for oligotrophic waterbody 4 - 10 $\mu\text{g/L}$
- (11) MDMER Schedule 4 - maximum authorized monthly mean concentration
- (12) Guideline is based on dissolved zinc.
- (13) Short term guideline is based on Benchmark = $\exp(0.833[\ln(\text{hardness mg-L}^{-1})] + 0.240[\ln(\text{DOC mg-L}^{-1})] + 0.526)$. (Site-specific background hardness is 5.26 mg/L, DOC is 2.24 mg/L, pH is 6.61 (95th percentile of LA-5 and LA-6). Note – extrapolated for value outside the hardness range.
- (14) Long term guideline is based on CWQG = $\exp(0.947[\ln(\text{hardness mg-L}^{-1})] - 0.815[\text{pH}] + 0.398[\ln(\text{DOC mg-L}^{-1})] + 4.625)$. (Site-specific background hardness is 5.26 mg/L, DOC is 2.24 mg/L, pH is 6.61 (95th percentile of LA-5 and LA-6). Note – extrapolated for value outside the hardness range.

Table 8.2-3: Baseline Surface Water Quality in Local Study Area Watercourses

| Parameter | Units | Short-term Benchmark | | | Long-term Benchmark | | | Icelander River (SA-1) | | | SA-2 | | | SA-3 | |
|---------------------|-------|----------------------|-----------|-------|---------------------|-----------|-------|------------------------|----------|-----------|----------|---------------|-----------------|----------|----------|
| | | Value | Reference | Notes | Value | Reference | Notes | Min | Max | Mean | Min | Max | Mean | Min | Max |
| Alkalinity | mg/L | | | | | | | 2 | 13 | 5.5 | 2 | 11 | 6.75 | 1 | 23 |
| Aluminum | mg/L | | | | 0.1 | SEQG/CCME | (1) | 0.0022 | 0.0056 | 0.0037 | 0.0039 | 0.081 | 0.015 | 0.0013 | 0.006 |
| Ammonia as N | mg/L | | | | 5.74 | SEQG/CCME | (2) | <0.01 | 0.04 | 0.014 | <0.01 | 0.04 | 0.01375 | <0.01 | 0.04 |
| Ammonia, *unionized | mg/L | | | | 0.019 | SEQG/CCME | | 1.84E-05 | 7.36E-05 | 2.576E-05 | 1.84E-05 | 7.36E-05 | 2.53E-05 | 1.84E-05 | 7.36E-05 |
| Antimony | mg/L | | | | | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Arsenic | mg/L | | | | 0.005 | SEQG/CCME | | <0.0001 | <0.0001 | <0.0001 | 0.0001 | 0.0001 | <0.0001 | 0.0001 | 0.0001 |
| Barium | mg/L | | | | | | | 0.0022 | 0.0035 | 0.00267 | 0.0019 | 0.0041 | 0.0026625 | 0.0025 | 0.004 |
| Beryllium | mg/L | | | | | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Bicarbonate | mg/L | | | | | | | 2 | 16 | 6.7 | 2 | 13 | 8.125 | 1 | 28 |
| Boron | mg/L | 29 | CCME | | 1.5 | SEQG/CCME | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Cadmium | mg/L | 0.00011 | SEQG/CCME | (3) | 0.00004 | SEQG/CCME | | <1.0E-05 | 0.00002 | 0.000012 | <1.0E-05 | 0.00002 | 0.0000125 | 1.00E-05 | 0.00002 |
| Calcium | mg/L | | | | | | | 1.3 | 1.7 | 1.4 | 1.2 | 1.7 | 1.3375 | 1.5 | 1.9 |
| Carbonate | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Chloride | mg/L | 640 | SEQG/CCME | (4) | 120 | SEQG/CCME | | 0.4 | 0.6 | 0.45 | 0.2 | 0.4 | 0.3125 | 0.5 | 0.7 |
| Chromium | mg/L | | | | 0.001 | SEQG/CCME | (5) | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Cobalt | mg/L | | | | 0.00078 | FEQG | (15) | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Copper | mg/L | 0.0009 | SEQG | (6) | 0.0002 | FEQG | (7) | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0008 | 0.000275 | <0.0002 | <0.0002 |
| DOC | mg/L | | | | | | | 1.7 | 2.4 | 2.13 | 1.9 | 2.5 | 2.225 | 1.7 | 2.6 |
| Fluoride | mg/L | | | | | | | 0.01 | 0.07 | 0.026 | 0.01 | 0.03 | 0.01625 | <0.01 | 0.07 |
| Hardness | mg/L | | | | | | | 5 | 6 | 5.3 | 4 | 6 | 4.75 | 5 | 7 |
| Hydroxide | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Iron | mg/L | | | | 0.3 | SEQG/CCME | | 0.031 | 0.31 | 0.1215 | 0.041 | 0.11 | 0.073875 | 0.036 | 0.13 |
| Lead | mg/L | | | | 0.001 | SEQG/CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0003 | 0.000125 | <0.0001 | <0.0001 |
| Lead-210 | Bq/L | | | | 0.2 | HC | | <0.02 | <0.02 | <0.02 | <0.02 | 0.05 | 0.02375 | <0.02 | 0.03 |
| Magnesium | mg/L | | | | | | | 0.3 | 0.7 | 0.43 | 0.3 | 0.6 | 0.375 | 0.4 | 0.5 |
| Manganese | mg/L | 0.501 | CCME | (8) | 0.21 | SEQG/CCME | (9) | 0.0041 | 0.025 | 0.01467 | 0.0044 | 0.017 | 0.010325 | 0.0066 | 0.023 |
| Mercury | mg/L | | | | 0.000026 | CCME | | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 |
| Molybdenum | mg/L | | | | 0.07 | CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Nickel | mg/L | | | | 0.025 | CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |

| Parameter | Units | Short-term Benchmark | | | Long-term Benchmark | | | Icelander River (SA-1) | | | SA-2 | | | SA-3 | |
|--------------|-------|----------------------|------------------|----------|---------------------|-----------|-------|------------------------|----------|-----------|----------|----------|----------|-------------|----------|
| | | Value | Reference | Notes | Value | Reference | Notes | Min | Max | Mean | Min | Max | Mean | Min | Max |
| Nitrate | mg/L | 550 | CCME | | 3.0 | SEQG | | <0.04 | 0.26 | 0.0714286 | <0.04 | 0.31 | 0.094 | <0.04 | 0.26 |
| pH | units | | | | 6.5-9.0 | SEQG/CCME | | 6.34 | 6.99 | 6.75 | 6.58 | 7.01 | 6.78 | 6.42 | 7.02 |
| Phosphorus | mg/L | | | | 0.004 - 0.01 | CCME | (10) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Polonium-210 | Bq/L | | | | 0.1 | HC | | <0.005 | 0.01 | 0.0054999 | <0.005 | <0.005 | <0.005 | <0.005 | 0.01 |
| Potassium | mg/L | | | | | | | 0.2 | 0.5 | 0.36 | 0.1 | 0.4 | 0.3375 | 0.3 | 0.5 |
| Radium-226 | Bq/L | | | | 0.11 | SEQG | | <0.005 | 0.009 | 0.0061 | <0.005 | 0.01 | 0.006125 | <0.005 | 0.01 |
| Selenium | mg/L | | | | 0.001 | CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Silver | mg/L | | | | 0.25 | CCME | | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Sodium | mg/L | | | | | | | 1.4 | 1.7 | 1.53 | 1.2 | 1.8 | 1.45 | 1.4 | 1.8 |
| Conductivity | µS/cm | | | | | | | 16 | 22 | 18.2 | 14 | 22 | 17 | 18 | 24 |
| Strontium | mg/L | | | | 2.5 | FEQG | | 0.011 | 0.015 | 0.0127 | 0.011 | 0.015 | 0.012125 | 0.013 | 0.018 |
| Sulphate | mg/L | | | | 128 | BC MOE | | 0.4 | 0.9 | 0.71 | <0.2 | 0.7 | 0.5875 | 0.4 | 0.8 |
| Sum of Ions | | | | | | | | 6 | 22 | 11.5 | 6 | 19 | 12.5 | 6 | 33 |
| Temperature | | Narrative | CCME | | Narrative | CCME | | 10.8 | 12.5 | 14.0 | 9.8 | 13.1 | 15.5 | 11.6 | 17.7 |
| Thallium | mg/L | | | | 0.0008 | SEQG/CCME | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Thorium-228 | Bq/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-230 | Bq/L | | | | 0.6 | HC | | <0.01 | <0.01 | <0.01 | <0.01 | 0.02 | 0.01125 | <0.01 | <0.01 |
| Thorium-232 | Bq/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tin | mg/L | | | | | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Titanium | mg/L | | | | | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0015 | 0.000375 | <0.0002 | <0.0002 |
| TDS | mg/L | | | | | | | 18 | 25 | 21.7 | 13 | 30 | 21.25 | 17 | 26 |
| TKN | mg/L | | | | | | | 0.11 | 0.3 | 0.241 | <0.05 | 0.31 | <0.195 | 0.13 | 0.3 |
| TOC | mg/L | | | | | | | 1.8 | 2.6 | 2.25 | 2.1 | 2.4 | 2.2875 | 1.8 | 2.6 |
| TSS | mg/L | 15 | MDMER Schedule 4 | (11) | background + 5 mg/L | CCME | | <1 | 3 | 2.2 | 1 | 3 | 1.5 | <1 | 2 |
| Uranium | mg/L | 0.033 | CCME | | 0.015 | SEQG/CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Vanadium | mg/L | | | | 0.12 | FEQG | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Zinc | mg/L | 0.008 | CCME | (12)(13) | 0.013 | CCME | (14) | <0.0005 | 0.0028 | 0.00074 | <0.0005 | 0.0096 | 0.001675 | <0.0005 | 0.0011 |

Table 8.2-3 (Continued)

| Parameter | Units | Short-term Benchmark | | | Long-term Benchmark | | | SA-4 | | | SA-5 | | | SA-6 | |
|---------------------|-------|----------------------|-----------|-------|---------------------|-----------|-------|----------|----------|-----------|----------|----------------|-----------|----------|----------|
| | | Value | Reference | Notes | Value | Reference | Notes | Min | Max | Mean | Min | Max | Mean | Min | Max |
| Alkalinity | mg/L | | | | | | | 2 | 15 | 7.5 | 2 | 8 | 5.2 | 3 | 13 |
| Aluminum | mg/L | | | | 0.1 | SEQG/CCME | (1) | 0.0025 | 0.0099 | 0.0053 | 0.004 | 0.014 | 0.0065 | 0.0032 | 0.02 |
| Ammonia as N | mg/L | | | | 6.98 | SEQG/CCME | (2) | <0.01 | 0.05 | 0.015 | <0.01 | 0.05 | 0.01444 | <0.01 | 0.04 |
| Ammonia, *unionized | ug/L | | | | 0.019 | SEQG/CCME | | 1.84E-05 | 9.2E-05 | 2.76E-05 | 1.84E-05 | 9.2E-05 | 2.657E-05 | 1.84E-05 | 7.36E-05 |
| Antimony | mg/L | | | | | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Arsenic | mg/L | | | | 0.005 | SEQG/CCME | | 0.0001 | 0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | 0.0001 | 0.0001 |
| Barium | mg/L | | | | | | | 0.0021 | 0.0032 | 0.0025625 | 0.0021 | 0.0031 | 0.0025556 | 0.0023 | 0.0032 |
| Beryllium | mg/L | | | | | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Bicarbonate | mg/L | | | | | | | 2 | 18 | 9.125 | 2 | 10 | 6.2222 | 4 | 16 |
| Boron | mg/L | 29 | CCME | | 1.5 | SEQG/CCME | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Cadmium | mg/L | 0.00011 | SEQG/CCME | (3) | 0.00004 | SEQG/CCME | | 1.00E-05 | 0.00007 | 0.0000175 | 1.00E-05 | 0.00004 | 1.44E-05 | 1.00E-05 | 0.00005 |
| Calcium | mg/L | | | | | | | 1.3 | 2 | 1.5625 | 1.2 | 1.4 | 1.2444 | 1.2 | 1.8 |
| Carbonate | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Chloride | mg/L | 640 | SEQG/CCME | (4) | 120 | SEQG/CCME | | 0.4 | 0.6 | 0.45 | 0.2 | 0.3 | 0.23333 | 0.3 | 0.5 |
| Chromium | mg/L | | | | 0.001 | SEQG/CCME | (5) | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Cobalt | mg/L | | | | 0.00078 | FEQG | (15) | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Copper | mg/L | 0.0009 | SEQG | (6) | 0.0002 | FEQG | (7) | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| DOC | mg/L | | | | | | | 2 | 2.4 | 2.275 | 1.8 | 2.5 | 2.2667 | 1.9 | 2.5 |
| Fluoride | mg/L | | | | | | | 0.01 | 0.07 | 0.02625 | 0.01 | 0.08 | 0.0233 | <0.01 | 0.07 |
| Hardness | mg/L | | | | | | | 5 | 7 | 5.625 | 4 | 5 | 4.56 | 4 | 6 |
| Hydroxide | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Iron | mg/L | | | | 0.3 | SEQG/CCME | | 0.034 | 0.13 | 0.077375 | 0.03 | 0.11 | 0.071222 | 0.036 | 0.16 |
| Lead | mg/L | | | | 0.001 | SEQG/CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Lead-210 | Bq/L | | | | 0.2 | HC | | <0.02 | 0.03 | 0.02125 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Magnesium | mg/L | | | | | | | 0.4 | 0.6 | 0.4375 | 0.2 | 0.4 | 0.33333 | 0.3 | 0.5 |
| Manganese | mg/L | 0.501 | CCME | (8) | 0.21 | SEQG/CCME | (9) | 0.0029 | 0.019 | 0.010625 | 0.0025 | 0.018 | 0.0083333 | 0.0037 | 0.029 |
| Mercury | mg/L | | | | 0.000026 | CCME | | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 |
| Molybdenum | mg/L | | | | 0.07 | WHO | | <0.0001 | 0.0002 | 0.00011 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Nickel | mg/L | | | | 0.025 | CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |

| Parameter | Units | Short-term Benchmark | | | Long-term Benchmark | | | SA-4 | | | SA-5 | | | SA-6 | |
|--------------|-------|----------------------|------------------|----------|---------------------|-----------|-------|----------|----------|-----------|-------------|----------|-----------|-------------|----------|
| | | Value | Reference | Notes | Value | Reference | Notes | Min | Max | Mean | Min | Max | Mean | Min | Max |
| Nitrate | mg/L | 550 | CCME | | 3.0 | SEQG | | <0.04 | 0.35 | 0.112 | <0.04 | 0.31 | 0.093 | <0.04 | 0.35 |
| pH | units | | | | 6.5-9.0 | SEQG/CCME | | 6.58 | 7.16 | 6.85 | 6.17 | 6.97 | 6.72 | 6.48 | 7.07 |
| Phosphorus | mg/L | | | | 0.004 - 0.01 | CCME | (10) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Polonium-210 | Bq/L | | | | 0.1 | HC | | <0.005 | 0.007 | 0.0052 | <0.005 | <0.005 | <0.005 | <0.005 | 0.006 |
| Potassium | mg/L | | | | | | | 0.2 | 0.6 | 0.375 | 0.2 | 0.4 | 0.32222 | 0.2 | 0.4 |
| Radium-226 | Bq/L | | | | 0.11 | SEQG | | <0.005 | 0.009 | 0.00625 | <0.005 | 0.007 | 0.00544 | <0.005 | <0.005 |
| Selenium | mg/L | | | | 0.001 | CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Silver | mg/L | | | | 0.25 | CCME | | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Sodium | mg/L | | | | | | | 1.4 | 2.1 | 1.63 | 1.3 | 1.6 | 1.41 | 1.3 | 1.9 |
| Conductivity | µS/cm | | | | | | | 17 | 25 | 19.375 | 14 | 20 | 16.111 | 14 | 23 |
| Strontium | mg/L | | | | 2.5 | FEQG | | 0.012 | 0.018 | 0.0141 | 0.011 | 0.013 | 0.0113 | 0.011 | 0.016 |
| Sulphate | mg/L | | | | 128 | BC MOE | | 0.4 | 0.7 | 0.525 | 0.4 | 0.8 | 0.63333 | 0.3 | 0.8 |
| Sum of Ions | | | | | | | | 7 | 25 | 14.125 | 6 | 14 | 10.667 | 8 | 22 |
| Temperature | | Narrative | CCME | | Narrative | CCME | | 10.8 | 12.5 | 14 | 9.8 | 13.1 | 15.5 | 11.6 | 17.7 |
| Thallium | mg/L | | | | 0.0008 | SEQG/CCME | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Thorium-228 | Bq/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-230 | Bq/L | | | | 0.6 | HC | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-232 | Bq/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tin | mg/L | | | | | | | <0.0001 | 0.0002 | 0.0001125 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Titanium | mg/L | | | | | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0003 |
| TDS | mg/L | | | | | | | 21 | 32 | 25 | 13 | 28 | 20 | 15 | 28 |
| TKN | mg/L | | | | | | | 0.13 | 0.3 | 0.215 | 0.11 | 0.29 | 0.213 | 0.15 | 0.41 |
| TOC | mg/L | | | | | | | 2 | 2.6 | 2.325 | 1.9 | 2.7 | 2.3111 | 1.9 | 2.6 |
| TSS | mg/L | 15 | MDMER Schedule 4 | (11) | background + 5 mg/L | CCME | | 1 | 3 | 2 | <1 | 3 | 1.89 | 1 | 6 |
| Uranium | mg/L | 0.033 | CCME | | 0.015 | SEQG/CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Vanadium | mg/L | | | | 0.12 | FEQG | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Zinc | mg/L | 0.008 | CCME | (12)(13) | 0.013 | CCME | (14) | <0.0005 | 0.0012 | 0.0006 | <0.0005 | 0.0017 | 0.0007445 | <0.0005 | 0.0006 |

Table 8.2-3 (Continued)

| Parameter | Units | Short-term Benchmark | | | Long-term Benchmark | | | SB-3 | | | SB-5 | | |
|---------------------|-------|----------------------|-----------|-------|---------------------|-----------|-------|----------|----------|-----------|----------|----------------|-----------|
| | | Value | Reference | Notes | Value | Reference | Notes | Min | Max | Mean | Min | Max | Mean |
| Alkalinity | mg/L | | | | | | | <1 | 24 | <6.7778 | 3 | 13 | 7.375 |
| Aluminum | mg/L | | | | 0.1 | SEQG/CCME | (1) | 0.0052 | 0.012 | 0.0089 | 0.0016 | 0.0086 | 0.0054 |
| Ammonia as N | mg/L | | | | 5.74 | SEQG/CCME | (2) | <0.01 | 0.04 | 0.01333 | <0.01 | 0.04 | 0.0138 |
| Ammonia, *unionized | ug/L | | | | 6.98 | SEQG/CCME | (2) | 1.84E-05 | 7.36E-05 | 2.453E-05 | 1.84E-05 | 7.36E-05 | 2.539E-05 |
| Antimony | mg/L | | | | | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Arsenic | mg/L | | | | 0.005 | SEQG/CCME | | <0.0001 | <0.0001 | <0.0001 | 0.0001 | 0.0001 | <0.0001 |
| Barium | mg/L | | | | | | | 0.0025 | 0.0041 | 0.0031111 | 0.0026 | 0.004 | 0.0030625 |
| Beryllium | mg/L | | | | | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Bicarbonate | mg/L | | | | | | | <1 | 29 | <8.3333 | 4 | 16 | 9 |
| Boron | mg/L | 29 | CCME | | 1.5 | SEQG/CCME | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Cadmium | mg/L | 0.00011 | SEQG/CCME | (3) | 0.00004 | SEQG/CCME | | <1.0E-05 | 0.00002 | 1.11E-05 | <1.0E-05 | 0.00004 | 0.000016 |
| Calcium | mg/L | | | | | | | 1.1 | 1.7 | 1.3778 | 1.2 | 1.7 | 1.3625 |
| Carbonate | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 |
| Chloride | mg/L | 640 | SEQG/CCME | (4) | 120 | SEQG/CCME | | 0.1 | 0.2 | 0.17778 | <0.1 | 0.2 | <0.175 |
| Chromium | mg/L | | | | 0.001 | SEQG/CCME | (5) | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Cobalt | mg/L | | | | 0.00078 | FEQG | (15) | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Copper | mg/L | 0.0009 | SEQG | (6) | 0.0002 | FEQG | (7) | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| DOC | mg/L | | | | | | | 2.2 | 3.4 | 3.0222 | 2.6 | 3.2 | 2.975 |
| Fluoride | mg/L | | | | | | | 0.01 | 0.07 | 0.023333 | 0.01 | 0.07 | 0.02375 |
| Hardness | mg/L | | | | | | | 4 | 6 | 5.11 | 4 | 6 | 4.88 |
| Hydroxide | mg/L | | | | | | | <1 | <1 | <1 | <1 | <1 | <1 |
| Iron | mg/L | | | | 0.3 | SEQG/CCME | | 0.042 | 0.22 | 0.095111 | 0.036 | 0.16 | 0.098375 |
| Lead | mg/L | | | | 0.001 | SEQG/CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Lead-210 | Bq/L | | | | 0.2 | HC | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Magnesium | mg/L | | | | | | | 0.3 | 0.5 | 0.38889 | 0.2 | 0.5 | 0.375 |
| Manganese | mg/L | 0.501 | CCME | (8) | 0.21 | SEQG/CCME | (9) | 0.0053 | 0.02 | 0.010633 | 0.0071 | 0.016 | 0.010325 |
| Mercury | mg/L | | | | 0.000026 | CCME | | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 | <1.0E-05 |
| Molybdenum | mg/L | | | | 0.07 | WHO | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Nickel | mg/L | | | | 0.025 | CCME | | 0.0001 | 0.0002 | 0.00011 | <0.0001 | <0.0001 | <0.0001 |

| Parameter | Units | Short-term Benchmark | | | Long-term Benchmark | | | SB-3 | | | SB-5 | | |
|--------------|-------|----------------------|------------------|----------|---------------------|-----------|-------|-------------|----------|----------|-------------|----------|----------|
| | | Value | Reference | Notes | Value | Reference | Notes | Min | Max | Mean | Min | Max | Mean |
| Nitrate | mg/L | 550 | CCME | | 3.0 | SEQG | | <0.04 | 0.4 | 0.115 | <0.04 | 0.4 | 0.13 |
| pH | units | | | | 6.5-9.0 | SEQG/CCME | | 6.18 | 6.99 | 6.70 | 6.47 | 6.99 | 6.73 |
| Phosphorus | mg/L | | | | 0.004 - 0.01 | CCME | (10) | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Polonium-210 | Bq/L | | | | 0.1 | HC | | <0.005 | 0.008 | 0.0058 | <0.005 | <0.005 | <0.005 |
| Potassium | mg/L | | | | | | | 0.2 | 0.5 | 0.33333 | 0.2 | 0.5 | 0.3625 |
| Radium-226 | Bq/L | | | | 0.11 | SEQG | | <0.005 | 0.01 | 0.0059 | <0.005 | 0.006 | 0.0051 |
| Selenium | mg/L | | | | 0.001 | CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Silver | mg/L | | | | 0.25 | CCME | | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Sodium | mg/L | | | | | | | 1.2 | 1.7 | 1.4 | 1.3 | 1.7 | 1.44 |
| Conductivity | µS/cm | | | | | | | 15 | 22 | 16.778 | 15 | 23 | 17.25 |
| Strontium | mg/L | | | | 2.5 | FEQG | | 0.011 | 0.015 | 0.0124 | 0.011 | 0.015 | 0.0119 |
| Sulphate | mg/L | | | | 128 | BC MOE | | 0.3 | 0.9 | 0.68889 | 0.5 | 1 | 0.725 |
| Sum of Ions | | | | | | | | 4 | 34 | 12.667 | 8 | 22 | 13.375 |
| Temperature | | Narrative | CCME | | Narrative | CCME | | 10.6 | 14 | 12.8 | 9.9 | 16.2 | 14.4 |
| Thallium | mg/L | | | | 0.0008 | SEQG/CCME | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| Thorium-228 | Bq/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-230 | Bq/L | | | | 0.6 | HC | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Thorium-232 | Bq/L | | | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tin | mg/L | | | | | | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Titanium | mg/L | | | | | | | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| TDS | mg/L | | | | | | | 14 | 26 | 20.556 | 16 | 26 | 20.125 |
| TKN | mg/L | | | | | | | 0.16 | 0.34 | 0.256 | 0.18 | 0.33 | 0.27 |
| TOC | mg/L | | | | | | | 2.4 | 3.6 | 3.1111 | 2.7 | 3.2 | 3 |
| TSS | mg/L | 15 | MDMER Schedule 4 | (11) | background + 5 mg/L | CCME | | <1 | 4 | 2.56 | <1 | 3 | 1.875 |
| Uranium | mg/L | 0.033 | CCME | | 0.015 | SEQG/CCME | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Vanadium | mg/L | | | | 0.12 | FEQG | | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 | <0.0001 |
| Zinc | mg/L | 0.008 | CCME | (12)(13) | 0.013 | CCME | (14) | <0.0005 | 0.0012 | 0.00059 | <0.0005 | 0.0016 | 0.00065 |

Notes

All parameters listed as total concentrations unless otherwise specified.

Saskatchewan Water Quality Objectives, SEQG on-line (<https://envrbrportal.crm.saskatchewan.ca/seqg-search/>), SEQG for the protection of aquatic life were selected, based on total concentrations.

Bold numbers indicate exceedance of a long-term criterion.

Bold and italicized indicate exceedance of the short-term criterion and long-term criterion.

SEQG – Saskatchewan Environmental Quality Guidelines – Water Quality Guidelines for Freshwater Aquatic Life.

CWQG – Canadian Council of Ministers of the Environment – Canadian Water Quality Guidelines for the Protection of Aquatic Life.

SSWQO – Saskatchewan Surface Water Quality Objectives.

DOC – Dissolved organic carbon.

TDS – Total dissolved solids.

TKN – Total Kjeldahl Nitrogen.

TOC – Total organic carbon.

TSS – Total suspended solids.

Temperature - Maximum Weekly Average Temperature: Thermal additions to receiving waters should be such that the maximum weekly average temperature is not exceeded. Short-term Exposure to Extreme Temperature: Thermal additions to receiving waters should be such that the short-term exposures to maximum temperatures are not exceeded. Exposures should not be so lengthy or frequent as to adversely affect the important species.

A pH of 7 and a temperature of 15°C were assumed to convert total ammonia to un-ionized ammonia in accordance with CCME (2002).

- (1) Long-term criterion for aluminum based on CCME/SEQG of 0.1 mg/L for dissolved aluminum when pH is greater than 6.5.
- (2) Total ammonia-N calculated from the total ammonia guideline for an average annual temperature of 15°C and a pH of 7.0, Un-ionized Ammonia from Table 1 of temperature and pH, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Ammonia (<https://ccme.ca/en/res/ammonia-en-canadian-water-quality-guidelines-for-the-protection-of-aquatic-life.pdf>).
- (3) Based on water hardness of >0 to <5.3 mg/L (Site-specific background hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6).
- (4) Based on water hardness >0 to <17 mg/L.
- (5) Guideline specific to Chromium VI for conservative comparison to baseline water quality
- (6) Based on hardness of 5.26 mg/L (Short-term equation is $(e^{(0.979123[\ln(\text{hardness})]-8.64497)}) \times 1000$ (SEQG via AEP 1996b)
- (7) Federal Water Quality Guideline for Copper Biotic Ligand Model (BLM) Tool and User Manual, (Site-specific background hardness is 5.26 mg/L, DOC is 2.24 mg/L, pH is 6.61 (95th percentile of LA-5 and LA-6)
- (8) Short Term Guideline is based on dissolved manganese. Benchmark = $\exp(0.878[\ln(\text{hardness})] + 4.76)$ where the benchmark is expressed in dissolved manganese concentration (µg/L), and hardness is measured as CaCO₃ equivalents in mg/L. (Site-specific hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6).
- (9) Long-term guideline for manganese based on Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life - Manganese, Appendix B - Canadian Water Quality Guidelines Calculator (pH = 6.61, hardness = 5.26 mg/L).

- (10) Framework provides Trigger Ranges for Total Phosphorus ($\mu\text{g/L}$) - guideline for oligotrophic waterbody 4 - 10 $\mu\text{g/L}$
- (11) MDMER Schedule 4 - maximum authorized monthly mean concentration
- (12) Guideline is based on dissolved zinc.
- (13) Short term guideline is based on Benchmark = $\exp(0.833[\ln(\text{hardness mg}\cdot\text{L}^{-1})] + 0.240[\ln(\text{DOC mg}\cdot\text{L}^{-1})] + 0.526)$. (Site-specific background hardness is 5.26 mg/L, DOC is 2.24 mg/L, pH is 6.61 (95th percentile of LA-5 and LA-6). Note – extrapolated for value outside the hardness range.
- (14) Long term guideline is based on CWQG = $\exp(0.947[\ln(\text{hardness mg}\cdot\text{L}^{-1})] - 0.815[\text{pH}] + 0.398[\ln(\text{DOC mg}\cdot\text{L}^{-1})] + 4.625)$. (Site-specific background hardness is 5.26 mg/L, DOC is 2.24 mg/L, pH is 6.61 (95th percentile of LA-5 and LA-6). Note – extrapolated for value outside the hardness range.
- (15) Environment Canada 2017. Federal Environmental Quality Guidelines, Cobalt, May. Based on equation and lowest hardness for equation of 52 mg/L.

- Department: ECCC
- Project Effects Link: Change to an environmental component due to hazardous contaminants
- Reference to EIS, appendices, or supporting documentation: Section 8.2.4.1.1 Aquatic Environment Appendix 8-E, Section 2.1

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, June 26, 2024) |
|--------------|----------------|--|--|--|---|--|---|--|
| IR-110 | - | <p>Context: It is stated that the diffuser at the final effluent discharge point will be located in approximately 3m of water. However, in Figure 8.2-5 displaying the location of the proposed diffuser and lake bathymetry, the diffuser location seems to be located in 2-2.5m of water. A similar image in Figure 1 Section 2.0 of Appendix 8-E also indicates that the diffuser seems to be located in 2-2.5m of water. Additionally, while thermal effects are unlikely, this cannot be confirmed until a more detailed diffuser design is provided for review.</p> <p>Rationale: The Proponent should confirm the location and depth of the proposed diffuser in order to confirm that modelling predictions for effluent discharged into the receiving environment are accurate.</p> | <p>Provide confirmation of the diffuser depth and location.</p> <p>ECCC requests the opportunity to review the finalized diffuser design once it is available.</p> | <p>The diffuser will be placed at a depth between 2.5 and 3 m. The mapping provided in the draft EIS and Appendix 8-E is based on coarse bathymetric information, which will be supplemented with more robust bathymetric surveys to support final siting and design associated with permitting and licensing.</p> | <p>This response has not been accepted.</p> <p>ECCC requests confirmation that the finalized diffuser design will be available for review once it is completed as reviewing it will be necessary to confirm the location and depth of the proposed diffuser and modelling predictions for effluent discharged into the receiving environment.</p> | <p>It is noted that basic design criteria (e.g., depth, location, port configuration) have been provided in the Draft EIS (Section 8.2) and Appendix 8-E on which modeling was based. While some minor adjustments may be made during preparation of the final diffuser engineering design, the level of mixing predicted in the assessment will be maintained (minimally). The final designs will follow standard engineering practice and be stamped and signed by a professional engineer.</p> <p>As for Denison’s understanding of the regulatory process, the finalized diffuser design information will be included in Denison's license to operate application that will be submitted to the CNSC. Such information will also be provided to the province as part of the provincial approvals process. Should CNSC, or the province, choose to provide this information to ECCC that is their discretion, but Denison doesn’t believe it is within their purview (or appropriate) to make commitments on behalf of others, nor act outside the normal licensing/ approvals processes.</p> | <p>This IR is conditionally accepted. As Denison is unable to provide the finalized diffuser design, a commitment should be captured in the Commitments Register that the final diffuser configuration will not change the environmental assessment conclusions of risk to aquatic receptors and that water quality will remain below guidelines.</p> <p>Once Denison has added a commitment that the final diffuser design will not change the environmental assessment conclusions of risk to aquatic receptors and that water quality will remain below guidelines to the Commitments Register, this can be accepted.</p> <p>Note, if there are deviations from predicted effluent and near-field surface water concentrations of COPCs and risk to aquatic receptors due to the finalized diffuser design, this would be addressed through Denison identifying and implementing mitigation measures (e.g., treatment) to ensure that the environmental assessment conclusions of risk to aquatic receptors will not change and that water quality will remain below guidelines.</p> <p>Proposed rationale text for posting: Denison has captured a commitment in the Commitments Register that the final diffuser configuration will not change the environmental assessment conclusions of risk to aquatic receptors and that water quality will remain below guidelines, so this IR has been accepted.</p> <p>Any outstanding issues will be further assessed as part of licensing technical reviews, prior to the granting of a license.</p> | <p>Commitment 8-9 has been updated in Version 2 of the Commitments Register (additions shows in bold):</p> <p>“The exact diffuser design configuration will be optimized as required during the engineering design and permitting phase to facilitate optimal performance of the diffuser specific to site conditions. The final diffuser configuration will not change the environmental assessment conclusions of risk to aquatic receptors and that water quality will remain at or below guidelines.”</p> |

- Department: ECCC
- Project Effects Link: Change to an environmental component due to hazardous contaminants
- Reference to EIS, appendices, or supporting documentation: Section 8.2.4.2.3 and Section 8.4.7.6, Aquatic Environment

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, June 28, 2024) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------|-------------------|---|---|---|-----------------------------|---------------------------------------|----------------------------|---|--|--------------------|--|--|--|--|----------|---------|---------|---------|----------|---------|---------|---------|-----------|-----|-----|-----|-----|----|----|----|----|------|--|-----|-----|-----|--|----|----|----|------|--|-----|-----|-----|--|----|----|----|------|--|-----|-----|-----|--|----|----|----|------|--|-----|-----|-----|--|----|----|----|------|--|-----|-----|-----|--|----|----|----|------|--|-----|-----|-----|--|----|----|----|------|--|-----|-----|-----|--|----|----|----|------|--|-----|-----|-----|--|----|----|----|-------------------|--|----|----|----|--|----|----|---|--|--|---|---|
| IR-113 | - | <p>Context: No quantitative assessment of climate change has been conducted. Representative concentration pathways (RPC) projections for climate change have not been integrated with near- and far-field modelling to assess impacts to surface water quality or sediment quality in the future.</p> <p>Rationale: Changes in air and water temperatures, precipitation, snow melt, ice formation, etc., due to climate change can all influence COPC concentrations in surface water and sediment. It is not possible to assess the potential impacts from climate change on predicted surface water and sediment COPC concentrations with the current information.</p> | Provide a quantitative analysis of the potential impacts of predicted COPCs from mine effluent to surface water and sediment quality with climate change scenarios for the Project lifespan incorporated into modelling. Include modelling predictions regarding the influence of changes to air and water temperatures, precipitation, snow melt, ice formation, etc., on COPC concentrations in surface water and sediment. | <p>Section 8.1.3.4 (and Appendix 8-C) provides a quantitative assessment of the potential changes in surface water quantity due to climate change. The 1:100 year, 24-hour return period rainfall events for the baseline and climate change influenced IDF curves are 79.9 mm and 88.6 mm, respectively. The PMP for the Project is estimated to be 493 mm (refer to IR-15 and AD-15) which is well above both 24-hour maximum precipitation and 1:100, 24 hour return precipitation events. The PMP is very conservative (e.g., assumes effectively a full year of precipitation in one event) under both existing and future conditions (climate change). The potential impacts of climate change to precipitation and therefore flows was summarized in Appendix 6-C, Table 10 with the total annual precipitation and the maximum 1-day events being variable over the next four decades (Table 1). Regardless, the climate change scenario indicates a potential increase in event based assimilative capacity in the receiving environment.</p> <p>TABLE 1- Existing and Predicted Precipitation Data for Key Lake (provided in EIS, Appendix 6-C, Table 10)</p> <table><tr><th>Year</th><th colspan="4">Total Annual (mm)</th><th colspan="4">Maximum 1-day (mm)</th></tr><tr><td></td><td>Measured</td><td>RCP 2.6</td><td>RCP 4.5</td><td>RCP 8.5</td><td>Measured</td><td>RCP 2.6</td><td>RCP 4.5</td><td>RCP 8.5</td></tr><tr><td>2011-2020</td><td>455</td><td>518</td><td>509</td><td>508</td><td>48</td><td>29</td><td>27</td><td>27</td></tr><tr><td>2030</td><td></td><td>528</td><td>503</td><td>537</td><td></td><td>27</td><td>24</td><td>26</td></tr><tr><td>2040</td><td></td><td>487</td><td>498</td><td>514</td><td></td><td>28</td><td>29</td><td>24</td></tr><tr><td>2050</td><td></td><td>504</td><td>524</td><td>520</td><td></td><td>26</td><td>29</td><td>33</td></tr><tr><td>2060</td><td></td><td>513</td><td>515</td><td>523</td><td></td><td>26</td><td>33</td><td>26</td></tr><tr><td>2070</td><td></td><td>527</td><td>534</td><td>568</td><td></td><td>29</td><td>31</td><td>28</td></tr><tr><td>2080</td><td></td><td>539</td><td>551</td><td>547</td><td></td><td>30</td><td>33</td><td>28</td></tr><tr><td>2090</td><td></td><td>543</td><td>545</td><td>548</td><td></td><td>31</td><td>32</td><td>35</td></tr><tr><td>2100</td><td></td><td>546</td><td>535</td><td>559</td><td></td><td>23</td><td>25</td><td>28</td></tr><tr><td colspan="2">Overall Increase:</td><td>28</td><td>26</td><td>51</td><td></td><td>-6</td><td>-2</td><td>1</td></tr></table> <p>To mitigate the potential for unplanned release of deleterious substances into the surface water environment even during the next 40 years of climate change, the PMP of 493 mm was used for water management engineering designs. During a PMP, water requiring management will report to the wellfield runoff pond which will be sized to accommodate a PMP event at the site. This pond has been sized to 38,200 m³ (excluding a freeboard of 1 meter). From the wellfield runoff pond, water will then be sent to the process water pond for treatment if required. In Section 2.8 Project Design Features, Denison notes that “Ponds will be designed to maintain a minimum freeboard of at least 1.0 m to allow for continued functioning during a probable maximum precipitation (PMP) event.” As such, the project has been designed to manage water during PMP and greater, and therefore mitigation of potential impacts to water quality due to climate change has been initially included as part of the EIS. As a result, it is Denison's opinion that a quantitative assessment of potential impacts to surface water quality is not warranted as it is likely to indicate improved results from the conservative assessment of potential water quality changes during operation and decommissioning phases. Continued monitoring of background, effluent and receiver water quality will be undertaken and provide the ability for adaptive management throughout the life of the mine in association with potential climatic changes to the local and regional area.</p> | Year | Total Annual (mm) | | | | Maximum 1-day (mm) | | | | | Measured | RCP 2.6 | RCP 4.5 | RCP 8.5 | Measured | RCP 2.6 | RCP 4.5 | RCP 8.5 | 2011-2020 | 455 | 518 | 509 | 508 | 48 | 29 | 27 | 27 | 2030 | | 528 | 503 | 537 | | 27 | 24 | 26 | 2040 | | 487 | 498 | 514 | | 28 | 29 | 24 | 2050 | | 504 | 524 | 520 | | 26 | 29 | 33 | 2060 | | 513 | 515 | 523 | | 26 | 33 | 26 | 2070 | | 527 | 534 | 568 | | 29 | 31 | 28 | 2080 | | 539 | 551 | 547 | | 30 | 33 | 28 | 2090 | | 543 | 545 | 548 | | 31 | 32 | 35 | 2100 | | 546 | 535 | 559 | | 23 | 25 | 28 | Overall Increase: | | 28 | 26 | 51 | | -6 | -2 | 1 | <p>This response has not been accepted.</p> <p>Based on the information provided it is not possible to assess the resiliency of the Project to potential adverse effects from climate change and potential impacts to surface water and sediment quality. The Proponent should review the guidance documents available on the Strategic Assessment of Climate Change (SACC) website with regards to climate change resilience and provide a quantitative analysis of the potential impacts of predicted COPCs from mine effluent to surface water and sediment quality with climate change scenarios for the Project lifespan incorporated into modelling.</p> <p>Include modelling predictions regarding the influence of changes to air and water temperatures, precipitation, lake levels, flow rates, etc., on COPC concentrations in surface water and sediment. The Proponent should refer to the SACC website for guidance on conducting this quantitative analysis.</p> <p>See also follow-up IR-113-R1.</p> | <p>Please refer to Attachment IR-113_IR-113-R1 for the response.</p> | <p>The Proponent has not adequately responded to the IR. The Proponent suggests that the requested quantitative analysis is not necessary and contends that potential climate change effects on water quality should instead be addressed through mitigation measures, monitoring and adaptive management.</p> <p>The Proponent’s approach does not sufficiently characterize the range of potential effluent and water quality predictions. Climate change analysis is lacking, and a sensitivity analysis was not conducted in order to further understand uncertainty and drivers of the model results. Further, some aspects of water quality modeling are not sufficiently conservative, including use of the geometric mean (instead of the 95th percentile) as the baseline concentration for constituents, and pooling data from all lakes, which would mask any differences between the lakes. It is therefore not known whether water quality exceedances may be predicted under climate change scenarios. Without estimating the potential influence of climate change on water quality, it is unclear whether the proposed water quality mitigation measures are adequate.</p> <p>The Proponent should conduct a sensitivity analysis on water quality predictions for low and high precipitation scenarios, including the potential influences of climate change to assist in fulfilling the IR from the previous round.</p> <p>This information is required to assess the potential for significant adverse effects to the environment. If additional baseline information is required, it should be sourced or otherwise collected.</p> | <p>Denison has considered climate change within the water quality / quantity analysis and based on that considered concluded that quantitative analysis was not warranted as it concerns determination of the significance of residual effects potentially associated with the Project. Denison disagrees that a quantitative climate change assessment is required at this time for the purposes of the EIS as highlighted above because:</p> <ul style="list-style-type: none">• The duration of the project (15 years) is short within the context of climate change thereby making it unlikely that large scale changes in precipitation and temperature will occur. As previously identified as part of IR-103 responses, an assessment of the potential high flow scenario under climate change has been included in the design criteria (i.e., the IDF). Therefore, water management, and the ability to contain water within site infrastructure as designed, mitigates potential water management issues associated with high flow scenarios.• Sufficient conservatism has been included in the water quality assessment, for instance:<ul style="list-style-type: none">◦ Average effluent rate of 36.5 m3/hr and continuous flow – this is an unlikely scenario. Denison intends to recycle process water to the greatest extent possible, thereby reducing the demand for fresh water supply and volume of treated effluent. In an effort to develop a conservative assessment basis for the EA, the water recycle flows from the industrial wastewater treatment plant back into the processing plant and wellfield <i>have not been incorporated</i> into the estimates for freshwater withdrawal and treated effluent discharge.◦ The water quality analysis was conducted for each of the low flow scenarios (i.e., 7Q10 low flow, monthly low flow, and monthly average flow) for the receiving water environment◦ Ninety-fifth percentile (95%) concentrations of constituents at baseline condition were used in modelling potential effects.• Future climate predictions for the general project area indicate an increase in precipitation and not a reduction, thereby increasing the potential assimilative capacity within the receiving environment.• The design basis PMP is robust and inclusive of projected total annual precipitation under a high carbon scenario. As previously identified as part of IR-103 responses, an assessment of the potential high flow scenario under climate change has been included in the design criteria (i.e., IDF). Contact water containment has been designed to ensure that water management infrastructure can contain high flow events (the IDF for non-contact water is based on 1:100 return, 24 hour using climate projections for 2020 to 2050).• Effluent discharge will be monitored as per the MDMER Schedules 4 and 5;• Low flow scenarios have been assessed under the near-field water quality model (i.e. 7Q10). Additionally, and under scenarios of low flow condition, discharge can be limited seasonally or periodically and specific to the assimilative capacity of the receiver (flow proportioned of fixed dilution discharge); and,• Adaptive management and adjustment to discharge timing and volume as needed over time to meet criteria based on climate induced changes in flow. <p>Despite these lines of evidence providing strong rationale for not needing the quantitative assessment, Denison suggests that a sensitivity analysis on water quality predictions for low and high precipitation scenarios, including the potential influences of climate change could be completed as part of operational licensing and as applicable to REGDOC-2.9.2 (Environmental</p> |
| Year | Total Annual (mm) | | | | Maximum 1-day (mm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Measured | RCP 2.6 | RCP 4.5 | RCP 8.5 | Measured | RCP 2.6 | RCP 4.5 | RCP 8.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2011-2020 | 455 | 518 | 509 | 508 | 48 | 29 | 27 | 27 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2030 | | 528 | 503 | 537 | | 27 | 24 | 26 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2040 | | 487 | 498 | 514 | | 28 | 29 | 24 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2050 | | 504 | 524 | 520 | | 26 | 29 | 33 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2060 | | 513 | 515 | 523 | | 26 | 33 | 26 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2070 | | 527 | 534 | 568 | | 29 | 31 | 28 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2080 | | 539 | 551 | 547 | | 30 | 33 | 28 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2090 | | 543 | 545 | 548 | | 31 | 32 | 35 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2100 | | 546 | 535 | 559 | | 23 | 25 | 28 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Overall Increase: | | 28 | 26 | 51 | | -6 | -2 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, June 28, 2024) |
|--------------|----------------|--|--------------------------|---|-----------------------------|---|--|--|
| | | | | | | | | <p>Protection: Controlling Releases to the Environment).</p> <p>This would be consistent with the approach of further analyses conducted as part of licensing and following the collection of additional water quality data to support such modelling. We remind the CSNC that treated mine effluent release does not occur until operational commissioning.</p> |
| IR-113 | IR-113 R1 | <p>Context: The Proponent states the following, “The PMP is very conservative (e.g., assumes effectively a full year of precipitation in one event) under both existing and future conditions (climate change)”. This statement suggests that the PMP value utilized considers future climate changes such as possible changes in the frequency or intensity of extreme precipitation events.</p> <p>Rationale: As noted by the Proponent, increases in extreme rainfall are anticipated with a warmer climate. For precipitation extremes across Canada, the relative change in event frequency is expected to be larger for more extreme and rarer events. Given that the extreme precipitation is expected to intensify in the future (Kunkel et al. 2013), the Proponent should consider how these potential changes will influence design values such as PMP.</p> | | | | <p>Please refer to Attachment IR-113_IR-113-R1 for this response.</p> | <p><i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> <p>The Proponent has not clarified if climate change has been considered in the PMP value provided or discussed how potential increases in PMP have been or need to be considered in the Project design.</p> <p>Thermodynamic effects on atmospheric moisture will lead to intensification of local extreme precipitation in the future. Probable maximum precipitation (PMP) is defined as the greatest accumulation of precipitation for a given duration meteorologically possible for an area (Kunkel et al., 2013). PMP values may increase with climate change.</p> <p>In the response to IR-113 R1, the Proponent states that “the design basis PMP is robust and inclusive of projected total annual precipitation under a high carbon scenario”. It is unclear from this statement how the analysis provided indicates that the PMP is inclusive of climate change.</p> <p>The Proponent should clarify how the analysis that they provided shows that the design PMP considers climate change, and indicate if or how the potential for increased PMP has informed site water management for the mine life and into post-closure and considered in the development of mitigation measures.</p> <p>Reference: Kunkel, K. E., Karl, T. R., Easterling, D. R., et al. 2013. Probable maximum precipitation and climate change. Geophysical Research Letters 40(7), 1402–1408. Available at: 10.1002/grl.50334</p> | <p>This IR has been accepted for the purposes of the current EA process. Denison agrees that a sensitivity analysis on water quality predictions for low and high precipitation scenarios, including the potential influences of climate change can be completed as part of licensing and as applicable to REGDOC-2.9.2 (Environmental Protection: Controlling Releases to the Environment).</p> |

ATTACHMENT IR-113_IR-113-R1 (included in Round 2 submission)

Denison's Response:

Prairie province hydrology is dominated by cold regions processes so that snowmelt is the primary hydrological event of the year for both the major rivers that derive from the Rocky Mountains and small streams and rivers that arise in Saskatchewan. Climate change impacts on water resources are therefore focused on changes to snow accumulation, snowmelt and infiltration to frozen soils. Climate change scenarios suggest generally warmer and wetter winters for Saskatchewan. Large scale hydrological models that take these scenarios into account suggest changes in the annual streamflow of the South Saskatchewan River ranging from an 8% increase to a 22% decrease, with an 8.5% decrease being an average prediction. Small scale hydrological models for prairie streams suggest a 24% increase in spring runoff by 2050 followed by a 37% decrease by 2080 as the winter snow cover becomes discontinuous. Both model results suggest that there is not a dramatic drying of the prairies to be anticipated under climate change and that in some cases streamflow will increase for certain scenarios and under moderate degrees of climate change. While prairie runoff should increase in the near term, as climate change progresses later in the 21st C there will be dramatic drops in runoff and the flow of small streams to wetlands and depressions and to small prairie rivers (Sauchyn et al 2009).

Changes in temp (warmest max temp) for the region was referenced from the Climate Atlas of Canada (https://climateatlas.ca/data/grid/782/maxmax_2030_45/line0) for the Tomblin Lake watershed.

The primary source of climate model data presented in their maps, charts and tables is the Pacific Climate Impacts Consortium (PCIC) . The PCIC has provided downscaled projections of daily temperature and precipitation data from 24 climate models using two carbon emission scenarios.

The Climate Atlas of Canada use PCIC's statistically downscaled data (Bias Correction with Constructed Analogues and Quantile mapping, Version 2; BCCAQv2) derived from 24 CMIP5 global climate models for two emissions scenarios (RCP4.5 and RCP8.5). The Climate Atlas of Canada call the RCP4.5 and RCP8.5 the "Low Carbon" and "High Carbon" scenarios, respectively. We use PCIC's statistically downscaled data (Bias Correction with Constructed Analogues and Quantile mapping, Version 2; BCCAQv2) derived from 24 CMIP5 global climate models (the complete list of models can be found at (<https://climateatlas.ca/data-sources-and-methods>) (Climate Atlas of Canada, 2023)

The climate model data presented in the Atlas has been statistically downscaled and bias corrected using a method called Bias-Correction/Constructed Analogues with Quantile mapping reordering, Version 2 (BCCAQv2); the work was done by the Pacific Climate Impacts Consortium (PCIC) . [1] This method has been extensively tested by Murdock et al. (2014) and found to outperform many other statistical downscaling methodologies.

The data indicates an ensemble increase in warmest maximum temperature under the high carbon (RCP8.5) scenario of 2.32 degrees Celsius from the background average of 2.59 (1950 to 2022) to 4.91 (2023 to 2065). Increases in temperature can then influence the rates of evapotranspiration thereby reducing water availability. However, in the case of Saskatchewan, the rate of

transpiration on an annual basis is not expected to overbalance the increase in precipitation for the region.

The data indicates an ensemble increase in warmest maximum temperature under the high carbon (RCP8.5) scenario of 2.32 degrees Celsius from the background average of 2.59 (1950 to 2022) to 4.91 (2023 to 2065). Increases in temperature can then influence the rates of evapotranspiration thereby reducing water availability. However, in the case of Saskatchewan, the rate of transpiration on an annual basis is not expected to overbalance the increase in precipitation for the region.

Table 1: Warmest Maximum Temperature Under High Carbon Scenario Historical to Projected Statistics

| Statistic | Historical (1950 – 2022) | | | Projected (Ensemble Data 2023 – 2065) | | |
|-----------|--------------------------|-------------------------|-------------------------|---------------------------------------|-------------------------|-------------------------|
| | Annual Average | 10% Confidence Interval | 90% Confidence Interval | Annual Average | 10% Confidence Interval | 90% Confidence Interval |
| Mean | 2.59 | 1.07 | 4.17 | 4.91 | 3.48 | 7.14 |
| SD | 1.23 | 0.70 | 0.72 | 0.89 | 0.83 | 1.17 |
| Min | 0.00 | -0.45 | 2.80 | 3.00 | 2.05 | 5.10 |
| Max | 5.30 | 3.00 | 6.15 | 7.00 | 5.25 | 9.40 |

The data indicate an ensemble increase in total precipitation under the high carbon (RCP8.5) scenario of 39.21 millimetres from the background average of 454.65 (1950 to 2022) to 493.86 (2023 to 2065). This increase is likely to increase mean annual flows in the Icelander River drainage area thereby increasing the assimilative capacity of the receiving environment of Whitefish Lake.

Table 2: Total Annual Precipitation Under High Carbon Scenario Historical to Projected Statistics

| Statistic | Historical (1950 – 2022) | | | Projected (Ensemble Data 2023 – 2065) | | |
|-----------|--------------------------|-------------------------|-------------------------|---------------------------------------|-------------------------|-------------------------|
| | Annual Average | 10% Confidence Interval | 90% Confidence Interval | Annual Average | 10% Confidence Interval | 90% Confidence Interval |
| Mean | 454.65 | 366.97 | 558.69 | 493.86 | 392.34 | 603.23 |
| SD | 66.85 | 19.66 | 28.74 | 19.35 | 25.36 | 31.79 |
| Min | 264.60 | 325.20 | 506.00 | 459.00 | 344.35 | 555.20 |
| Max | 609.20 | 405.70 | 626.45 | 533.00 | 444.30 | 672.65 |

Several uncertainties apply:

- 1) The background water quality conditions of the Icelander River system in future decades may change appreciably as a result of increases in surface run-off, landscape changes and precipitation event intensity and duration. Such changes are not predictable at this time;
- 2) The long-term accuracy of predictive models for precipitation, temperature and evapotranspiration for the region is not such that an estimate of changes to the receiving environment water quality is reasonable at this time. Any estimates would have a large attributed uncertainty. Furthermore, as mine discharge is not expected to increase in volume or constituent concentrations over the mine life, any increase in flows within the Icelander River system would provide for an increase in assimilative capacity.

As a result, quantitative assessment of the potential change in surface water quality at Whitefish Lake under Climate Change is not needed at this time as:

- the design basis PMP is robust and inclusive of projected total annual precipitation under a high carbon scenario
- the level of variability that is likely in future background water quality is high due to changes in precipitation levels and intensity and therefore run-off contributions to the aquatic environment; and,
- predictive models for the future period (2050s) for the region are variable in accuracy.

Rather, the following mitigation measures, monitoring and adaptive management should be employed.

- 1) Changes in water quality in the receiver should be monitoring on a consistent basis to understand changes in the background water quality prior to effluent mixing;
- 2) Effluent discharge will be monitored as per the MDMER Schedules 4 and 5;
- 3) Under scenarios of low flow condition, discharge can be limited seasonally or periodically and specific to the assimilative capacity of the receiver (flow proportioned of fixed dilution discharge);
- 4) Adaptive management and adjustment to discharge timing and volume as needed over time to meet criteria based on climate induced changes in flow.

References:

Murdock, T., Sobie, S., Hiebert, J., 2014. Statistical downscaling of future climate projections for North America: report on contract no: KM040-131148/A. Available online: https://www.pacificclimate.org/sites/default/files/publications/PCIC_EC_downscaling_report_2014.pdf

Sauchyn, Dave; Barrow, Elaine; Fang, X., Henderson, Norm; Johnston, Mark; Pomeroy, John; Thorpe, Jeff; Wheaton, Elaine; and Williams, B. 2009. Saskatchewan's Natural Capital in a Changing Climate: An Assessment of Impacts and Adaptation. Report to Saskatchewan Ministry of Environment from the Prairie Adaptation Research Collaborative, 162 pp.

- Department: ECCC, CNSC
- Project Effects Link Change to an environmental component due to hazardous contaminants
- Reference to EIS, appendices, or supporting documentation: Section 8.2.4.2.3 and Section 8.2.4.2.4

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, July 5, 2024) |
|--------------|----------------|--|--|---|---|--|---|--|
| IR-114 | - | <p>Context: Tables 8.2-9, 8.2-10 and 8.2-13 demonstrate predicted maximum effluent concentrations of COPCs and maximum predicted receiving environment concentrations in the near- and far-field. General parameters such as temperature, pH, conductivity, etc. that would require Project thresholds and monitoring under the MDMER have not been provided in this table. Lead, nickel, TSS and un-ionized ammonia were not provided, despite all being Schedule 4 substances with maximum monthly concentrations under the MDMER. Aluminum, iron, nitrate, thallium, and manganese have not been provided despite being required parameters under Schedule 5 Section 4 of the MDMER for effluent characterization.</p> <p>For zinc, it is unclear how guidelines have been calculated when CCME thresholds can only be derived with hardness values <250 mg/L. Additionally, water quality thresholds appear to have been calculated using estimated effluent concentrations rather than receiving environment baseline concentrations.</p> <p>Mercury has been identified as a COPC of interest to Indigenous groups for the proposed Project. Table 8.2-8 indicates that background concentrations of mercury in LA-5 are low, and predicted effluent concentrations are also low. However, no information has been provided on background methylmercury concentrations or expected atmospheric deposition of mercury from Project related emissions. Predicted effluent concentrations of 3915 mg/L of sulphate are quite high, and sulphate is known to increase mercury methylation rates in aquatic environments.</p> <p>Rationale: A review of all modelling results for all COPCs under the MDMER will assist ECCC in understanding the potential risks to the receiving environment. ECCC recommends the use of the most stringent guidelines for the protection of aquatic biota. All water quality thresholds should be derived from receiving environment parameters to determine any baseline receiving environment and effluent COPC exceedances of water quality thresholds.</p> <p>Increased sulphate availability can lead to increased methylation rates of mercury and methylmercury in sediment and surface water. Methylmercury is a toxin that can bioaccumulate within the food chain and present risks to aquatic biota and wildlife consuming aquatic biota. Potential changes to methylmercury concentrations in water quality, sediment and fish tissues should be assessed due to the proposed sulphate loadings in effluent.</p> <p>Additionally, in accordance with the MDMERs, Denison will be required to demonstrate that their effluent quality meets the limits in the MDMER. Denison is expected to provide the predicted effluent quality for lead, nickel, and un-ionized ammonia to demonstrate compliance with the MDMERs.</p> | <p>1. Update all tables to include all COPCs with required monitoring under the MDMER including acute and chronic thresholds.</p> <p>2. Ensure all selected water quality thresholds are derived using baseline receiving environment concentrations and use water quality guidelines that are protective of aquatic biota.</p> <p>3. Provide baseline data on the concentrations of methylmercury in surface water, sediment and fish tissues (i.e., large-bodied sports fish and small-bodied forage fish) in the LSA and RSA receiving environment to establish a baseline prior to potential Project impacts.</p> <p>4. Provide an assessment of risk from methylmercury to ecological receptors due to changes in sulphate concentrations in effluent, and potential deposition of mercury from Project related atmospheric emissions in the receiving environment.</p> | <p>See response in Attachment IR-114.</p> | <p>This response has not been accepted.</p> <p>The Proponent has not updated all tables to include missing data for mercury, aluminum, total suspended solids, iron, thallium, manganese, nitrate, and phosphorous, all of which are COPCs with monitoring requirements under the MDMER.</p> <p>The Proponent has not updated tables to include predictions of total hardness concentration in effluent and the receiving environment or acute water quality thresholds, and water quality thresholds have not been derived using baseline receiving environment concentrations.</p> <p>All water quality thresholds should be derived from receiving environment parameters to determine if any baseline receiving environment and effluent COPCs exceed water quality thresholds.</p> <p>Please:</p> <p>1. Update all tables to include missing data for mercury, aluminum, total suspended solids, iron, thallium, manganese, nitrate and phosphorus.</p> <p>2. Update tables to include predictions of total hardness concentrations (in mg/L CaCO3) in effluent and the receiving environment.</p> <p>3. Update tables to include acute water quality thresholds to ensure COPCs do not have the potential to be acutely lethal at the end-of-pipe.</p> <p>4. Ensure that all selected water quality thresholds are derived using baseline receiving environment concentrations and use water quality guidelines that are protective of aquatic biota.</p> | <p>Please see Attachment IR-114. Briefly, Tables 8.2-9, 8.2-10 and 8.2-13 have been updated in the revised Draft EIS as requested.</p> | <p>In response to the FIRT’s previous review, Denison provided responses to the following outstanding requests from ECCC:</p> <ol style="list-style-type: none">1. Update all tables to include missing data for mercury, aluminum, total suspended solids, iron, thallium, manganese, nitrate and phosphorus.2. Update tables to include predictions of total hardness concentrations (in mg/L CaCO3) in effluent and the receiving environment.3. Update tables to include acute water quality thresholds to ensure COPCs do not have the potential to be acutely lethal at the end-of-pipe.4. Ensure that all selected water quality thresholds are derived using baseline receiving environment concentrations and use water quality guidelines that are protective of aquatic biota. <p>The Proponent has resolved item two and four of the above, but items one and three require additional follow up.</p> <p>Regarding item one, further corrections to Table 8.2-13 are necessary:</p> <ul style="list-style-type: none">• There are several inconsistencies in the footnotes:<ul style="list-style-type: none">○ numbers 2 & 3 are missing in the footnotes at the bottom;○ there is no reference to footnote 2 in the table; and○ The asterisk “*”, which is sometimes used to qualify the source of screening concentration, is not defined.• Screening criteria are missing for aluminum and iron, and should be sourced from CCME or SEQG rather than the MDMER as listed in the table.• Uranium-234 and uranium-238 are missing from the table, even though they have been identified as contaminants of potential concern.• Proposed screening criteria for cobalt, copper, manganese, nickel, phosphorous and un-ionized ammonia are inadequate, see comment in IR-108 & IR-108-R1.• Alkalinity and nitrate have been added to the table as requested, however predicted maximum concentrations are only presented for Whitefish Lake Middle and South. The proponent should describe why there are no estimates for these parameters in other lakes, and how they intend to fill these gaps.• Un-ionized ammonia appears in two separate lines in the table with concentrations differing by 3-4 orders of magnitude and different screening values. A single line entry with accurate values should be retained. The Proponent should provide an explanation for the error in order to give the reviewer confidence that the correct values are retained.• The column with screening values does not always use the most conservative value from Table 8.2-8. See comment IR-115 for request to provide justifications. <p>Table 8.2-14 should be updated with corrections to screening criteria necessary for this IR as well as for IR-108 and IR-115. Additional follow up for Table 8.2-10 can be found under IR-108 and IR-108-R1.</p> <p>In the Proponent’s response to item three of the IR, Table 8.2-10 is missing the source for the short-term screening criteria value for arsenic. The Proponent should update Table 8.2-10 to include the source for the short-term screening criteria value for arsenic.</p> | <p>Item 1 – further corrections to Table 8.2-13 have been made (please see updated Table 8.2-13 in Attachment IR-114-R3) as follows:</p> <ul style="list-style-type: none">• Footnotes were restructured and are provided in Attachment IR-114-R3 for each of the tables that were updated.• Screening criteria were added for aluminum and iron, and sourced from CCME or SEQG.• Uranium-234 and uranium-238 were added to the table.• Proposed screening criteria for cobalt, copper, manganese, nickel, phosphorous and un-ionized ammonia were changed as applicable and are consistent with other tables as associated with IR-108 & IR-108-R1.• Un-ionized ammonia is updated to only be provided in one line. The first line provided previously was associated with a miscalculation of the un-ionized ammonia value and was the unionized ammonia-N value. The values provided as part of Attachment IR-114-R3 should be considered correct for unionized ammonia for comparison against the guideline.• The column with screening values now is consistent across all tables that are presented as part of Section 8 and in Attachments for IRs 108/108-R1, 114 and 115.• Table 8.2-14 was updated with corrections to screening criteria necessary for this IR as well as for IR-108 and IR-115 (please see Attachment IR-114-R3).• Table 8.2-10 was updated to include the source for the short-term screening criteria value for arsenic (please see Attachment IR-114-R3 for updated Table 8.2-10). |

Attachment: IR-114 (included in Round 1 Submission)

1) Please see updated Tables 8.2-9 and 8.2-10 from the draft EIS below. Water quality predictions for the well mixed portion of LA-5 for each of the three flow scenarios (described in Section 8.2.4.2.3 and Table 8.2-7 of the draft EIS) are provided in the updated Table 8.2-10 below. Predicted site discharge concentrations that exceed respective receiver WQOs are bolded. Chloride, sulphate, TDS, arsenic, cadmium, chromium, cobalt, copper, selenium, and uranium, thorium-230, radium-226, lead-210, and polonium-210 predicted discharge concentrations are above receiver WQOs. However, under all three flow scenarios, the predicted water quality for all constituents is below respective WQOs within the well mixed portion of LA-5, indicating that sufficient dilution is present within LA-5 to meet objectives. Updated Table 8.2-13 is provided below. Water quality predictions have been added for MDMER constituents listed under Schedule 4 and Schedule 5. There are no predicted exceedances of water quality guidelines for any of the COPCs during Construction, Operation, or Decommissioning

2) The predictive water quality analysis considered the effects of toxicity modifying factors, such as hardness, on water quality. Specifically, the analysis considered induced hardness - that is hardness that is derived from or includes contributions from on site sources and in this case discharge from the IWWTP. It is a reasonable in this case to utilize induced hardness since the water quality assessment directly considers the potential effect of IWWTP discharge on the receiving environment. The hardness added to the receiver from the discharge represents a constant source during periods of discharge. The effluent hardness value used in the analysis was derived from bench scale testing and is considered to be a reasonable estimate of expected hardness in effluent. With that in mind, the predictive water quality analysis reflects the water quality conditions that are anticipated to prevail in the receiver and therefore presents an appropriate platform on which to base the effects assessment.

3) The table below (IR-114 Table 1) shows a summary of baseline concentrations of total mercury in surface water within the LSA. Sediment was not analyzed for mercury during previous baseline surveys. Baseline water quality in the LSA and RSA showed no indication of total mercury present above detectable limits and as such, the potential for methyl-mercury to be detected was unlikely. Generally, 60 to 95% of total mercury concentrations in fish muscle tissues are present in the form of methyl-mercury. Table 8.5-2 of Section 8.5 of the EIS provides a full summary of tissue constituent concentrations for key species from the Icelder River and Russell Lake. A conservative approach of assuming 95% of mercury in the tissues is present in the methylated form could be used for comparative purposes. These data supplemented with more current baseline data for water, sediment and fish tissues specific to total and methyl-mercury prior to the onset of site development will provide a robust database for comparative purposes during the subsequent development and operation on site.

4) Consistent with CSA N288.1-20, Clause 5.1.5, atmospheric depositions to large water bodies such as lakes, are considered negligible; therefore, the air to surface water pathway has been excluded for the ecological risk assessment. The rationale for exclusion of atmospheric deposition to lakes and rivers is explained in detail in Section G9, Appendix G of the COG DRL Guidance Document (Hart, 2019). Typical transfer parameters from source to air and source to water are on a similar magnitude to each other. The transfer parameter from air to water is orders of magnitude lower indicating that atmospheric deposition to the lake would have a negligible effect. Rationale on the exclusion of the air to water pathway can be included in the ERA in Appendix 10-A. The

following statement will be added to Section 2.2 in Appendix A to Appendix 10-A "Atmospheric deposition to Whitefish Lake is considered negligible. This is consistent with the COG DRL guidance (COG, 2019) which shows (assuming a modest flow rate for a lake of 0.1 m/s and an assumed water depth of 10 m) that the transfer of constituents from the atmosphere to large bodies of water (including lakes and rivers) is considered negligible."

As baseline surface water did not identify measurable concentrations of total mercury in the LSA or RSA (See IR-114 Table 1 below) and deposition to large water bodies such as lakes is not likely to contribute to the methyl mercury concentration in the Wheeler River receiving waters, it is most reasonable to conclude that changes in total and methyl mercury can be adequately monitored in relation to sulphate inputs. Denison will undertake monitoring of total and methyl mercury as it relates to the discharge of sulphate to Whitefish Lake.

References: Hart, D. 2019. Derived Release Limits Guidance. COG-06-3090R4-I

Table 8.2-9: Predicted Effluent Water Quality (Updated to include MDMER Constituents)

| Constituent | Unit | Discharge Concentration |
|---------------------|------|-------------------------|
| | | (max predicted) |
| Chloride | mg/L | 600 |
| Sulphate (Hardness) | mg/L | 3915 |
| Sulphate | mg/L | 3915 |
| TDS | mg/L | 6420 |
| TSS | mg/L | 6 |
| Arsenic | mg/L | 0.006 |
| Cadmium | mg/L | 0.0018 |
| Chromium | mg/L | 0.025 |
| Cobalt | mg/L | 0.0030 |
| Copper | mg/L | 0.022 |
| Lead | mg/L | 0.0003 |
| Molybdenum | mg/L | 2.5 |
| Nickel | mg/L | 0.014 |
| Selenium | mg/L | 0.042 |
| Uranium | mg/L | 0.057 |
| Vanadium | mg/L | 0.059 |
| Zinc | mg/L | 0.042 |
| Mercury | mg/L | 0.000001 |
| Ammonia (as N) | mg/L | 3.9 |
| Un-ionized Ammonia* | mg/L | 0.0078 |
| Phosphorus | mg/L | N/A |
| Thorium-230 | Bq/L | 0.9 |
| Radium-226 | Bq/L | 0.15 |
| Lead-210 | Bq/L | 0.419 |
| Polonium-210 | Bq/L | 0.15 |

Note: * - Calculated value

Table 8.2-10: Near-field Receiving Water Quality Results (Updated to include MDMER Constituents)

| Constituent | Unit | Screening Concentration | Source of Screening Concentration | Predicted Site Discharge Concentration | LA-5 Well Mixed | LA-5 Well Mixed | LA-5 Well Mixed |
|---|------|-------------------------|-----------------------------------|--|-----------------|-----------------|-----------------|
| | | | | | (7Q10) | (Monthly Low) | (Average) |
| Chloride | mg/L | 120 | SEQG/CCME | 600 | 10.06 | 6.18 | 4.69 |
| Sulphate (Hardness) | mg/L | 429 | BC MOE* | 3915 | 63.83 | 38.51 | 28.76 |
| Sulphate | mg/L | 128 | BC MOE | 3915 | 63.83 | 38.51 | 28.76 |
| TDS | mg/L | 500 | SEQG | 6420 | 131.41 | 90.06 | 74.13 |
| TSS | mg/L | 15 | Schd 4 - MDMER | 6 | 3.9 | 3.9 | 3.9 |
| Arsenic | mg/L | 0.01 | SEQG/CCME | 0.006 | 0.00020 | 0.00016 | 0.00014 |
| Cadmium | mg/L | 0.0003 | SEQG/CCME* | 0.0018 | 0.00005 | 0.00004 | 0.00003 |
| Chromium | mg/L | 0.001 | SEQG/CCME | 0.025 | 0.00090 | 0.001 | 0.00068 |
| Cobalt | mg/L | 0.0003 | FEQG | 0.0030 | 0.00015 | 0.00013 | 0.00012 |
| Copper | mg/L | 0.004 | SEQG/CCME* | 0.022 | 0.00055 | 0.00041 | 0.00036 |
| Lead | mg/L | 0.005 | CCME | 0.0003 | 0.0001 | 0.0001 | 0.0001 |
| Molybdenum | mg/L | 0.07 | WHO | 2.5 | 0.040 | 0.024 | 0.018 |
| Nickel | mg/L | 0.07 | WHO | 0.014 | 0.0003 | 0.0002 | 0.0002 |
| Selenium | mg/L | 0.001 | SEQG/CCME | 0.042 | 0.0008 | 0.001 | 0.0004 |
| Uranium | mg/L | 0.02 | SEQG/CCME | 0.057 | 0.0010 | 0.0006 | 0.0005 |
| Vanadium | mg/L | 0.12 | FEQG | 0.059 | 0.0011 | 0.0007 | 0.0005 |
| Zinc | mg/L | 0.1 | FEQG** | 0.042 | 0.0018 | 0.0015 | 0.0014 |
| Mercury | mg/L | 0.000026 | SEQG/CCME | 0.000001 | 0.00001 | 0.00001 | 0.00001 |
| Ammonia (as N) | mg/L | 5.74 | SEQG/CCME | 3.9 | 0.13 | 0.11 | 0.10 |
| Un-ionized Ammonia | mg/L | 1.00 | MDMER Sched 4 | 0.0078 | 0.00008 | 0.00006 | 0.00006 |
| Phosphorus | mg/L | 0.015 | BC MOE | N/A | 0.01 | 0.01 | 0.01 |
| Thorium-230 | Bq/L | 0.6 | HC | 0.9 | 0.024 | 0.019 | 0.016 |
| Radium-226 | Bq/L | 0.11 | SEQG | 0.15 | 0.008 | 0.007 | 0.007 |
| Lead-210 | Bq/L | 0.2 | HC | 0.419 | 0.026 | 0.024 | 0.023 |
| Polonium-210 | Bq/L | 0.1 | HC | 0.15 | 0.007 | 0.006 | 0.006 |
| Notes | | | | | | | |
| (1) Bolded values are those that exceed the screening concentrations | | | | | | | |
| Un-ionized ammonia calculated value | | | | | | | |
| * Hardness induced guideline, assuming hardness >250 mg/L | | | | | | | |
| ** Hardness induced guideline, assuming hardness >250 mg/L, pH=7.0, DOC = 5.26 mg/L | | | | | | | |

Table 8.2-13: Maximum Concentration of Surface Water Constituents of Potential Concern in Surface Water (Updated to include available MDMER Constituents)

| Constituent | Unit | Kratchkowsky Lake (LA-7) | Whitefish Lake North (LA-6) | Whitefish Lake Middle (LA-5 North) | Whitefish Lake South (LA-5 South) | McGowan Lake (LA-1) | Icelander River | Russell Lake Inlet | Screening Concentration | Source of Screening Concentration |
|---|------|--|-----------------------------|------------------------------------|-----------------------------------|---------------------|-----------------|--------------------|-------------------------|-----------------------------------|
| Chloride | mg/L | 0.32 | 0.32 | 6.14 | 6.11 | 4.20 | 4.16 | 3.26 | 120 | SEQG/CCME |
| Sulphate | mg/L | 0.69 | 0.69 | 38.66 | 38.49 | 26.03 | 25.75 | 19.88 | 128 | BC MOE |
| Arsenic | mg/L | 0.00012 | 0.00011 | 0.00015 | 0.00015 | 0.00013 | 0.00013 | 0.00012 | 0.01 | SEQG/CCME |
| Cadmium | mg/L | 0.000024 | 0.000023 | 0.000040 | 0.000039 | 0.000033 | 0.000033 | 0.000030 | 0.0003 | SEQG/CCME* |
| Chromium | mg/L | 0.000530 | 0.0005 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0006 | 0.001 | SEQG/CCME |
| Cobalt | mg/L | 0.000101 | 0.000101 | 0.000129 | 0.000128 | 0.000119 | 0.000119 | 0.000114 | 0.0003 | FEQG |
| Copper | mg/L | 0.00062 | 0.00062 | 0.00082 | 0.00082 | 0.00075 | 0.00075 | 0.00072 | 0.004 | SEQG/CCME* |
| Lead | mg/L | 0.000124 | 0.000114 | 0.000118 | 0.000130 | 0.000114 | 0.000114 | 0.000116 | 0.005 | CCME |
| Molybdenum | mg/L | 0.0001 | 0.0001 | 0.0243 | 0.0240 | 0.0158 | 0.0156 | 0.0118 | 0.07 | WHO |
| Nickel | mg/L | 0.00039 | 0.00038 | 0.00051 | 0.00050 | 0.00046 | 0.00046 | 0.00044 | 0.07 | WHO |
| Selenium | mg/L | 0.000034 | 0.00003 | 0.00043 | 0.00041 | 0.00026 | 0.00026 | 0.00020 | 0.001 | SEQG/CCME |
| Uranium | mg/L | 0.00003 | 0.00003 | 0.00057 | 0.00055 | 0.00034 | 0.00033 | 0.00025 | 0.02 | SEQG/CCME |
| Vanadium | mg/L | 0.00017 | 0.00015 | 0.00067 | 0.00056 | 0.00033 | 0.00033 | 0.00027 | 0.12 | FEQG |
| Zinc | mg/L | 0.00070 | 0.00069 | 0.00106 | 0.00103 | 0.00090 | 0.00090 | 0.00084 | 0.1 | FEQG** |
| Ammonia (as N) | mg/L | 0.01463 | 0.01463 | 0.05232 | 0.05215 | 0.03978 | 0.03950 | 0.03368 | 5.74 | SEQG/CCME |
| Un-ionized Ammonia | mg/L | 0.0000086 | 0.0000086 | 0.0000309 | 0.0000308 | 0.0000235 | 0.0000233 | 0.0000199 | 1.00 | MDMER Sched 4 |
| Thorium-230 | Bq/L | 0.01014 | 0.01012 | 0.01868 | 0.01854 | 0.01569 | 0.01563 | 0.01430 | 0.6 | HC |
| Radium-226 | Bq/L | 0.0057 | 0.0056 | 0.0069 | 0.0067 | 0.0063 | 0.0063 | 0.0061 | 0.11 | SEQG |
| Lead-210 | Bq/L | 0.0062 | 0.0057 | 0.0084 | 0.0083 | 0.0067 | 0.0067 | 0.0064 | 0.2 | HC |
| Polonium-210 | Bq/L | 0.0063 | 0.0058 | 0.0067 | 0.0072 | 0.0062 | 0.0062 | 0.0062 | 0.1 | HC |
| Mercury | mg/L | No background information or effluent concentration to model | | | | | | | | |
| Aluminum | | Monitoring required under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | MDMER Sched 5 |
| TSS | | Will be mitigated through design and treatment and monitored as per CCME and MDMER Sched 4 criterion | | | | | | | | MDMER Sched 4 |
| Iron | | Monitoring required under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | MDMER Sched 5 |
| Thallium | | Monitoring required under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | MDMER Sched 5 |
| Manganese | | Monitoring required under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | MDMER Sched 5 |
| Phosphorus | | Monitoring required under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | MDMER Sched 5 |
| Notes | | | | | | | | | | |
| (1) Bolded values are those that exceed the screening concentrations | | | | | | | | | | |
| * Hardness induced guideline, assuming hardness >250 mg/L | | | | | | | | | | |
| ** Hardness induced guideline, assuming hardness >250 mg/L, pH=7.0, DOC = 5.26 mg/L | | | | | | | | | | |
| Un-ionized ammonia represented by calculated values | | | | | | | | | | |

IR-114 Table 1: Total and Dissolved Mercury Concentrations in the LSA and RSA

| Parameter | Total Mercury, Dissolved | Total Mercury |
|------------------|-----------------------------|---------------|
| Units | mg/L | mg/L |
| Total Count | 40 | 59 |
| Count (<RDL) | 39 | 46 |
| Minimum | <1.00E-05 | <1.00E-07 |
| 5th Percentile | <1.00E-05 | <8.20E-07 |
| 50th Percentile | <1.00E-05 | <1.00E-05 |
| 95th Percentile | <1.00E-05 | <1.00E-05 |
| Maximum | <1.00E-05 | <1.00E-05 |
| Arithmetic Mean | <1.00E-05 | <7.63E-06 |
| StdDev | 2.76E-12 | 3.70E-06 |
| Std Error | 0 | 4.81E-07 |
| Geometric Mean | <1.00E-05 | <5.38E-06 |
| Geometric StdDev | 1. | 3.281 |

Notes:

1. The summary time is between 01-Jan-2010 and 31-Dec-2021.
2. The reporting locations are: "LA-1", "LA-1-Bottom", "LA-5", "LA-6", "LAB-1", "LAB-2", "SA-1", "SA-2", "SA-3", "SA-6".

Attachment IR-114 (included in Round 2 submission)

The requested tables have been updated to include water quality thresholds derived from receiving environment parameters (background) as well as effluent induced concentrations for completeness. Please see the tables below and updated in Section 8 of the EIS.

Table 8.2-9: Predicted Effluent Water Quality

| Constituent | Unit | Predicted Discharge Concentrations (Max Expected) |
|---|-----------------|--|
| General Chemistry, Nutrients and Anions | | |
| Alkalinity | mg/L | 12.4 |
| Ammonia (as N) | mg/L | 3.9 |
| Un-Ionized Ammonia | mg/L | 4.74 |
| Hardness | mg/L (as CaCO3) | 250 |
| Conductivity | µS/cm | 21.7 |
| Nitrate | mg/L | 0.249 |
| pH | pH Unit | 7 |
| Phosphorus | mg/L | N/A |
| Sulphate | mg/L | 2600 |
| TDS | mg/L | 6420 |
| Temperature | deg C | 16.5 |
| TSS | mg/L | 6 |
| Chloride | mg/L | 600 |
| Metals | | |
| Aluminum | mg/L | 0.051 |
| Arsenic | mg/L | 0.006 |
| Cadmium | mg/L | 0.0018 |
| Chromium | mg/L | 0.025 |
| Cobalt | mg/L | 0.0027 |
| Copper | mg/L | 0.02 |
| Cyanide | mg/L | NA |
| Iron | mg/L | 0.0039 |
| Lead | mg/L | 0.0003 |
| Manganese | mg/L | 0.03 |
| Mercury | mg/L | 0.00001 |
| Molybdenum | mg/L | 2.5 |
| Nickel | mg/L | 0.0138 |
| Selenium | mg/L | 0.042 |
| Strontium | mg/L | 1.68 |
| Thallium | mg/L | 0.0006 |
| Uranium | mg/L | 0.057 |
| Vanadium | mg/L | 0.059 |
| Zinc | mg/L | 0.042 |
| Radiological | | |
| Lead-210 | Bq/L | 0.42 |
| Polonium-210 | Bq/L | 0.15 |
| Radium-226 | Bq/L | 0.15 |
| Thorium-230 | Bq/L | 0.9 |
| Uranium-238 | Bq/L | 0.7 |
| Uranium-234 | Bq/L | 0.7 |

Table 8.2-10: Near-field Receiving Water Quality Results

| Parameter | Units | Short-term Screening Criteria (background hardness) | Short-term Screening Criteria (Hardness induced >250 mg/L)] | Source | Note | Long-term Screening Criteria (background hardness) | Long-term Screening Criteria (Hardness induced >250 mg/L)] | Source | Note | Discharge Concentration (max predicted) | LA-5 Well Mixed (7Q10) | LA-5 Well Mixed (Monthly Low) | LA-5 Well Mixed (Average) |
|---|----------|---|---|------------------|---------|--|--|-----------|---------|---|------------------------|-------------------------------|---------------------------|
| General Chemistry, Nutrients and Anions | | | | | | | | | | | | | |
| Alkalinity | mg/L | -- | -- | -- | -- | -- | -- | -- | | 12.4 | 12.4 | 12.4 | 12.4 |
| Ammonia (as N) | mg/L | -- | -- | -- | -- | 5.74 | 5.74 | SEQG/CCME | (4) | 3.9 | 0.13 | 0.11 | 0.1 |
| Un-Ionized Ammonia | mg/L | -- | -- | -- | -- | 6.98 | 6.98 | SEQG/CCME | (4) | 4.74 | 0.08 | 0.05 | 0.03 |
| Hardness | mg/L | -- | -- | -- | -- | -- | -- | -- | -- | 250 | 9 | 8 | 7 |
| Conductivity | µS/cm | -- | -- | -- | -- | -- | -- | -- | -- | 21.7 | 21.7 | 21.7 | 21.7 |
| Nitrate | mg/L | 550 | 550 | CCME | | 3 | 3 | SEQG | -- | 0.249 | 0.249 | 0.249 | 0.249 |
| pH | pH units | -- | -- | -- | -- | 6.5-9.0 | 6.5-9.0 | SEQG/CCME | -- | 7 | 7 | 7 | 7 |
| Phosphorus | mg/L | -- | -- | -- | -- | 0.02 - 0.035 | 0.02 - 0.035 | CCME | (17) | 0.03 | 0.0103 | 0.0102 | 0.0101 |
| Sulphate | mg/L | -- | -- | -- | -- | 128 | 429 | BC MOE | (12) | 2600 | 43 | 26 | 19 |
| TDS | mg/L | -- | -- | -- | -- | 500 | 500 | SEQG | -- | 6420 | 131 | 90 | 74 |
| Temperature | °C | -- | -- | -- | -- | ambient temp | ambient temp | -- | -- | 16.5 | 15 | 15 | 15 |
| TSS | mg/L | 15 | 15 | MDMER Schedule 4 | (22) | background + 5 mg/L | background + 5 mg/L | CCME | -- | 6 | 4 | 4 | 4 |
| Chloride | mg/L | 640 | 640 | SEQG/CCME | (6) | 120 | 120 | SEQG/CCME | (6) | 600 | 10 | 6 | 5 |
| Metals | | | | | | | | | | | | | |
| Aluminum | mg/L | -- | -- | -- | -- | 0.1 | 0.1 | SEQG/CCME | (5) | 0.051 | 0.0 | 0.0 | 0.0 |
| Arsenic | mg/L | 0.1 | 0.1 | [| -- | 0.005 | 0.005 | SEQG/CCME | -- | 0.006 | 0.000 | 0.000 | 0.000 |
| Cadmium | mg/L | 0.00011 | 0.0053 | SEQG/CCME | (18) | 0.00004 | 0.00034 | SEQG/CCME | -- | 0.0018 | 0.00005 | 0.00004 | 0.00003 |
| Chromium | mg/L | -- | -- | -- | -- | 0.001 | 0.001 | SEQG/CCME | | 0.025 | 0.001 | 0.001 | 0.001 |
| Cobalt | mg/L | -- | -- | -- | -- | 0.000295 | 0.00149 | FEQG | (10) | 0.0027 | 0.000142 | 0.000125 | 0.000119 |
| Copper | mg/L | 0.0009 | 0.00004 | SEQG | (19) | 0.002 | 0.004 | CCME | -- | 0.02 | 0.001 | 0.000 | 0.000 |
| Cyanide | mg/L | -- | -- | -- | -- | -- | -- | -- | -- | N/A | 0.0 | 0.0 | 0.0 |
| Iron | mg/L | -- | -- | -- | -- | 0.3 | 0.3 | SEQG/CCME | -- | 0.0039 | 0.178 | 0.179 | 0.180 |
| Lead | mg/L | -- | -- | -- | -- | 0.001 | 0.007 | SEQG/CCME | (8) | 0.0003 | 0.000 | 0.000 | 0.000 |
| Manganese | mg/L | 0.501 | 15 | CCME | (3) | 0.26 | 0.64 | SEQG/CCME | (3) | 0.03 | 0.020 | 0.020 | 0.020 |
| Mercury | mg/L | -- | -- | -- | -- | 0.000026 | 0.000026 | CCME | -- | 0.00001 | 0.000010 | 0.000010 | 0.000010 |
| Molybdenum | mg/L | -- | -- | -- | -- | 0.07 | 0.07 | WHO | (16) | 2.5 | 0.04 | 0.02 | 0.02 |
| Nickel | mg/L | -- | -- | -- | -- | 0.07 | 0.07 | WHO | (16) | 0.0138 | 0.00 | 0.00 | 0.00 |
| Selenium | mg/L | -- | -- | -- | -- | 0.001 | 0.001 | CCME | -- | 0.042 | 0.001 | 0.001 | 0.000 |
| Strontium | mg/L | -- | -- | -- | -- | 205 | 2.5 | FEQG | (11) | 1.68 | 0.04 | 0.03 | 0.03 |
| Thallium | mg/L | -- | -- | -- | -- | 0.0008 | 0.0008 | SEQG/CCME | -- | 0.0006 | 0.0002 | 0.0002 | 0.0002 |
| Uranium | mg/L | 0.033 | 0.033 | CCME | | 0.015 | 0.015 | SEQG/CCME | -- | 0.057 | 0.001 | 0.001 | 0.001 |
| Vanadium | mg/L | -- | -- | -- | -- | 0.12 | 0.12 | FEQG | (13) | 0.059 | 0.0011 | 0.0007 | 0.00 |
| Zinc | mg/L | 0.008 | 0.204 | CCME | (9)(20) | 0.007 | 0.058 | CCME | (9)(23) | 0.042 | 0.002 | 0.001 | 0.001 |
| Radiological | | | | | | | | | | | | | |
| Lead-210 | Bq/L | -- | -- | -- | -- | 0.2 | 0.2 | HC | -- | 0.42 | 0.026 | 0.024 | 0.023 |
| Polonium-210 | Bq/L | -- | -- | -- | -- | 0.1 | 0.1 | HC | -- | 0.15 | 0.007 | 0.006 | 0.006 |
| Radium-226 | Bq/L | -- | -- | -- | -- | 0.11 | 0.11 | SEQG | -- | 0.15 | 0.008 | 0.007 | 0.007 |
| Thorium-230 | Bq/L | -- | -- | -- | -- | 0.6 | 0.6 | HC | -- | 0.9 | 0.024 | 0.019 | 0.016 |
| Uranium-238 | Bq/L | -- | -- | -- | -- | 3 | 3 | HC | -- | 0.7 | 0.013 | 0.008 | 0.006 |
| Uranium-234 | Bq/L | -- | -- | -- | -- | 3 | 3 | HC | -- | 0.7 | 0.013 | 0.008 | 0.006 |

Notes:

- (1) Saskatchewan Water Quality Objectives, SEQG on-line (<https://envrbrportal.crmp.saskatchewan.ca/seqg-search/>), SEQG for the protection of aquatic life were selected, based on total concentrations, a temperature of 15°C and a pH of 7.0.
- (2) Hardness dependent WQOs are for very soft water (hardness <25 mg CaCO₃/L). Site-specific hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6).
- (3) Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life - Manganese, Appendix B - Canadian Water Quality Guidelines Calculator (pH = 7.5, hardness = 15 mg/L). Guideline is based on dissolved manganese. Benchmark = exp(0.878[ln(hardness)] + 4.76) where the benchmark is expressed in dissolved manganese concentration (µg/L), and hardness is measured as CaCO₃ equivalents in mg/L.
- (4) Total ammonia-N calculated from the total ammonia guideline for a temperature of 15°C and a pH of 7.0, Un-ionized Ammonia from Table 1 of temperature and pH Canadian Water Quality Guidelines for the Protection of Aquatic Life - Ammonia (<https://ccme.ca/en/res/ammonia-en-canadian-water-quality-guidelines-for-the-protection-of-aquatic-life.pdf>)
- (5) Based on a pH of >6.5.
- (6) Based on water hardness >0 to <17 mg/L.
- (7) Based on water hardness >0 to <82 mg/L.
- (8) Based on water hardness >0 to ≤60 mg/L equation used at hardness of 5.26. At hardness >180 mg/L, the CWQG is 7 µg/L
- (9) Guideline is based on dissolved zinc.
- (10) Environment Canada 2017. Federal Environmental Quality Guidelines, Cobalt, May. Based on equation and site-specific baseline hardness of 15 mg/L.
- (11) ECCC 2020. Federal Environmental Quality Guidelines Strontium. July.
- (12) BC MECCS 2021. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture. https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf
- (13) Environment Canada 2016. Federal Environmental Quality Guidelines, Vanadium. May.

(14) Health Canada 2020. Guidelines for Canadian Drinking Water Quality Summary Table. September. https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/water-eau/sum_guide-res_recom/summary-table-EN-2020-02-11.pdf

(15) BC MECCS 2020. Source Drinking Water Quality Guidelines, Guideline Summary Ministry of Environment & Climate Change Strategy Water Protection & Sustainability Branch .

(16) WHO 2017. Guidelines for Drinking Water Quality. Fourth Edition Incorporating The First Addendum.

(17) Framework - guideline for meso-eutrophic waterbody 20-35 µg/L

(18) Based on water hardness of >0 to <5.3 mg/L

(19) Based on hardness of 5 mg/L (Short-term equation is $(e^{[0.979123[\ln(\text{hardness})]-8.64497}]) * 1000$ (SEQQ via AEP 1996b)

(20) Based on benchmark = $\exp(0.833[\ln(\text{hardness mg}\cdot\text{L}^{-1})] + 0.240[\ln(\text{DOC mg}\cdot\text{L}^{-1})] + 0.526)$. Site-specific background hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6). Site-specific DOC is 2.2 (arithmetic mean for LA-5 and LA-6), induced hardness of 250.5 used as upper limit of extrapolation available.

(21) based on water hardness of > 250 mg/L (CaCO₃) (251 mg/L)

(22) MDMER Schedule 4 - maximum authorized monthly mean concentration

(23) Bold numbers indicate exceedance of long-term criteria

SEQG – Saskatchewan Environmental Quality Guidelines – Water Quality Guidelines for Freshwater Aquatic Life.

CWQG – Canadian Council of Ministers of the Environment – Canadian Water Quality Guidelines for the Protection of Aquatic Life.

SSWQO – Saskatchewan Surface Water Quality Objectives.

DOC – Dissolved organic carbon.

TDS – Total dissolved solids.

TKN – Total Kjeldahl Nitrogen.

TOC – Total organic carbon.

TSS – Total suspended solids.

- Department: ECCC
- Project Effects Link: Fish and Habitat
- Reference to EIS, appendices, or supporting documentation: Section 8.2.4.2.3 Aquatic Environment, Appendix 10-A (ERA), Section 3.1.1.1

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, July 4, 2024) |
|--------------|----------------|---|--|---|--|--|---|---|
| IR-115 | - | <p>Context: Table 8.2-8 demonstrates baseline concentrations of COPCs in LA-5 South Whitefish Lake, their respective water quality guidelines from applicable sources, and proposed Project thresholds. General parameters such as temperature, pH, conductivity, etc. that would require Project thresholds and monitoring under the MDMER have not been provided in this table. Lead, nickel, Total Suspended Solids (TSS) and un-ionized ammonia were not provided, despite all being Schedule 4 substances with maximum monthly concentrations under the MDMER. Aluminum, iron, nitrate, thallium, and manganese have not been provided despite being required parameters under Schedule 5 Section 4 of the MDMER for effluent characterization. Water quality thresholds appear to have been calculated using estimated effluent concentrations rather than receiving environment baseline concentrations. The water quality objective selected for molybdenum is the 31 mg/L SEQG rather than the CCME guideline of 0.073 mg/L.</p> <p>Rationale: ECCC recommends the use of guidelines that will ensure the protection of aquatic biota. All water quality thresholds should be derived from receiving environment parameters to determine any baseline receiving environment and effluent COPC exceedances of water quality thresholds.</p> | <p>1. Update Table 8.2-8 to include all COPCs with required monitoring under the MDMER.</p> <p>2. Ensure all selected water quality thresholds are derived using baseline receiving environment concentrations and are at levels protective of aquatic life.</p> <p>3. Provide additional information to justify the use of the selected water quality guideline for molybdenum.</p> | <p>1. Table 8.2-8 has been updated and provided in Attachment IR-115</p> <p>2. Denison believes that the water quality thresholds used in the assessment (Section 8.2.4.2.3, Aquatic Environment; Appendix 10-A (ERA), Section 3.1.1.1) were appropriate and reflect levels that are protective of aquatic life. The predictive water quality analysis considered the effects of toxicity modifying factors, such as hardness, on water quality. Specifically, the analysis considered induced hardness - that is hardness that is derived from or includes contributions from on site sources and in this case discharge from the IWWTP. It is a reasonable in this case to utilize induced hardness since the water quality assessment directly considers the potential effect of IWWTP discharge on the receiving environment. The hardness added to the receiver from the discharge represents a constant source during periods of discharge. The effluent hardness value used in the analysis was derived from bench scale testing and is considered to be a reasonable estimate of expected hardness in effluent. With that in mind, the predictive water quality analysis reflects the water quality conditions that are anticipated to prevail in the receiver and therefore presents an appropriate platform on which to base the effects assessment.</p> <p>3. Denison has selected the Saskatchewan specific guideline for molybdenum of 31 mg/L to be the most appropriate for the Project. It was derived from recent data following the CCME (2007) protocol. The molybdenum water quality objective based on the 5th percentile (HC5) of the species sensitivity distribution (SSD) according to the CCME protocol; 18 data points for 12 different species were used, mainly EC10 data (WSA, 2017). The CCME guideline is identified as an interim guideline and was based on multiplying the lowest chronic toxicity value, the 28-d LC50 of 0.73 mg/L for rainbow trout (O. mykiss), by a safety factor of 0.1. This original study by Birge (1978) has not been reproducible, either using the original methods or using standard methods (Davies et al. 2005). No changes to the EIS are proposed in this regard.</p> <p>References: Birge, W.J. 1978. Aquatic Toxicology of Trace Elements of Coal and Fly Ash. Special Collections, USDA National Agricultural Library. Accessed February 16, 2023, https://www.nal.usda.gov/exhibits/speccoll/items/show/5224.</p> <p>CCME. 2007. A protocol for the derivation of water quality guidelines for the protection of aquatic life.</p> <p>Davies, T.D., J. Pickard and K.J. Hall. 2005. Acute molybdenum toxicity to rainbow trout and other fish. Journal of Environmental Engineering & Science 4: 481-485.</p> <p>WSA (Saskatchewan Water Security Agency). 2017. Saskatchewan Water Quality Objective for the Protection of Aquatic Life – Molybdenum. Fact Sheet. Report No. WSA 514.</p> | <p>This response has not been accepted.</p> <p>Items 1. And 3. In the Proponent’s response adequately responded to the IR. However, the water quality thresholds in item two have not been derived using baseline receiving environment concentrations and not all COPCs which require monitoring under the MDMER have been included in the updated table. Additionally, the Proponent did not account for changes in baseline hardness concentrations in the receiving environment due to the deposition of effluent. Water hardness is an environmental modifying factor which can influence the toxicity of COPCs in the aquatic environment, therefore requiring the mentioned COPCs as well as background concentrations of total hardness in the receiving environment to accurately determine potential effects of COPCs upon the receiving aquatic environment. The Proponent should also provide rationale to support that all selected water quality thresholds are derived using baseline receiving environment concentrations and are at levels protective of aquatic life.</p> <p>See also follow-up IR-115-R1.</p> | <p>Please see Attachment IR-115_IR115-R1. Briefly, Table 8.2-8 has been updated in the revised Draft EIS as requested.</p> | <p>Please see the response to IR-115-R1 (below).</p> | <p>Please see the response to IR-115-R1 (below).</p> |
| IR-115 | IR-115 R1 | <p>Context: In the Proponent’s response to item two, it is mentioned that the derived water quality thresholds used in Table 8.2-8 and in the assessment (Section 8.2.4.2.3, Aquatic Environment; Appendix 10-A (ERA), Section 3.1.1.1) are based on hardness concentrations found in effluent. The Proponent mentions that hardness derived from IWWTP discharge will consider IWWTP discharge on the receiving environment and provide “a reasonable estimate of expected hardness in effluent”. However, this does not consider induced hardness (i.e., hardness concentration increases in the receiving environment over the lifecycle of the Project) from effluent contributions as a Project effect; the receiving environment baseline concentrations of hardness have been altered due to inputs from Project effluent. Providing only one estimate of expected effluent hardness in the receiving environment is not an appropriate means of conducting the effects assessment.</p> <p>Additionally, the following COPCs have not been included in the updated table provided in the</p> | n/a | <p>n/a</p> | <p>1. Update Table 8.2-8 to include the following COPCs: un-ionized ammonia, aluminum, iron, manganese, thallium and total dissolved solids (TDS).</p> <p>2. Update Table 8.2-8 to include background concentrations of total hardness (in mg/L CaCO3) in the receiving environment.</p> <p>3. Provide rationale that all selected water quality thresholds are derived using baseline receiving environment concentrations and are at levels protective of aquatic life.</p> <p>See also related IR-108-R1</p> | <p>Please see Attachment IR-115_IR115-R1. Briefly, Table 8.2-8 has been updated in the revised Draft EIS as requested.</p> | <p>The Proponent has not fully responded to the previous round’s IR. For items one and two, some of the information provided on contaminants of potential concern (COPCs) and the background concentrations of hardness in the receiving environment is not sufficiently conservative. Item three requested rationale that all selected water quality thresholds (i.e., screening criteria) are at levels protective of aquatic life, which was not provided.</p> <p>The updated Table 8.2-8 provides two short-term and two long-term screening criteria for each parameter. The screening criteria reflect calculated screening criteria for both background hardness and project-induced hardness, however, it is unclear which criteria the Proponent intends to apply in their assessment since four separate criteria are provided (see IR-114).</p> <p>The information presented in Table 8.2-8 indicates there are no background water quality exceedances of guidelines. However, it is noted that several screening criteria do not reflect the most conservative guidelines, which is not consistent with the approach described in Appendix 10-A (Environmental Risk Assessment). For some examples, the short-term screening criteria value of 500 mg/L for nitrate is much higher than the BC MOE nitrate guideline of 32.8 mg/L., the long-term criteria for un-ionized ammonia of 6.87 mg/L is much higher than the CCME guideline of 0.019 mg/L and the MDMER limit, and the long-term phosphorus screening criteria represent a trigger range that is two to three trophic levels above background, which is much higher than the</p> | <p>In response to the reviewer’s comment that several criteria utilized in the water quality section of the EIS do not reflect the most conservative guidelines, which is not consistent with the approach described in Appendix 10-A (Environmental Risk Assessment) the following is provided.</p> <p>To clarify, the approach taken in the ERA with respect to screening criteria followed a hierarchical approach. This was the same approach taken in and described in Section 8 of the EIS.</p> <p>The most stringent of either the Saskatchewan provincial (SEQG) or federal (CCME and/or FEQG) guidelines were used for the screening criteria.</p> <p>Where there was no screening criterion was provided by the province of Saskatchewan or federal government, an appropriate and available criteria from another jurisdiction was used as an alternative.</p> <p>The most stringent criteria in any jurisdiction was not deemed reasonable for the purposes of the EIS nor was this the intention of the methods described in Appendix 10-A or the ERA. The wording in the ERA/EIS can be revised to make the hierarchical process for selection of water quality screening criteria described above clearer.</p> <p>Further rationale as to our (Denison and its SME) belief that water quality thresholds were used that are protective of aquatic life should include the understanding of the hierarchical methods described above as well as the conservatisms that were adopted as part of the water quality assessment, and within the predictive near-field water quality model in particular. These conservatisms were as follows.</p> <p>1. Denison intends to recycle process water to the greatest extent possible, thereby reducing the demand for fresh water supply and volume of treated effluent. In an effort to develop a conservative assessment basis for the EA, the water recycle flows from the industrial wastewater treatment plant back into the processing plant and wellfield have not been incorporated</p> |

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, July 4, 2024) |
|--------------|----------------|---|--------------------------|---|-----------------------------|---------------------------------------|--|--|
| | | <p>Proponent’s response: un-ionized ammonia, aluminum, iron, manganese, thallium and total dissolved solids (TDS). It is noted that these COPCs are also subject to monitoring requirements under the <i>Metal and Diamond Mining Effluent Regulations</i> (MDMER).</p> <p>Rationale: Background concentrations of un-ionized ammonia, aluminum, iron, thallium, manganese and TDS are required to determine potential effects to the environment. The Proponent will also require this information to satisfy their obligations under the MDMER.</p> <p>The purpose of the surface water quality assessment is to determine if changes to the receiving environment over the project lifecycle will have significant adverse effects on biota. Changes from baseline in hardness concentrations in the receiving environment due to the deposition of effluent is a Project related effect and therefore providing a single baseline water quality threshold which is applicable only to one set of conditions is not an appropriate method to evaluate impacts across a shifting hardness baseline.</p> <p>Water hardness is an environmental modifying factor, various concentrations of hardness influence the toxicity of other COPCs in the aquatic environment. Using water quality thresholds that have been derived from high effluent hardness concentrations will not be protective of aquatic biota, particularly in the early stages of the project lifecycle when receiving environment water quality will be similar to baseline water quality.</p> | | | | | <p>CCME guidance framework recommends. The Proponent should review and update Table 8.2-8 to provide conservative screening criteria for all parameters, and include a consideration of the CCME, FEQG, SEQG, and BC MOE when selecting the screening criteria. Screening criteria selection should be informed by the most conservative guidelines. Cases where the Proponent does not propose to apply the most conservative screening criteria should be accompanied with a discussion and rationale for the selection. The Proponent should also specifically state which criteria will be used in screening, how these criteria will be or are applied, how the EA conclusions are informed by the criteria, and whether any EA conclusions are altered by changes to screening criteria.</p> | <p>into the estimates for freshwater withdrawal and treated effluent discharge.</p> <p>2. An average and continuous effluent discharge rate of 36.5 m³/hr was used which is an unlikely scenario with discharge likely being more intermittent and at lower rates (as indicated in bullet one).</p> <p>3. The water quality analysis was conducted for each of the low flow scenarios (i.e., 7Q10 low flow, monthly low flow, and monthly average flow) for the receiving water environment.</p> <p>4. The ninety-fifth percentile (95%) concentrations of constituents at baseline condition were used in modelling potential effects thereby providing them most conservative approach to the protection of aquatic life.</p> <p>Further context is provided as follows.</p> <p>The updated Table 8.2-8 (provided in Attachment IR-114-R3) provides two short-term and two long-term screening criteria for each parameter. The screening criteria reflect calculated screening criteria for both background hardness and project-induced hardness.</p> <p>Based on pilot tests completed for the IWWTP to date, sulphate, chromium, molybdenum, TSS, and selenium have been identified as having potential management needs. However, for each of these parameters, the estimated discharge concentrations provided were conservative in nature with a contingency factor of up to 3 times.</p> <p>Parameters where the available assimilative capacity of the receiver was estimated to be less than the max predicted discharge concentration when screening criteria are subject to background water quality include sulphate, chromium, molybdenum, and selenium. For chromium and selenium, the assessment was influenced by background WQ datapoints with values below the detection limit (Nearfield Model).</p> <p>Parameters whose available assimilative capacity exceeded short term criteria listed in Table 8.2-10 (IR Round 2 and revised draft EIS) for both background and induced screening criteria included chloride, TSS, arsenic, cadmium, copper, manganese, uranium, and zinc (Nearfield Model).</p> <p>The Round 3 updates to Table 8.2-10 are provided in Attachment IR-114-R3.</p> <p>The updated results indicate that the parameters previously identified as requiring management consideration remain unchanged with no additional parameters added.</p> <p>Finally, we note that Denison has committed to periodic sampling prior to construction to strengthen existing environmental data and will commit to update the analysis and predictions incorporating any new data collected during the operational licencing process, but there is no expectation that there would be any change to the EIS conclusions.</p> |

Attachment: IR-115 (included in Round 1 submission)

Table 8.2-8 has been updated and provided below.

| Constituent | Unit | LA-5 Background Concentration (95th percentile) | Screening Concentration | Source of Screening Concentration |
|---------------------|------|---|-------------------------|-----------------------------------|
| Chloride | mg/L | 0.39 | 120 | SEQG/CCME |
| Sulphate (Hardness) | mg/L | 0.69 | 429 | BC MOE* |
| Sulphate | mg/L | 0.69 | 128 | BC MOE |
| TDS | mg/L | 28.3 | 500 | SEQG |
| TSS | mg/L | 3.9 | 15 | Schd 4 - MD MER |
| Arsenic | mg/L | 0.0001 | 0.01 | SEQG/CCME |
| Cadmium | mg/L | 0.000019 | 0.0003 | SEQG/CCME* |
| Chromium | mg/L | <0.0005 | 0.001 | SEQG/CCME |
| Cobalt | mg/L | <0.0001 | 0.0003 | FEQG |
| Copper | mg/L | <0.0002 | 0.004 | SEQG/CCME* |
| Lead | mg/L | <0.0001 | 0.005 | CCME |
| Molybdenum | mg/L | <0.0001 | 0.07 | WHO |
| Nickel | mg/L | <0.0001 | 0.07 | WHO |
| Selenium | mg/L | <0.0001 | 0.001 | SEQG/CCME |
| Uranium | mg/L | <0.0001 | 0.02 | SEQG/CCME |
| Vanadium | mg/L | <0.0001 | 0.12 | FEQG |
| Zinc | mg/L | 0.0011 | 0.1 | FEQG** |
| Mercury | mg/L | <0.00001 | 0.000026 | SEQG/CCME |
| Ammonia (as N) | mg/L | 0.068 | 5.74 | SEQG/CCME |
| Phosphorus | mg/L | <0.01 | 0.015 | BC MOE |
| Thorium-230 | Bq/L | <0.01 | 0.6 | HC |
| Radium-226 | Bq/L | <0.0059 | 0.11 | SEQG |
| Lead-210 | Bq/L | <0.02 | 0.2 | HC |
| Polonium-210 | Bq/L | <0.005 | 0.1 | HC |

Notes

* Hardness induced guideline, assuming hardness >250 mg/L

** Hardness induced guideline, assuming hardness >250 mg/L, pH=7.0, DOC = 5.26 mg/L

Attachment IR-115_IR-115-R1 (included in Round 2 Submission)

Please see the updated Table 8.2-8 below which has also been updated in the EIS. It has been updated to include; un-ionized ammonia, aluminum, iron, manganese, thallium and total dissolved solids (TDS). The background hardness is included and screening criteria for both short-term and long-term criteria are added with notes identifying the rationale for their concentration level based on hardness, pH, temperature and/or other background or effluent induced constituent concentration.

Table 8.2-8: Summary of Background Water Quality Screening Criteria

| Constituent | Unit | Background Concentrations (95 th Percentile) | Short-term Screening Criteria (background hardness) | Short-term Screening Criteria (Hardness induced [>250 mg/L]) | Source | Note | Long-term Screening Criteria (background hardness) | Long-term Screening Criteria (Hardness induced [>250 mg/L]) | Source | Note |
|---|-----------------|--|---|---|------------------|------|--|---|-----------|------|
| General Chemistry, Nutrients and Anions | | | | | | | | | | |
| Alkalinity | mg/L | 12.4 | -- | -- | -- | -- | -- | -- | -- | |
| Ammonia (as N) | mg/L | 0.068 | -- | -- | -- | -- | 5.74 | 5.74 | SEQG/CCME | (4) |
| Un-Ionized Ammonia | mg/L | 0.00019 | -- | -- | -- | -- | 6.98 | 6.98 | SEQG/CCME | (4) |
| Hardness | mg/L (as CaCO3) | 5.26 | -- | -- | -- | -- | -- | -- | -- | -- |
| Conductivity | µS/cm | 21.7 | -- | -- | -- | -- | -- | -- | -- | -- |
| Nitrate | mg/L | <0.249 | 550 | 550 | CCME | | 3 | 3 | SEQG | -- |
| pH | pH Unit | 7 | -- | -- | -- | -- | 6.5-9.0 | 6.5-9.0 | SEQG/CCME | -- |
| Phosphorus | mg/L | <0.01 | -- | -- | -- | -- | 0.02 - 0.035 | 0.02 - 0.035 | CCME | (17) |
| Sulphate | mg/L | 0.69 | -- | -- | -- | -- | 128 | 429 | BC MOE | (12) |
| TDS | mg/L | 28.3 | -- | -- | -- | -- | 500 | 500 | SEQG | -- |
| Temperature | deg C | 15 | -- | -- | -- | -- | ambient temp | ambient temp | -- | -- |
| TSS | mg/L | 3.9 | 15 | 15 | MDMER Schedule 4 | (22) | background + 5 mg/L | background + 5 mg/L | CCME | -- |
| Chloride | mg/L | 0.39 | 640 | 640 | SEQG/CCME | (6) | 120 | 120 | SEQG/CCME | (6) |
| Metals | | | | | | | | | | |
| Aluminum | mg/L | 0.00758 | -- | -- | -- | -- | 0.1 | 0.1 | SEQG/CCME | (5) |
| Arsenic | mg/L | 0.0001 | 0.1 | 0.1 | [| -- | 0.005 | 0.005 | SEQG/CCME | -- |
| Cadmium | mg/L | 0.000019 | 0.00011 | 0.0053 | SEQG/CCME | (18) | 0.00004 | 0.00034 | SEQG/CCME | -- |
| Chromium | mg/L | <0.0005 | -- | -- | -- | -- | 0.001 | 0.001 | SEQG/CCME | |
| Cobalt | mg/L | <0.0001 | -- | -- | -- | -- | 0.000295 | 0.00149 | FEQG | (10) |
| Copper | mg/L | <0.0002 | 0.0009 | 0.00004 | SEQG | (19) | 0.002 | 0.004 | CCME | -- |
| Cyanide | mg/L | N/A | -- | -- | -- | -- | -- | -- | -- | -- |
| Iron | mg/L | 0.181 | -- | -- | -- | -- | 0.3 | 0.3 | SEQG/CCME | -- |
| Lead | mg/L | <0.0001 | -- | -- | -- | -- | 0.001 | 0.007 | SEQG/CCME | (8) |
| Manganese | mg/L | 0.0198 | 0.501 | 15 | CCME | (3) | 0.26 | 0.64 | SEQG/CCME | (3) |
| Mercury | mg/L | <0.00001 | -- | -- | -- | -- | 0.000026 | 0.000026 | CCME | -- |
| Molybdenum | mg/L | <0.0001 | -- | -- | -- | -- | 0.07 | 0.07 | WHO | (16) |
| Nickel | mg/L | <0.0001 | -- | -- | -- | -- | 0.07 | 0.07 | WHO | (16) |
| Selenium | mg/L | <0.0001 | -- | -- | -- | -- | 0.001 | 0.001 | CCME | -- |
| Strontium | mg/L | 0.015 | -- | -- | -- | -- | 205 | 2.5 | FEQG | (11) |

| Constituent | Unit | Background Concentrations (95 th Percentile) | Short-term Screening Criteria (background hardness) | Short-term Screening Criteria (Hardness induced [>250 mg/L]) | Source | Note | Long-term Screening Criteria (background hardness) | Long-term Screening Criteria (Hardness induced [>250 mg/L]) | Source | Note |
|--------------|------|--|---|--|--------|---------|--|--|-----------|---------|
| Thallium | mg/L | <0.0002 | -- | -- | -- | -- | 0.0008 | 0.0008 | SEQG/CCME | -- |
| Uranium | mg/L | <0.0001 | 0.033 | 0.033 | CCME | | 0.015 | 0.015 | SEQG/CCME | -- |
| Vanadium | mg/L | <0.0001 | -- | -- | -- | -- | 0.12 | 0.12 | FEQG | (13) |
| Zinc | mg/L | 0.0011 | 0.008 | 0.204 | CCME | (9)(20) | 0.007 | 0.058 | CCME | (9)(23) |
| Radiological | | | | | | | | | | |
| Lead-210 | Bq/L | <0.02 | -- | -- | -- | -- | 0.2 | 0.2 | HC | -- |
| Polonium-210 | Bq/L | <0.005 | -- | -- | -- | -- | 0.1 | 0.1 | HC | -- |
| Radium-226 | Bq/L | <0.0059 | -- | -- | -- | -- | 0.11 | 0.11 | SEQG | -- |
| Thorium-230 | Bq/L | <0.01 | -- | -- | -- | -- | 0.6 | 0.6 | HC | -- |
| Uranium-238 | Bq/L | <0.0012 | -- | -- | -- | -- | 3 | 3 | HC | -- |
| Uranium-234 | Bq/L | <0.0012 | -- | -- | -- | -- | 3 | 3 | HC | -- |

- Notes:**
- (1) Saskatchewan Water Quality Objectives, SEQG on-line (<https://envrbrportal.crmg.saskatchewan.ca/seqg-search/>), SEQG for the protection of aquatic life were selected, based on total concentrations, a temperature of 15°C and a pH of 7.0.
- (2) Hardness dependent WQOs are for very soft water (hardness <25 mg CaCO₃/L). Site-specific hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6).
- (3) Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life - Manganese, Appendix B - Canadian Water Quality Guidelines Calculator (pH = 7.5, hardness = 15 mg/L). Guideline is based on dissolved manganese. Benchmark = $\exp(0.878[\ln(\text{hardness})] + 4.76)$ where the benchmark is expressed in dissolved manganese concentration (µg/L), and hardness is measured as CaCO₃ equivalents in mg/L.
- (4) Total ammonia-N calculated from the total ammonia guideline for a temperature of 15°C and a pH of 7.0, Un-ionized Ammonia from Table 1 of temperature and pH Canadian Water Quality Guidelines for the Protection of Aquatic Life - Ammonia (<https://ccme.ca/en/res/ammonia-en-canadian-water-quality-guidelines-for-the-protection-of-aquatic-life.pdf>)
- (5) Based on a pH of >6.5.
- (6) Based on water hardness >0 to <17 mg/L.
- (7) Based on water hardness >0 to <82 mg/L.
- (8) Based on water hardness >0 to ≤60 mg/L equation used at hardness of 5.26. At hardness >180 mg/L, the CWQG is 7 µg/L
- (9) Guideline is based on dissolved zinc.
- (10) Environment Canada 2017. Federal Environmental Quality Guidelines, Cobalt, May. Based on equation and site-specific baseline hardness of 15 mg/L.
- (11) ECCC 2020. Federal Environmental Quality Guidelines Strontium. July.
- (12) BC MECCS 2021. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture. https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf
- (13) Environment Canada 2016. Federal Environmental Quality Guidelines, Vanadium. May.
- (14) Health Canada 2020. Guidelines for Canadian Drinking Water Quality Summary Table. September. https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/water-eau/sum_guide-res_recom/summary-table-EN-2020-02-11.pdf
- (15) BC MECCS 2020. Source Drinking Water Quality Guidelines, Guideline Summary Ministry of Environment & Climate Change Strategy Water Protection & Sustainability Branch .
- (16) WHO 2017. Guidelines for Drinking Water Quality. Fourth Edition Incorporating The First Addendum.
- (17) Framework - guideline for meso-eutrophic waterbody 20-35 µg/L
- (18) Based on water hardness of >0 to <5.3 mg/L
- (19) Based on hardness of 5 mg/L (Short-term equation is $(e^{[0.979123\ln(\text{hardness})]-8.64497}})*1000$ (SEGQ via AEP 1996b)

(20) Based on benchmark = $\exp(0.833[\ln(\text{hardness mg}\cdot\text{L}^{-1})] + 0.240[\ln(\text{DOC mg}\cdot\text{L}^{-1})] + 0.526)$. Site-specific background hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6). Site-specific DOC is 2.2 (arithmetic mean for LA-5 and LA-6), induced hardness of 250.5 used as upper limit of extrapolation available.

(21) based on water hardness of > 250 mg/L (CaCO₃) (251 mg/L)

(22) MDMER Schedule 4 - maximum authorized montly mean concentration

(23) Bold numbers indicate exceedance of long-term criteria

- Department: ECCC
- Project Effects Link: Change to an environmental component due to hazardous contaminants
- Reference to EIS, appendices, or supporting documentation: Section 8.4.4.2.3, Aquatic Environment

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, June 28, 2024) |
|--------------|----------------|---|--|--|--|---|--|---|
| IR-124 | - | <p>Context: Table 8.4-7 provides maximum concentrations of surface water COPCs in sediment. The following COPCs, which are required to evaluate the risk from effluent to sediment quality, were not evaluated:</p> <ol style="list-style-type: none">1. COPCs that have monitoring requirements in receiving environment2. COPCs that exceed water quality guidelines in effluent, and,3. COPCs that have baseline concentrations that exceed sediment quality thresholds in the receiving environment. <p>Rationale: Due to the lack of information on COPCs with baseline concentrations that exceed sediment quality guidelines, and COPCs that require monitoring under the MDMER, a determination on risk to sediment quality and aquatic biota cannot be made.</p> | <ol style="list-style-type: none">1. Provide the information on baseline exceedances of COPCs in sediment.2. Provide an assessment of risk for any COPCs that have baseline exceedances of sediment quality thresholds in the receiving environment.3. Provide an assessment of risk from any COPCs that require monitoring in the receiving environment and effluent under the MDMER. Please include any COPCs in effluent that will exceed water quality guidelines. | <p>1) The information on the baseline exceedance of COPCs in sediment are provided as part of Attachment IR-123. The table indicates that only the maximum concentration of cadmium exceeded the CCME ISQG on one occasion when assessing all sediment samples over the course of baseline surveys in the LSA.</p> <p>2) Only one sample concentration for Cadmium of 0.7 µg/g (LAB-2-3) at Russell Lake exceeded the CCME ISQG of 0.6 within the RSA. Another value of 0.6 µg/g (LAB-2-CORE) at Russell Lake equals to the CCME ISQG of 0.6. All other samples had cadmium concentrations below any screening criteria. Cadmium was included as one of the constituents identified as a COPC under the non-radiological Ecological Risk Assessment (Appendix 10-A). No significant adverse effect on either aquatic or terrestrial populations or communities, as a result of releases from the Project, are predicted during the Project phases or during the future centuries. All estimated total HQs for all COPCs (arsenic, cadmium, chromium, cobalt, copper, molybdenum, selenium, uranium, zinc, chloride, and sulphate) for all ecological receptors are predicted to remain below the HQ benchmark of 1.</p> <p>3) Denison has provided an analysis of the parameters that are identified under MDMER Schedule 4 and therefore have specified effluent discharge criteria. Schedule 5 parameters will be monitored as per the MDMER once under this regulation (i.e., meeting regulated criteria of discharge to the environment [50 m3/day). Please refer to Table 8.2-13 of attachment IR-114. In these cases, COPCs including Schedule 4 parameters were below screening criteria.</p> | <p>This response has not been accepted.</p> <p>An updated risk assessment for COPCs that requires monitoring under the MDMER with effluent concentrations that exceed guidelines has not been completed. This information is necessary to facilitate the determination on risk to sediment quality and aquatic biota.</p> <p>See also follow-up IR-124-R1.</p> | <p>1. Section 8.4.3.2.3 of the Draft EIS did not identify any constituents where baseline sediment quality exceeded sediment quality guidelines. Table 8.4-3 and Table 8.4-7 of the revised Draft EIS were updated to include sediment quality guidelines as recommended.</p> <p>2. The were no instances where constituent concentrations in the baseline sediment samples were greater than their respective of sediment quality guidelines; therefore, no further action is needed to address this part of the IR.</p> <p>3. This is not applicable. No additional COPCs need to be carried forward in the environmental risk assessment as the concentrations of COPCs in effluent do not exceed water quality guidelines (see Table 3-1 in the ERA in Appendix 10-A). All relevant constituents identified in Schedule 4 and Schedule 5 in MDMER were considered in the ERA screening with the exception of cyanide and mercury which are not identified as present in the effluent (see IR-100 regarding mercury). Phosphorus and nitrate will be present in the effluent at low levels and estimates of these constituents via the near-field water quality model indicate that levels will remain well below criteria protective of aquatic life in the Whitefish Lake environment (see Tables 8.2-10 and 8.2-13 of Section 8).</p> | <p>The Proponent has not fully responded to the previous round’s IR.</p> <p>The modeling of surface water and sediment COPC’s described in Appendix 10-A show results for the receiving waterbodies, but it is not clear how the results for the COPC concentrations for water quality and sediment quality calculated for each of the water bodies, shown in Figure 6-1 and 6-2 respectively, are being interpreted. The Proponent has not explained if these modeled values are based on the worst-case scenarios that account for environmental variables such as seasonal changes in hydrology and chemistry or if they have only accounted for changes in operational effluent discharge scenarios to consider the upper bound discharge rates. Additionally, it is unclear whether depositional areas for sediment were identified based on hydrological data. Additional information is also needed regarding baseline exceedances of sediment COPC thresholds and the associated risk assessment of mine operations on the receiving water body.</p> <p>The Proponent should consider maximum COPC scenarios for the receiving water bodies in baseline assessments and the risk assessment, including seasonal variability and sediment depositional areas to determine whether the baseline assessment and risk assessment fully considered the effects of the operations of the proposed mine. The Proponent should provide supplemental information to aid in determining if the environmental model has considered environmental variability such as seasonal changes in water levels, flows and sedimentation. The Proponent should also demonstrate that the model has considered a reasonable expected worst case scenario, such as a 100 year return.</p> <p>This IR is addressing quality of inputs (ex. baseline data, conservatism of scenarios modelled, environmental variability, etc.) in to modelling. This information is required to assess the conservatism of modelling the bounding conditions and potential for significant adverse effects to the environment.</p> | <ul style="list-style-type: none">• Denison would like to clarify that the figures that the reviewer is referring to (Figure 6-1 and Figure 6-2 in Appendix 10-A) are the figures for the sensitivity analysis shows the maximum predicted concentrations for each lake, arising from two effluent discharge scenarios: expected and upper bound discharge rates. The sensitivity analysis specifically looks at the difference between expected and upper bound effluent discharge rates. All other parameters are unchanged from the expected case. The concentrations over time (with seasonal variations) for all waterbodies are shown in Figure 3-2 and Figure 3-3 of Appendix 10-A (and reproduced below). The modelling considers COPC concentrations in the receiving water bodies in baseline assessments and the risk assessment, including seasonal variability and sediment depositional areas to determine whether the baseline assessment and risk assessment fully considered the effects of the operations of the proposed mine.• Appendix A to the ERA in Appendix 10-A is called “ Wheeler River Project IMPACT Model” which provides detailed information on the equations used, assumptions made and inputs used in the IMPACT model• The IMPACT Model considers monthly fluctuations in flows in all waterbodies. This is described in Section 3.1 of Appendix A. The IMPACT Model also assumes that all lakes are depositional. The sediment model represents deposition in the whole lake using partition equations and that the dominant process by which sediment quality would change is expected to be partitioning not particle settling – TSS in effluent is low (6 mg/L) and release of particulates is therefore not expected to contribute meaningfully to changes in sediment quality downstream of the discharge. The constituent specific partitioning coefficients (K_{ds}) used in the analysis are described in Appendix 10-A to the ERA and are based on the relationship between sediment quality and water quality for depositional habitats from monitoring data collected over many years in the Wheeler drainage Further, it is noted that it is unclear how the worst-case scenario, such as the 100 year event, is relevant to the sediment quality analysis. In addition to the fact that the dominant process is expected to be partitioning not particle settling such events, up to the design storm which in the case of the contact water management system is equivalent to more than 1 year’s worth of precipitation in a 24 hour period, would be contained with the site infrastructure and there would be no specific need to change treated effluent discharge flow as a result. The contained event water would be treated and released to the environment per standard operations.• For the assessment of impacts on the aquatic environment two different models were utilized for different purposes. The near-field model assessed different flow scenarios including low flow, and the IMPACT Model was used as the regional model for the risk assessment. The risk assessment focuses on the expected case.• There are numerous conservative assumptions in the near-field model (Appendix 8-E)<ul style="list-style-type: none">• The water quality analysis was conducted for each of the low flow scenarios (i.e., 7Q10 low flow, monthly low flow, and monthly average flow) for the receiving water environment.• Ninety-fifth percentile concentrations of constituents at baseline condition were used in modelling potential effects.• Average effluent discharge rate of 36.5 m³/hr and continuous effluent flow – this is conservative.• Effluent quality is conservative, based on pilot tests completed for the IWWTP to date with a contingency factor of 1 to 3 times incorporated for conservatism.• There are numerous conservative assumptions in the IMPACT Model.<ul style="list-style-type: none">• Ecological receptor assumptions: home ranges are selected based on sensitive life stages, 100% residency at exposure locations of interest.• Human receptor assumptions: traditional foods diet is conservative, both average and high consumers assessed. The amount of traditional food obtained from the Project area is conservative based on current understanding of land use.• The results shown in the ERA represent the maximum dose/risk receptors would receive, considering the variation among Project phases• Toxicity reference values incorporate safety and uncertainty factors• Although conservative, the models indicate no significant adverse effects to the environment. |
| IR-124 | IR-124-R1 | <p>Context: In the Proponent’s response it is stated, “Schedule 5 parameters will be monitored as per the MDMER once under this regulation (i.e., meeting regulated criteria of discharge to the environment [50 m3/day). Please refer to Table 8.2-13 of attachment IR-114. In these cases, COPCs</p> | n/a | n/a | <p>Provide an assessment of risk from any MDMER Schedule 5 parameters that are required to be characterized in effluent and in surface water quality in the receiving environment and that have effluent concentrations that will exceed water quality guidelines derived from environmental baseline conditions.</p> | <p>See response to IR-124 and revised Draft EIS Section 8, Table 8.4-3 and Table 8.4-7 and supporting updated documentation in Appendix 8E.</p> | <p>The Proponent has not fully responded to the previous round’s IR. The modeling of surface water and sediment COPC’s described in Appendix 10-A, Figure 6-1 and 6-2 respectively shows results for the receiving waterbodies. However, it is unclear if these modeled values are based on the worst-case scenarios that account for environmental variables such as seasonal changes in hydrology and chemistry, or if they have only accounted for changes in operational</p> | <p>See response to IR-124 above. No additional requests have been made as part of IR-124-R1</p> |

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, June 28, 2024) |
|--------------|----------------|--|--------------------------|---|-----------------------------|---------------------------------------|---|---|
| | | <p>including Schedule 4 parameters were below screening criteria.”</p> <p>If concentrations of Schedule 5 parameters in effluent exceed water quality thresholds, these parameters are necessary for ECCC to examine in the risk assessment to determine the potential for effluent to be acutely lethal and for adverse effects to aquatic biota. These parameters will also be required to be characterized under Section 4, 5 and 7 of the MDMER. As per CSA N288.6-22 Section 7.2.5.2.1, “Screening of environmental concentrations of chemical and radiochemical substances released to the environment should be performed to identify COPCs for further evaluation in the risk assessment. Both measured concentrations and concentrations calculated from release rates may be used in the screening analysis. The screening concentrations should be compared to screening criteria, and chemicals that exceed screening criteria should be identified as COPCs.”</p> <p>As per CSA N288.6-22 Section 7.2.5.4.2, “If COPCs exceed the screening level for one medium, they should be carried forward into the EcoRA for all media that are likely to contribute to exposure. For example, for a given COPC, if a water screening benchmark is exceeded, the same COPC should be carried forward for sediment if its concentration was above the detection limit.”</p> <p>Additionally, updated Table 8.2-13 of attachment IR-114 has been found to be insufficient due to maximum concentrations in surface water for mercury, aluminum, total suspended solids, iron, thallium, manganese, nitrate and phosphorus being absent and the use of incorrect water quality thresholds.</p> <p>Rationale: Due to the lack of information on COPCs with concentrations that exceed water quality thresholds in effluent, a determination on risk to sediment quality and aquatic biota cannot be made.</p> | | | | | <p>effluent discharge scenarios to consider the upper bound discharge rates. The Proponent’s responses regarding baseline exceedances of COPC thresholds in the receiving waterbodies require additional information regarding environmental variability, including but not limited to seasonal changes in water levels, flows and sedimentation, in order to determine whether the model has considered environmental variability. The Proponent should also demonstrate that the model has fully considered a reasonably expected worst case scenario, such as a 100-year return period for the above variables.</p> <p>The Proponent should include a consideration of the maximum COPC scenario for the receiving water bodies in baseline assessments and the risk assessment, including seasonal variability and sediment depositional areas, to consider the effects of the operations of the proposed mine.</p> <p>This IR is addressing quality of inputs (ex. baseline data, conservatism of scenarios modelled, environmental variability, etc.) in to modelling. This information is required to assess the conservatism of modelling the bounding conditions and potential for significant adverse effects to the environment.</p> | |



Figure 32: Modelled Concentrations of COPCs in Water during Project Phases

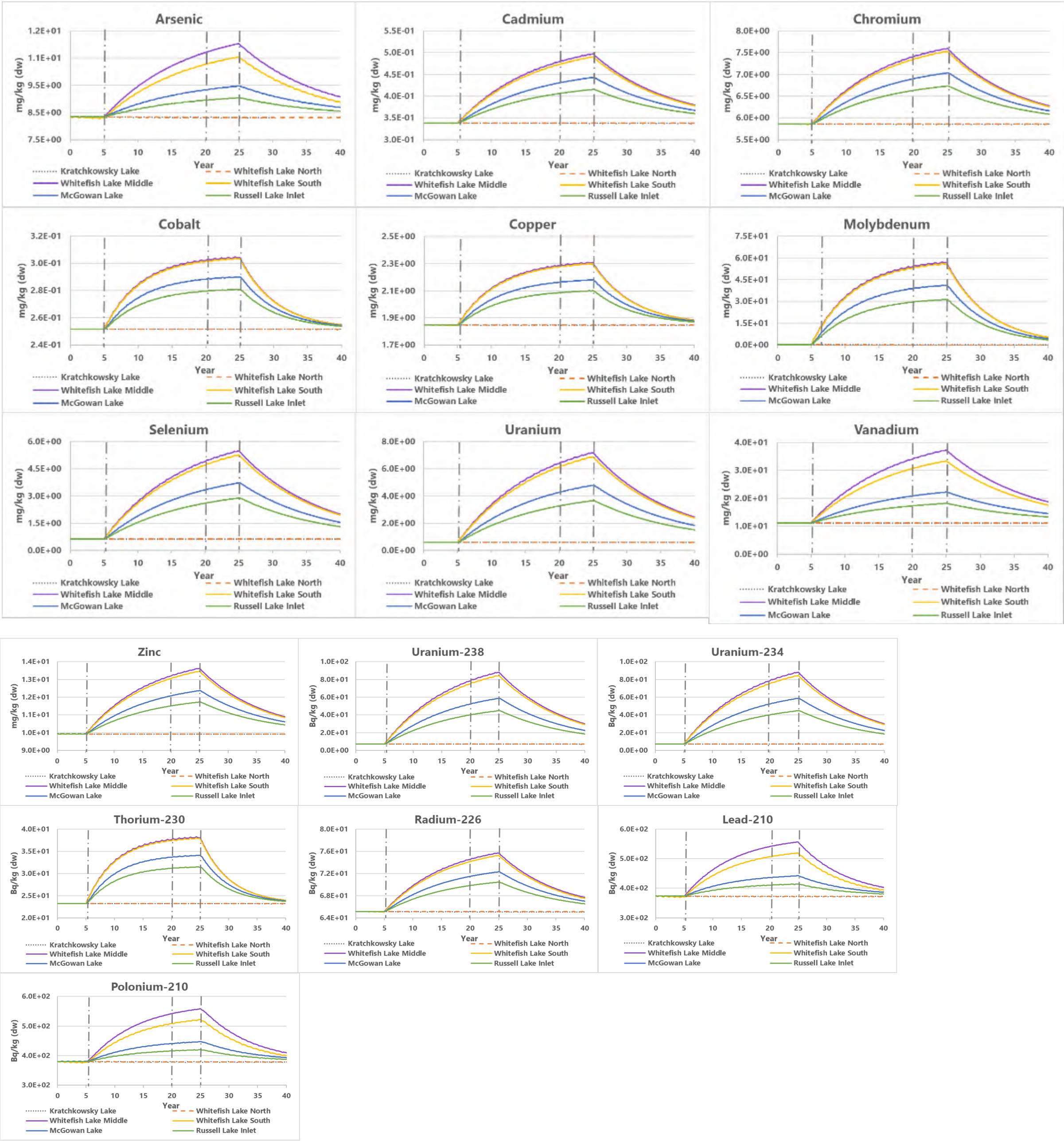


Figure 33: Modelled Concentrations of COPCs in Sediment during Project Phases

- Department: ECCC
- Project Effects Link: Aquatic species
- Reference to EIS, appendices, or supporting documentation: Section 8.5.3, Appendix 10-A (ERA), Section 5.3.1.1.8

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, June 28, 2024) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------|-----------------|--|--|---|---|---|----------------------------|---|----------------|----------------|---------------|---------|-----|----------|----------|----------|----------|----------|----------|----------|--------|----------|----------|----------|----------|----------|----------|----------|-----------------|----------|----------|----------|-----------|-----|----------|----------|----------|----------|----------|----------|----------|--------|----------|----------|----------|----------|----------|----------|----------|-----------------|----------|----------|----------|--|---|
| IR- 126 | - | <p>Context: The Proponent has used the US Environmental Protection Agency (US EPA) guidelines for the assessment of selenium fish tissue concentrations in Section 8.5.3 of the draft EIS and in the Environmental Risk Assessment (ERA) in Appendix 10-A (ERA) of Section 10.</p> <p>Rationale: ECCC’s Federal Environmental Quality Guidelines of 6.7 ug/g dry weight fish whole body tissue for selenium should be used, as it is more protective than the US EPA guidelines.</p> | Update the selenium fish tissue assessment in the draft EIS and the Wheeler River ERA (Appendix 10-A (ERA) in Section 10) as needed using ECCC’s FEQG. | <p>Denison is aware of the ECCC Federal Environmental Quality Guideline for selenium in fish. The ECCC FEQG is for fish tissue egg-ovary and whole-body. Denison selected the US EPA guideline over the ECCC guideline since US EPA provides guidelines for fish tissue muscle as well. The fish assessed in the ERA were large-bodied fish including northern pike and white sucker. A fish tissue muscle TRV is appropriate for assessment of large-bodied fish; therefore, the US EPA selenium fish tissue muscle benchmark was preferred over the whole body value from ECCC.</p> | <p>ECCC acknowledges that the Proponent prefers the use of the US EPA guidelines due to the ability to perform fish tissue muscle TRV, however, Environmental Effects Monitoring (EEM) would require a study on fish tissue selenium whole- body or egg-ovary concentrations. The current baseline data will not be comparable to future EEM studies using fish tissue muscle concentrations of selenium and US EPA guideline methodology. There is currently EEM guidance under development for conducting selenium fish tissue sampling in fish populations that will utilize the FEQG which applies to fish tissue egg-ovary and whole-body concentrations of selenium. Additionally, the Proponent has made a commitment to utilize the most stringent guidelines available.</p> <p>Based on the Project's proposed effluent concentrations of selenium, fish tissue sampling will be required as part of the EEM monitoring for the Project. The ECCC FEQG is the guideline applied to these studies, and the current use of this guideline will facilitate the comparison to future monitoring studies.</p> <p>Furthermore, the Proponent has not provided sufficient explanation in their response for the use of the less stringent US EPA guideline compared to the more conservative FEQG.</p> <p>The Proponent should explain their use of the US EPA guidelines over the ECCC FEQG or update the selenium fish tissue assessment in the draft EIS and the Wheeler River ERA as needed using ECCC’s FEQG.</p> <p>As noted in IR-126, please update the selenium fish tissue assessment in the draft EIS and the Wheeler River ERA (Appendix 10- A (ERA) in Section 10) as needed using ECCC’s FEQG. If the FEQG will not be used, provide further rationalization for the use of the US EPA guidelines when creating the study on fish tissue selenium concentration in the EEM.</p> | <p>The EIS assessed selenium in fish in terms of muscle tissue because the available baseline data were for muscle tissue. Since the review comment highlights the EEM program and the fish tissue selenium study component more specifically we note that the MDMER (2023) allows use of muscle tissue in the EEM study of selenium in fish (see Schedule 5, 12(1)(e)(iv). It is further noted that Denison has committed to a pre-operational EEM study and will conduct that study in accordance with the regulation and available federal guidance. The pre-operational EEM study will include a study respecting selenium in fish tissue.</p> <p>Regarding the EIS, Denison and its SME stand by the current assessment approach, using muscle tissue. Nevertheless, to address the reviewer’s concern, we have calculated whole-body concentrations from the predicted selenium in muscle (Table B.5 of the revised draft EIS Appendix 10-A), using EPA (2021) conversion factors. The resulting whole-body concentrations do not exceed either EPA (2021) or ECCC (2022) guidelines for whole-body tissue, which are 8.5 µg/g dw and 6.7 µg/g dw, respectively, and therefore the conclusions of the risk assessment are unchanged. No change to the EIS is warranted.</p> <table><tr><th>Fish Species</th><th>Lake</th><th>Muscle ug/g fw</th><th>Muscle ug/g dw</th><th>Whole ug/g dw</th></tr><tr><td rowspan="5">N. Pike</td><td>Ref</td><td>1.89E-01</td><td>7.56E-01</td><td>5.95E-01</td></tr><tr><td>WL North</td><td>1.86E-01</td><td>7.44E-01</td><td>5.86E-01</td></tr><tr><td>WL Mid</td><td>1.57E+00</td><td>6.28E+00</td><td>4.94E+00</td></tr><tr><td>WL South</td><td>1.51E+00</td><td>6.04E+00</td><td>4.76E+00</td></tr><tr><td>McGowan Russell</td><td>1.02E+00</td><td>4.08E+00</td><td>3.21E+00</td></tr><tr><td rowspan="5">W. Sucker</td><td>Ref</td><td>1.46E-01</td><td>5.84E-01</td><td>4.60E-01</td></tr><tr><td>WL North</td><td>1.43E-01</td><td>5.72E-01</td><td>4.50E-01</td></tr><tr><td>WL Mid</td><td>1.74E+00</td><td>6.96E+00</td><td>5.48E+00</td></tr><tr><td>WL South</td><td>1.66E+00</td><td>6.64E+00</td><td>5.23E+00</td></tr><tr><td>McGowan Russell</td><td>1.06E+00</td><td>4.24E+00</td><td>3.34E+00</td></tr></table> <p>Notes: dry wt = fresh wt / (1-0.75) [EPA (2021)] whole = muscle / 1.27 [EPA (2021)]</p> <p>References: MDMER. 2023. Metal and Diamond Mining Effluent Regulations. SOR/2002-222. Last amended June 9, 2023. Minister of Justice. EPA. 2021. 2021 Revision to: Aquatic Life Ambient Water Quality Criterion for Selenium 2016. EPA 822-R-21-006. U.S. Environmental Protection Agency. ECCC. 2022. Federal Environmental Quality Guidelines. Selenium. Environment and Climate Change Canada.</p> | Fish Species | Lake | Muscle ug/g fw | Muscle ug/g dw | Whole ug/g dw | N. Pike | Ref | 1.89E-01 | 7.56E-01 | 5.95E-01 | WL North | 1.86E-01 | 7.44E-01 | 5.86E-01 | WL Mid | 1.57E+00 | 6.28E+00 | 4.94E+00 | WL South | 1.51E+00 | 6.04E+00 | 4.76E+00 | McGowan Russell | 1.02E+00 | 4.08E+00 | 3.21E+00 | W. Sucker | Ref | 1.46E-01 | 5.84E-01 | 4.60E-01 | WL North | 1.43E-01 | 5.72E-01 | 4.50E-01 | WL Mid | 1.74E+00 | 6.96E+00 | 5.48E+00 | WL South | 1.66E+00 | 6.64E+00 | 5.23E+00 | McGowan Russell | 1.06E+00 | 4.24E+00 | 3.34E+00 | <p>The Proponent did not compare their predictions for fish tissue selenium to the FEQGs in the ERA as requested. Furthermore, in their response the Proponent does not use available species-specific moisture content and conversion factors available for northern pike and lake whitefish when converting muscle selenium concentrations to whole-body selenium concentrations. This means that the Proponent’s prediction likely underestimates the selenium tissue concentrations in the fish. Consequently, the hazard quotients reported are lower than expected.</p> <p>Additionally, the method used by the Proponent to predict selenium concentrations in northern pike and lake whitefish does not appear to include dietary uptake and bioaccumulation of selenium, only direct contact with pore water and overlying water is considered (Table 5-5 in Appendix 10A; Section 2.2.2 of Appendix A to Appendix 10-A). Selenium uptake through the aquatic food web has been shown to result in bioaccumulation of selenium in aquatic-dependent wildlife and resulting in reproductive impairments and malformations (ECCC 2022). Dietary sources of selenium would typically be expected to be the main contribution to tissue concentrations of selenium compared to selenium uptake from water. In most situations, the conversion of inorganic selenium to organic selenium through uptake from water into periphyton/algae is the rate limiting step of selenium bioaccumulation into higher level organisms including benthic invertebrates and fish. This step is affected by many environmental parameters (e.g. temperature, substrate, lentic/lotic environment). Considering that the effluent discharge contains 42 ug/L selenium, consideration of dietary selenium is warranted.</p> <p>The Proponent should update the final EIS with the following information:</p> <p>1. Update the ERA with the assessment of selenium concentrations in fish tissue to include a comparison of selenium fish tissue concentrations to ECCC FEQG guidelines for either fish whole body tissue (6.7 ug/g dry weight) or fish egg/ovary tissue (14.7 ug/g dry weight) using species-specific moisture content and muscle : whole body and/or egg-ovary : muscle conversion factors (see Tables B-1b, Table B-3, Table B-4, and Table B-5 in US EPA (2021)).</p> <p>2. Update the ERA for the assessment of selenium concentrations in fish tissue using a method that considers dietary uptake and bioaccumulation in order to determine predicted fish tissue concentrations of selenium in northern pike and lake whitefish. This is recommended to be done over all Project phases for both the Expected Case and sensitivity scenarios.</p> <p>Provide predicted fish tissue selenium concentrations that include the range of variability of data used to develop the tissue selenium predictions. Only one output value without a confidence interval is provided for each location and species (see Table B.5 in Appendix B of Appendix 10-A).</p> | <p>1. The Round 2 IR response provided a comparison against the ECCC FEQG by converting the muscle tissue concentrations to whole-body tissue concentrations using generic conversion values. The dry weight to fresh weight conversion factor used was 0.25. Based on Denison’s measured dry weight content in fish (northern pike and white sucker) the dry weight content ranged from 0.24 to 0.26 which is consistent with literature values; therefore, there is minimal difference in the moisture content. The species specific conversion factors for whole body and egg ovary for northern pike and white sucker from US EPA (2021) have been used to calculate the whole body and egg ovary tissue concentrations. (see Table in Attachment IR-126 Round 3 below for results). All predicted tissue concentrations for northern pike and white sucker in all lakes are below the FEQG.</p> <p>2. The ERA utilizes a bioaccumulation factor (BAF) model from water to tissue to conservatively reflect all the multi-media contributions to uptake. The BAFs are provided in Appendix A to the ERA in Section 3.6.1. The selenium BAF for northern pike is a non-linear BAF where BAF = 949x^{0.827} (x is in units of µg/L). The selenium BAF for white sucker is 4425 L/kg (the rounded value shown in Figure IR-126-1 is 4400 L/kg). Both BAFs are based on publicly available regional data from other uranium mine sites in northern Saskatchewan (see Appendix A to Appendix 10-A, Section 3.6.1). Additional information on the derivation of the BAFs is provided below in Attachment IR-126 Round 3.</p> <p>3. The fish tissue selenium concentrations represent the maximum concentration over the Project phases. This is the most conservative result.</p> <p>References: US EPA. 2021. 2021 Revision to: Aquatic Life Ambient Water Quality Criterion for Selenium 2016. EPA 822-R-21-006. U.S. Environmental Protection Agency. ECCC. 2022. Federal Environmental Quality Guidelines. Selenium. Environment and Climate Change Canada.</p> |
| Fish Species | Lake | Muscle ug/g fw | Muscle ug/g dw | Whole ug/g dw | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| N. Pike | Ref | 1.89E-01 | 7.56E-01 | 5.95E-01 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | WL North | 1.86E-01 | 7.44E-01 | 5.86E-01 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | WL Mid | 1.57E+00 | 6.28E+00 | 4.94E+00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | WL South | 1.51E+00 | 6.04E+00 | 4.76E+00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | McGowan Russell | 1.02E+00 | 4.08E+00 | 3.21E+00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| W. Sucker | Ref | 1.46E-01 | 5.84E-01 | 4.60E-01 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | WL North | 1.43E-01 | 5.72E-01 | 4.50E-01 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | WL Mid | 1.74E+00 | 6.96E+00 | 5.48E+00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | WL South | 1.66E+00 | 6.64E+00 | 5.23E+00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | McGowan Russell | 1.06E+00 | 4.24E+00 | 3.34E+00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Attachment IR-126 Round 3

The whole-body concentrations were recalculated from the predicted selenium in muscle tissue concentrations (Table B.5 of the revised draft EIS Appendix 10-A), using site-specific moisture content and the species-specific US EPA (2021) conversion factors. The values used for moisture content and conversion factors for muscle to whole body and egg-ovary to whole body are shown in Table IR-126-1 below. The resulting whole-body concentrations (Table IR-126-2) do not exceed either EPA (2021) or ECCC (2022) guidelines for whole-body tissue, which are 8.5 µg/g dw and 6.7 µg/g dw, respectively, and therefore the conclusions of the risk assessment are unchanged. Note that selenium was identified as a COPC in the risk assessment and a full quantitative risk assessment was completed including calculation of hazard quotients. No change to the EIS is warranted based on the results shown in the Table below. The calculations do not change the conclusions of the EIS of no significant adverse effect. Selenium is included as part of the environmental monitoring program throughout all phases of the Project.

Table IR-126-1: Moisture Content and Conversion Factors used for Selenium Calculations

| Fish Species | Moisture Content (Aquatic Baseline Studies, Table A-17) | Muscle:Whole Body (Table B-4, B-5, US EPA 2021) | Egg-Ovary:Muscle (Table B-3, US EPA 2021) |
|---------------------|--|--|--|
| Northern Pike | 77.98 | 1.27 | 1.88 |
| White Sucker | 76.55 | 1.34 | 1 |

Table IR-126-2: Calculated Whole Body and Egg-Ovary

| FEQG (µg/g dw) | | | | 6.7 | 14.7 |
|-----------------------|-----------------------|-----------------------|-----------------------|---------------------------|--------------------------|
| Fish Species | Lake | Muscle µg/g fw | Muscle µg/g dw | Whole Body µg/g dw | Egg-Ovary µg/g dw |
| Northern Pike | Ref | 1.89E-01 | 8.58E-01 | 0.68 | 1.61 |
| | Whitefish Lake North | 1.86E-01 | 8.45E-01 | 0.67 | 1.59 |
| | Whitefish Lake Middle | 1.57E+00 | 7.13E+00 | 5.61 | 13.40 |
| | Whitefish Lake South | 1.51E+00 | 6.86E+00 | 5.40 | 12.89 |
| | McGowan Lake | 1.02E+00 | 4.63E+00 | 3.65 | 8.71 |
| | Russell Lake | 8.12E-01 | 3.69E+00 | 2.90 | 6.93 |
| White Sucker | Ref | 1.46E-01 | 6.23E-01 | 0.46 | 0.62 |
| | Whitefish Lake North | 1.43E-01 | 6.10E-01 | 0.46 | 0.61 |
| | Whitefish Lake Middle | 1.74E+00 | 7.42E+00 | 5.54 | 7.42 |
| | Whitefish Lake South | 1.66E+00 | 7.08E+00 | 5.28 | 7.08 |
| | McGowan Lake | 1.06E+00 | 4.52E+00 | 3.37 | 4.52 |
| | Russell Lake | 8.06E-01 | 3.44E+00 | 2.57 | 3.44 |

Selenium bioaccumulation factors (BAFs) were derived using regional data. Using measured fish tissue data and measured water concentrations to develop the BAF incorporates the selenium bioaccumulation through the food chain and would represent the transfer (enrichment function and trophic transfer) as shown in the figure below.

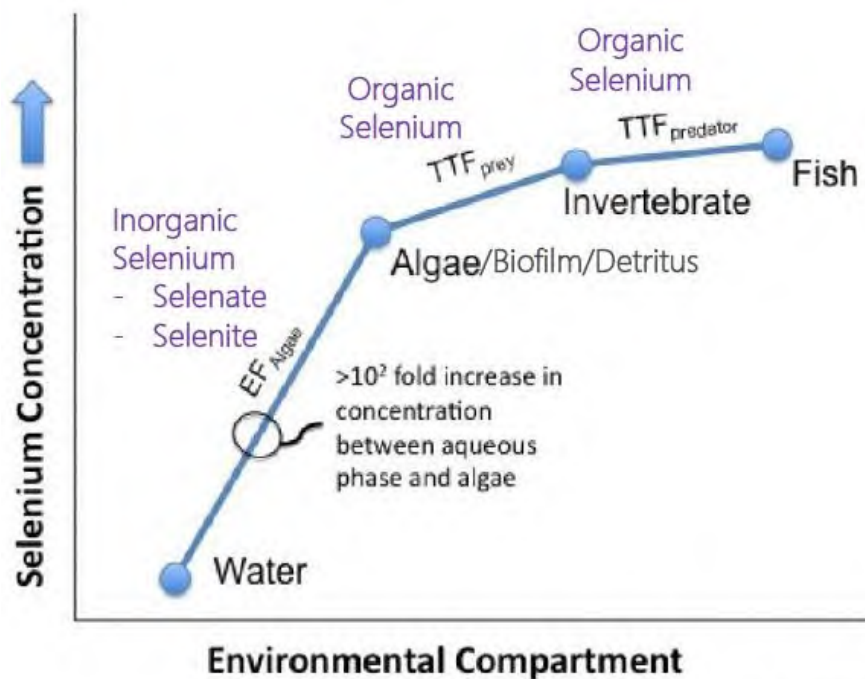


Image adapted from Chapman *et al.* (2009)

Large- and small-bodied fish were considered separately because selenium concentrations are based on different tissue analyses for these two groups: wet weight muscle and wet weight whole body, respectively. Tissue data were available for northern pike, cisco, lake trout, longnose sucker, lake whitefish, white sucker, lake chub and spottail shiner. The data comparisons resulted in the following conclusions:

- The same BAF can be applied to a fish species at different lakes;
- The BAF values for longnose sucker, cisco and lake trout were not significantly different from those for northern pike, therefore data from these species were combined to derive a BAF for northern pike;
- The BAF values for lake whitefish and white sucker were significantly different ($p < 0.05$) from that for northern pike; and
- The BAF values for lake chub and spottail shiner were not significantly different ($p > 0.05$) from each other, therefore data for these two species were combined to derive a BAF for small-bodied fish.

Most of the data from fish species evaluated demonstrated a linear relationship between fish tissue and water concentrations. The linear regression line was shown to underestimate selenium in northern pike tissue at low water concentrations. Therefore, a non-linear relationship was adopted for northern pike, where the $BAF = 949x^{0.827}$ (x is in units of $\mu\text{g/L}$). As shown in the figure, the

linear (dotted line) and power function (solid red curve) are quite similar except where the water concentrations were less than 0.001 mg/L. The R^2 values for the linear and power function are similar but the better fit at the lower water concentration values provided a basis for selecting the power function as the preferred model for the northern pike. Correlation analyses of the tissue and water concentration data for selenium indicated that a significant relationship ($p < 0.05$) existed between the water and tissue concentrations in northern pike, white suckers, lake whitefish and small-bodied fish.

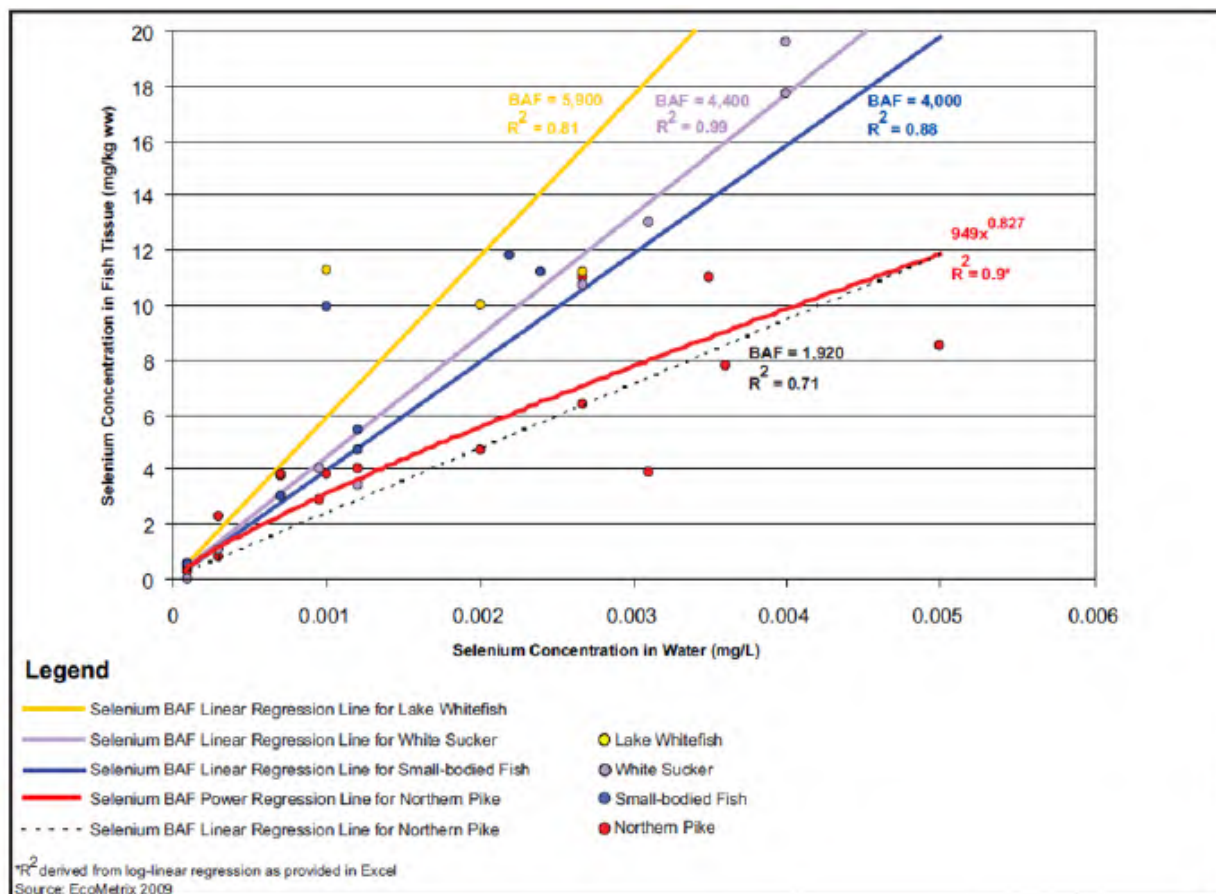


Figure IR-126-1: Development of Regional Fish BAFs for Selenium in Saskatchewan

References:

Chapman PM, Adams WJ, Brooks ML, Delos CG, Luoma SN, Maher WA, Ohlendorf HM, Presser TS and Shaw DP. 2009. Ecological Assessment of Selenium in the Aquatic Environment. SETAC Pellston Workshop, February 22-28, 2009, Pensacola, FL, USA.

EPA. 2021. 2021 Revision to: Aquatic Life Ambient Water Quality Criterion for Selenium 2016. EPA 822-R-21-006. U.S. Environmental Protection Agency.

- Department: ECCC
- Project Effects Link: Wildlife and Wildlife habitat
- Reference to EIS, appendices, or supporting documentation: Section 9, Terrestrial Environment

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, July 8, 2024) |
|--------------|----------------|---|---|--|--|---|--|--|
| IR-134 | - | <p>Context and Rationale: The draft EIS states in multiple places that vegetation clearing may occur year-round.</p> <p>In order to correspond with the timing of emergence from hibernation, tree clearing should not be conducted during the bat roosting period. If maternity roost trees are removed after pregnant females have established a roost area, there is a higher likelihood of abortion than there would be otherwise.</p> <p>Species-specific mitigations are required to protect bat SAR.</p> | Provide important roosting dates for bat species at risk in the Project area. | <p>Maternity roosts are used by pregnant females in late spring (April/May) either alone or in small groups. Females and their offspring roost in groups in nursery colonies in late summer/early fall prior to hibernation. Denison will adjust the activity timing windows to include the April/May maternity roosting period and the July/August nursery roosting period, to the extent practicable. Pre-construction surveys will identify all sensitive wildlife habitat features, including potential roosting trees (e.g., hollow trees, trees with defects, trees with cavities, and tree stumps). Should potential roosting trees be detected, consultations with the regulators will be initiated, and appropriate mitigation measures will be designed and implemented.</p> <p>This information above is provided in Attachment IR-131. This new SAR appendix (new Appendix 9-D) will be added to Section 9 of the final EIS.</p> | <p>The Proponent provided a complete response regarding the roosting dates for bat species at risk, however follow-up IRs are required.</p> <p>See follow-up IR-134-R1.</p> | n/a | <p>The Proponent provided a complete response regarding the roosting dates for bat species at risk, however follow-up IRs are required.</p> <p>See follow-up IR-134-R1.</p> | n/a |
| IR-134 | IR-134 R1 | <p>Context: The Proponent has committed to conduct pre-construction and pre-clearing surveys for multiple species, however the timing and methods for the surveys were not provided. Knowing the survey methodology for pre-construction and pre-clearing for little brown myotis and northern myotis is important for assessing cumulative impacts, effectiveness of adaptive management strategies as well as determining how bat species were considered in the EIS.</p> <p>Rationale: ECCC can determine whether the methodology the Proponent will use to collect data is appropriate and if the methodology would contribute to a more complete understanding cumulative effects and adaptive management strategies.</p> <p>A clear outline of how timing has been considered and incorporated into the methodologies is required to understand how sensitive periods for bats, such as roosting, have been considered in the EIS. An understanding of the methodologies and how these sensitive periods are being considered is required to evaluate the effectiveness of mitigation strategies and adaptive management strategies which are being developed by the Proponent.</p> | n/a | n/a | <p>The information provided by the Proponent regarding the roosting dates and potential habitat for bats is complete, however, the information related to the pre-construction and pre-clearing surveys is missing details on important habitat features for bat species at risk. As two Species at Risk Act (SARA) schedule 1 listed bat species, little brown myotis (<i>Myotis lucifugus</i>) and northern myotis (<i>Myotis septentrionalis</i>) have been identified in the Project area, effects need to be identified, avoided, lessened and monitored.</p> | <p>For clarification, the pre-construction and pre-clearing surveys will consist of wildlife sweeps conducted by qualified biologists within 7 days prior to any clearing activity at a specific location, and a 100 m buffer, within the Project Footprint. The wildlife sweeps will not be species-specific surveys focused on species at risk but will to be based on timing of Project related activities (i.e., will be completed in advance of site clearing activities). These surveys are intended to identify sensitive wildlife features such as hibernacula, dens, nests, cavities, mineral licks, that would require specific mitigation measures to avoid or minimize adverse effects on identified features and are not species-specific. The methods associated with these pre-construction and pre-clearing sweeps will be tailored to species at risk (including myotis species) that may potentially be using habitats at certain times of the year. Depending on the results of these sweeps, appropriate mitigation measures will be developed and implemented. This is a risk-based approach with the intent of reducing the potential of important wildlife features being adversely affected during vegetation or land disturbance activities. The wildlife sweeps would be conducted within 7 days prior to disturbance activities, year-round, so that sensitive features can be identified, and appropriate mitigation measures (e.g., avoidance, timing delay) can be developed and implemented, as appropriate.</p> | <p>The Proponent indicated that wildlife sweeps would be completed within a period of seven days prior to project activities. Wildlife sweeps will be conducted rather than conducting species-specific surveys focused on species at risk. Sweeps will be based on timing of the Project and related activities focused on identifying features such as hibernacula that may require mitigation.</p> <p>The Proponent also indicated that the methods associated with these sweeps will be tailored to species at risk (including bats) that may potentially be using the habitat.</p> <p>Species specific surveys are required to reliably identify rare species, such as species at risk, which may not be captured by more general wildlife sweeps. It remains unclear how the Proponent will complete wildlife sweeps, identify appropriate mitigation measures and implement those, or how these measures will be assessed for effectiveness.</p> <p>Information is outstanding on how surveys will be tailored to species at risk. It is requested that the Proponent to provide information on the methods that will be used for tailored surveys to species at risk, including bats or for the Proponent to provide a discussion on why these methods cannot be developed as part of this review.</p> <p>For further clarity, Denison is expected to describe how the pre-construction and pre-clearing survey methods are targeted/tailored for each SAR, where surveys will be performed to address SAR habitat, and the approximate timing prior to disturbance along with appropriate scientific rationale. At a minimum, one paragraph must be provided for each SAR specifically addressing the items above.</p> <p>Also see: IR-142-159-167-R1</p> | See response to IR-142-159-167-R1. |

IR-142, IR-159, IR-167 -R1

- Department: ECCC
- Project Effects Link: Migratory birds
- Reference to EIS, appendices, or supporting documentation: Section 9.4.5.2.1 Work Timing Windows and Habitat Disturbance

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, July 8, 2024) |
|--------------|----------------|---|---|--|--|--|--|---|
| IR-142 | | <p>Context: The Proponent did not conduct any field work to identify potential wolverine dens in the Project area and therefore did not present any mitigations for the potential impacts to wolverine dens.</p> <p>In Section 9.3.3.2.1, the Proponent states: “Denning females are sensitive to disturbance during denning season in February to April and may abandon their dens and, in some cases, their litter, which may decrease their reproductive success. “</p> <p>In Section 9.3.6, the Proponent states: “In the Project Area, 145.0 ha or 100% of available wolverine habitat is assumed to be removed and will not be available to wolverine for the duration of the Project (Table 9.3-13). Similarly, 145.0 ha (3.4%) of available wolverine habitat within the Wildlife LSA is anticipated to be removed, all from the Project Area, during site clearing in Construction. In the Terrestrial RSA, up to 0.5% (145.0 ha; from the Project Area) of available wolverine habitat is anticipated to be removed during site clearing in Construction.”</p> <p>The residual effect assessment estimates that 8.2% of available wolverine habitat within the Terrestrial RSA may be altered or lost (Table 9.3-20).</p> <p>Rationale: As Wolverine is a Species at Risk Act Schedule 1 listed species, effects need to be identified, avoided, lessened and monitored. Mitigations, such as setback distances, should be used to protect important habitat features, such as dens.</p> <p>Wolverine occupy large home ranges and, therefore, need vast tracts of undisturbed land to maintain viable populations. The species avoids most human footprint types and linear features</p> | <p>1. Please provide additional information on whether the lost and/or altered wolverine habitat overlaps with wolverine home ranges.</p> <p>2. Describe any important wolverine habitat feature (i.e., dens) that may be lost as a result of the Project.</p> <p>3. Assess the need for pre- construction/pre-clearing surveys to identify any wolverine denning sites.</p> <p>4. Please provide additional information on whether the remaining, available, undisturbed wolverine habitat size is suitable to maintain populations.</p> | <p>1. While wolverine were not observed during baseline studies for the Project, it is assumed that the Project (Project Area, LSA) may overlap with wolverine home ranges. As described in the EIS, wolverine occur in low densities across all forest stand and vegetation types but are generally absent from areas of human development and activities.</p> <p>2. No wolverine dens were identified during any of the baseline studies. It is not anticipated that wolverine denning sites will be lost and/or altered because there are no specific landscape features typically used by wolverine as potential denning sites located in the Project footprint. Further, much of the proposed Project footprint will be developed within previously disturbed areas, including roads and cutlines.</p> <p>3. Pre-construction surveys will be completed to identify all sensitive wildlife habitat features, including wolverine denning sites.</p> <p>4. Most of the Project footprint is already disturbed through previous exploration activities. The total expected direct habitat loss of 169.6 ha includes the already disturbed areas. In the Terrestrial RSA, 8.2% of available wolverine habitat may be altered or lost; this includes 0.5% that will be cleared within the Project Area during Construction, and an additional 7.7% that may be altered through indirect effects (sensory disturbance). The magnitude of this effect was characterized as being "moderate" and the residual effect is not expected to result in a change that will alter wolverine habitat integrity to the point where it would not be able to sustain the regional populations of wolverine. This considers that no wolverine were observed during the baseline investigations, the small Project footprint, and the typically large size of a wolverine home range.</p> | <p>The information provided by the Proponent is complete, however, a follow up IR regarding survey methods for all pre-construction and pre-clearing surveys is required. See follow-up IR-142-159-167.</p> | n/a | n/a | n/a |
| IR-159 | | <p>Context and Rationale: Information presented in the draft EIS is insufficient to accurately predict Project impacts to breeding birds. The Proponent collected a single year of breeding songbird point counts and aerial waterfowl surveys (including avian species at risk). A single year of surveys in which birds may be unusually scarce or abundant could severely compromise interpretation of post-construction monitoring data.</p> <p>Additionally, data presented in the draft EIS is from 2017 and ECCC advises that more recent data is needed for a comprehensive baseline to verify Project impacts.</p> <p>Data from the Saskatchewan Conservation Data Centre (HABISask), the Saskatchewan Breeding Bird Atlas and the Boreal Avian Modelling project contain information on avian densities and avian species at risk that could supplement field data.</p> <p>The national standard for major projects recommends a minimum of two years of field surveys to be provided, so that temporal variability can be considered when comparing post-construction against baseline records and other available data.</p> | <p>Supplement breeding bird point count data and aerial waterfowl data collected during 2017 with additional pre-construction field data or existing post-2017 data/modelling to provide a comprehensive baseline that can be used to verify Project impacts during construction and operational phases.</p> | <p>The baseline data presented in the draft EIS are sufficient for the intended purpose – that is the data are sufficient, in conjunction with regionally available data, to identify potential project effects. The data collected as part of the baseline studies for birds was focused on the habitat types and areas most likely to be disturbed as a result of the Project. Conducting additional baseline surveys for waterfowl, raptors, and breeding birds is not anticipated to result in changes to the assessment outcomes and predictions made as part of the effects assessment, which was habitat-based, for avian species. The assessment methods used a conservative approach with the assumption that following the implementation of site-specific mitigation measures, the proposed Project activities would have a residual effect on these species guilds regardless of species presence on site.</p> <p>As described in the EIS, pre-construction surveys will be conducted prior to the commencement of any vegetation clearing or soil disturbance. Avian species will also be routinely monitored throughout the life of the Project. Results from the surveys and monitoring activities are expected to inform the adaptive management process to update Project design and identify the need for additional mitigation measures, if required. Note: Section 9.4.3.3 of the draft EIS includes all available information from the HABISask database at the time of the assessment. While recent surveys from Environment and Climate Change Canada and the Saskatchewan Breeding Bird Atlas have expanded surveys into the northern boreal forest, these data are not yet publicly available or published to make inferences on population trends for migratory songbirds that could use the available habitat in the Terrestrial RSA.</p> | <p>This response has not been accepted.</p> <p>The Proponent’s response indicated that their opinion is that the data presented in the draft EIS is sufficient and that no updates to the draft EIS are needed.</p> <p>However, a single year of baseline data from 2017 is insufficient to assess Project impacts during the follow-up and monitoring program. Although pre-construction surveys prior to clearing can give a very localized picture of the avian community, it does not provide a baseline within the Regional Study Area (RSA) of the bird community and will be of limited use for comparing construction and operational monitoring data to baseline conditions. Use of more recent data or supplemental data can account for interannual variation and any regional effects and will allow for a more accurate review of mitigation and follow-up measures.</p> <p>See follow-up IR-142-159-167-R1</p> | <p>Denison and its SME continue to be of the opinion that the data on which the effects assessment is based are sufficient and fit for purpose as it concerns the EA process. The effects assessment was not based on the 2017 field survey data alone. The EA used an accepted, proven habitat-based EA approach to address the variability of population surveys. Further, the EA used all available, recent/relevant survey data collected in appropriately timed and executed methodologies, including IK. The supplemental avian data received from records from the Saskatchewan Breeding Bird Atlas downloaded through the NatureCounts web portal (Saskatchewan Breeding Bird Atlas 2017), which also includes data received as part of the Saskatchewan Boreal Monitoring Strategy program. These data represent bird observations from 24-point counts conducted on June 7 and June 9, 2019. Nine point-counts are located approximately 6.5 km east of the Project footprint, the majority of which are located in the BS3 ecosite type; 15 point-counts are located approximately 7.7 km south of the Project footprint, the majority of which are located in the BS3/BS7 ecosite type. During this survey effort, 24 migratory songbird species were documented. A summary of the total number of individuals observed for each species across all plots is provided in Appendix 9-F of the revised Draft EIS. While the supplemental data do provide further context for the RSA, they would not be expected to alter the findings or the mitigation measures proposed, nor the conclusions reached in the EA.</p> <p>The above does not preclude the implementation of further breeding bird surveys prior to site development and operations. Denison accepts the comment that additional, more recent information, as well as supplemental data as available, and will provide the basis for a more effective review of mitigation and follow-up measures as the Project moves forward. The details of such follow-up monitoring will be defined as part of the further consideration of planning related to follow up programs.</p> <p>For clarification the pre-clearance wildlife sweeps are intended to identify sensitive wildlife features (e.g., hibernacula, roosting habitat, dens, nests, mineral licks) that would require site-specific mitigation measures to limit or avoid adverse effects. The spatial scale of where these pre-construction sweeps would be completed could be expanded to include other areas beyond the Project Area but within the RSA.</p> | n/a (accepted) | n/a |
| IR-167 | - | <p>Context and Rationale: The Proponent has stated that when it is not practicable to clear outside of the breeding bird window, they will conduct pre-clearing</p> | <p>Provide the following information:</p> | <p>Site clearing and other works that involve disturbance of vegetation and/or soil will be completed during least-risk timing windows for</p> | <p>Response is accepted, but also see AD-57 in the Advice to Proponent</p> | n/a | <p>Response is accepted, but also see AD-57 in the Advice to</p> | <p>See response to IR-142-159-167-R1 below.</p> |

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, July 8, 2024) |
|--------------|-----------------------------|--|---|---|--|--|---|--|
| | | <p>surveys. Section 9.4.5.2.1 states: “Prior to commencing any site clearing (i.e., vegetation clearing and/or soil disturbance) during the nesting season, pre-clearing nest surveys will be conducted at that location within the Project Area.”</p> <p>ECCC does not recommend the use of nest searches or pre-clearing surveys for active bird nests during the breeding season as a mitigation, given the difficulty associated with finding nests reliably and the high likelihood of disturbing nesting birds when searching. Instead, ECCC recommends that clearing and grubbing activities not be conducted during the breeding bird season.</p> <p>The Migratory Birds Regulations 2022 (MBR 2022) brings new scenarios that need to be considered:</p> <ol style="list-style-type: none"> Most migratory birds: <ul style="list-style-type: none"> Nests are protected only when they are in use or when live eggs or chicks are present. Migratory birds listed in MBR 2022 Schedule 1: <ul style="list-style-type: none"> For the 18 species of migratory birds identified on Schedule 1, the MBR 2022 provide year-round nest protection until they can be deemed abandoned. Migratory birds listed under SARA: <ul style="list-style-type: none"> For some SARA listed migratory birds, the residence prohibition (s.33) will protect nests that are not active, but are re-used in subsequent years, and the critical habitat prohibition (s.58) will protect nests that are part of the critical habitat identification. Those prohibitions apply everywhere in Canada and at all times of the year. In these cases, a SARA permit will be required. | <ul style="list-style-type: none"> details on how vegetation clearing related to site development will be conducted to minimize risk to migratory birds and species at risk (SAR). the timing window that will be used for vegetation removal to reduce risk to migratory birds and SAR | <p>migratory birds and SAR (i.e., winter), where practical, to avoid disturbance during sensitive time periods. It is noted that additional information related to timing windows and species as it concerns Project activities has been provided in response to IR-134.</p> <p>Pre-clearing surveys will be conducted and set-back buffers implemented, as needed. The pre-clearance surveys will be completed prior to all clearing events, regardless of the time of year / season when clearing is set to occur. If nests or tree cavities should be encountered during pre-construction surveys or ongoing monitoring activities, any subsequent Project activities will be in accordance with the 2022 Migratory Birds Regulations.</p> | table and follow-up IR-142-159-167-R1. | | Proponent table and follow-up IR-142-159-167-R1. | |
| n/a | IR-142, IR-159, IR-167 - R1 | | n/a | n/a | <p>Provide survey methodology and timing for all preconstruction and pre-clearing surveys, including avian and species at risk surveys (caribou, wolverine).</p> | <p>As noted in the August 2023 IR responses, site clearing and other works that involve disturbance of vegetation and/or soil will be completed during least-risk timing windows for migratory birds and SAR (i.e., winter), where practical, to avoid disturbance during sensitive time periods.</p> <p>However, in the event that site clearing activities or other works are anticipated to occur during a sensitive timing window for migratory birds and SAR, the pre-disturbance wildlife sweeps would be conducted by qualified biologists at least 7 days prior to any scheduled vegetation/land disturbance. The biologist would search the proposed area to be cleared, plus a 100 m buffer, for sensitive wildlife features that may be used by avian SAR (e.g., nests and/or nesting cavities), woodland caribou, and bats (e.g., roosting sites/cavities). The wildlife sweeps will not be species-specific surveys focused on species at risk per se, but will be based on timing of Project related activities (i.e., will be completed in advance of site clearing activities). These surveys are intended to identify sensitive wildlife features such as hibernacula, dens, nests, cavities, mineral licks, that would require specific mitigation measures to avoid or minimize adverse effects on identified features and are not species-specific. Nevertheless, the methods associated with these pre-construction and pre-clearing sweeps will be tailored to species at risk that may potentially be using habitats at certain times of the year. For example, methods will include searching prominent topographic features such as rock outcropping or downed forest trees and debris where wolverine may establish denning sites. In the event the sweeps are conducted during the winter period, methods related to snow tracking would identify wolverine presence based on tracks and potential denning sites in the snow pack within ravines or drainages within the forested areas within the study areas (as per Resources Inventory Committee 1999). Additionally, methods will include searching for potential roost trees for bat species, as per protocols included in the Wildlife Habitat Features Field Guide (BC Ministry of Environment and Climate Change Strategy, Ecosystems Branch 2019). Depending on the results of these sweeps, appropriate mitigation measures will be developed and implemented.</p> <p>If sensitive wildlife features are found, they will be documented (e.g., photographs, GPS location recorded). The data collected would inform the development and implementation of appropriate mitigation measures (e.g., appropriate set-back distances for Project activities and/or consideration of timing windows as per SK MOE (2017), in consideration of applicable laws and regulations (e.g., Migratory Birds Conservation Act, Wildlife Act), as appropriate.</p> <p>References:</p> <p>B.C. Ministry of Environment and Climate Change Strategy Ecosystems Branch. 2019. Wildlife Habitat Features Field Guide (Kootenay Boundary Region). October 2019. Pp. 119</p> | <p>The Proponent notes that:</p> <ul style="list-style-type: none"> Site clearing and other works that involve disturbance of vegetation and/or soil will be completed in winter. Pre-disturbance wildlife sweeps would be conducted by qualified biologists at least seven days prior to any scheduled vegetation/land disturbance. Mitigation measures to avoid or minimize adverse effects on identified features are not species specific. The methods associated with these pre-construction and pre-clearing sweeps will be tailored to species at risk that may potentially be using habitats at certain times of the year. Methods will include searching for potential roost trees for bat species, as per protocols included in the Wildlife Habitat Features Field Guide (BC Ministry of Environment and Climate Change Strategy, Ecosystems Branch 2019). If sensitive features are found, then they will be documented, and data collected would inform the development and implementation of appropriate mitigation measures. <p>It is unclear what is meant by “surveys are not species-specific” but sweeps will be “tailored to the species at risk”. It is also unclear how mitigation measures will be developed and implemented in a seven-day period.</p> <p>In order for ECCC and CNSC to provide advice on potential effects to SAR based on the habitat potential mapping, the development of species-specific mitigation measures needs to be produced for review during this assessment process. The Proponent also needs to provide details on follow up and monitoring programs that are in place to confirm that the mitigation measures implemented are effective.</p> <p>In addition, ongoing monitoring is required for SAR. Denison is expected to describe the planned monitoring and follow-up programs for SAR. Denison must justify how the proposed methods are adequate to provide a baseline for each SAR, to verify</p> | <p>The requested information on species at risk pre-clearance sweeps are summarized below in Attachment IR-142, IR-159, IR-167-R1 (Round 3).</p> <p>Denison and its SMEs believe we have provided sufficient information and analysis in the EIS, associated supporting documents and IR responses for the federal government to make a determination as to the effect of the Project on SAR, within the approved scope of the Project and CEEA 2012.</p> <p>Commensurate with the stage of the Project and EA process conceptual level detail for monitoring and follow-up programs (see EIS Appendix 16F) and a description of the programs fit into the overall environmental management system (EIS Section 2.9) have been provided. Further details regarding these programs have been provided in response to various IRs. Denison continues to refine the program level detail, and in parallel develop its plan level documentation to support CNSC licensing and provincial permitting. Any ongoing monitoring for SAR will be detailed in the Wheeler River Project’s Environmental Management Program documentation, including for example the Biodiversity Management Plan. We also note that ongoing SAR management is under Provincial jurisdiction. For reference, within the EIS, the EMS framework is described in Section 2.9, wildlife monitoring plans are provided in Section 9.3.8, avian monitoring plans are provided in 9.4.8, and a summary of general and species-specific mitigation measures is provided in Appendix 9-D. Briefly, wildlife and avian species will be routinely monitored throughout the life of the Project in accordance with the wildlife monitoring plans. An adaptive management process will be employed, after applicable consultations and approvals, where implemented mitigation measures are found to be unsuccessful.</p> |

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, July 8, 2024) |
|--------------|----------------|-----------------------|--------------------------|---|-----------------------------|--|--|--|
| | | | | | | <p>Resources Inventory Committee. 1999. Inventory Methods for Medium-Sized Territorial Carnivores: Coyote, Red Fox, Lynx, Bobcat, Wolverine, Fisher and Badger. Standards for Components of BC's Biodiversity No. 25. Ministry of Environment, Lands and Parks.</p> <p>Saskatchewan Ministry of Environment (SK MOE). 2017. Saskatchewan Activity Restriction Guidelines for Sensitive Species. https://publications.saskatchewan.ca/api/v1/products/79242/formats/89555/download (accessed July 2021).</p> | that mitigation measures are effective, and to allow for statistically robust comparison to assess potential impacts on SAR over the lifecycle of the project. | |

Attachment IR-142, IR-159, IR-167-R1 (Round 3)

Table 1: Species at Risk Survey Methods

| Species of Concern | Baseline Survey Results | Assessed in the EIS | Important Habitat and Needs | Survey Target Areas | Survey Technique | Timing | Action if Species Detected | Information Source |
|--------------------------------------|---|---------------------|--|---|---|---|---|--|
| Northern Leopard Frog | Not observed. | Appendix 9-D | From winter sites, adult frogs travel up to 1.6 km to breed. | Wetlands/ water/ riparian / wet/ moist/ scrublands/ bogs/ fens. | Visual searches for egg masses or frogs. | Snow/ice-free early spring and spring season. | Pond setback; 10m (low); 200m (Mod) and 500m (High); | MOE (2017) |
| | | | They breed in the shallow, warm waters of a variety of wetlands including marshes, springs, flooded ditches, dugouts, borrow pits, beaver ponds, margins of lakes, and slow-moving waters of streams and rivers. | | Auditory call surveys. | April 20 to June 10. | | |
| | | | After breeding, adults and sub-adults may disperse up to 8 km from breeding ponds. | | | | | |
| | | | Northern Leopard Frogs usually do not utilize areas that are heavily wooded | | Visual searches for egg masses or frogs. | Snow/ice-free early spring and spring season. | | |
| | | | They forage in the summer in riparian or upland habitats. These areas are moist habitats including meadows, pastures, scrublands, riparian corridors, and drainage or irrigation ditches. | | Visual searches for egg masses or frogs. | Snow/ice-free early spring and spring season. | | |
| Little Brown Myotis and Northern Bat | 34 ultrasonic detections of little brown/northern myotis. | Appendix 9-D | The presence of large snags, tree cavities, is an important attribute in old growth forest stands that provides maternity roosts and day roosts for northern myotis and little brown bats. Building are also used. | Treed areas with the largest diameter and/or older trees. Focus on older forest, or areas with large snags in younger forest within the project footprint (majority is regenerating forest 1-5m). | Daytime visual search of trees and potential roost sites. Systematic meandering search of areas to be cleared during active bat season. Focus on searching for roost features (snags, cracks, stumps, cavities, bark peeling) and bat sign (e.g., guano). | May to Sept | Should a roosting bat be discovered the area will be afforded protection from clearing for 24 hours and re-surveyed. The area will only be cleared if no bats are discovered. A 100 m buffer will be given to nursery roots and 50 m to daily roosting bats. If many roosting bats are recorded compensation will be considered (e.g., bat houses). | COSEWIC (2013a); Resources Information Standards Committee (RISC) (2022) |

| Species of Concern | Baseline Survey Results | Assessed in the EIS | Important Habitat and Needs | Survey Target Areas | Survey Technique | Timing | Action if Species Detected | Information Source |
|--------------------|-------------------------|---------------------|---|--|---|--------------------|---|--|
| | | | Foraging habitat in proximity to roosting sites is also an important factor in roost selection. | Treed areas in proximity to clearings, wetlands and open water. | | Year Round | Roost/Foraging site; 100m(low); 500m (Mod) and 500m (High); | MOE (2017) |
| Wolverine | Not observed. | Section 9.3 | A wide variety of forested and vegetation associations are used by wolverine. Habitats must have an adequate year-round supply of food, mainly consisting of smaller prey such as rodents and Snowshoe Hares, and the carcasses of large ungulates, like Moose, Caribou, and Muskox. | All areas of project activity. | Winter den searches. | Snow cover months. | Setback of 250m when occupied and 100m when unoccupied. | COSEWIC (2014); Environmental Protection and Management Guideline (2024) |
| | | | Females den under snow-covered rocks, logs or within snow tunnels. Wolverines reproduce in areas where snow cover persists at least into April. | | | | | |
| Woodland Caribou | Observed. | Section 9.3 | Woodland caribou may occupy all potential project areas but prefer forests greater than 40 year of age. | All areas of project activity. | Visual search to ensure no caribou are in the area. Ongoing vigilance. | Year Round | If caribou are within the Project area cease operations until they are clear of the area. | SME (2021) |
| Rusty Blackbird | Not observed. | Section 9.4 | Rusty blackbird primarily nests in small conifers, predominantly spruce. In Canada, nests have also been found in Balsam Fir, Eastern White Cedar, Paper Birch, Balsam Poplar, Red Maple, Pin Cherry, emergent sedges, cattails, and on the ground on a beaver dam | All habitat with spruce, white birch and balsam poplar. Very limited suitable (spruce) habitat within project footprint. | Visual search for nests. | MBCA window | A 75 m buffer around coniferous bogs, fens and other wetlands suitable for Rusty blackbirds (Odsen and Pyper 2019). | Environment Canada. (2015); Odsen and Pyper (2019); Wildlife Division (2020) |
| | | | We only have spruce, birch and poplar at Wheeler. | | | May 1 to July 31 | Nest setback of 0-50m (low activity); 150m (Mod activity) and 300m (High activity); | Manitoba Conservation (2021) |
| Yellow Rail | Not observed. | Section 9.4 | Yellow rails inhabit shallow wetlands and other wet areas with grass-like vegetation. | Using available mapping conduct daytime Ecosite verification and stratify surveys in appropriate habitat only. Based on available mapping, no suitable habitat within project footprint. | Mid May to mid to late June. Triplicate nocturnal (23:00-03:00) call-playback surveys spaced at least 4 days apart. Or use Autonomous Recording Units throughout the breeding season. | | | Environment Canada (2012); SME (2014) |
| | | | They breed in wetlands such as damp hay fields or meadows, floodplains, bogs, upper levels of estuaries, salt marshes | | | | | |
| | | | These wetlands are generally dominated by short, fine-stemmed herbaceous vegetation, especially sedges (Carex spp.), as well as other graminoid vegetation of the families Cyperaceae, Poaceae, and Juncaceae. Vegetation structure (e.g. short, grass-like, and dense) is likely more important than its taxon | | | | | |

| Species of Concern | Baseline Survey Results | Assessed in the EIS | Important Habitat and Needs | Survey Target Areas | Survey Technique | Timing | Action if Species Detected | Information Source |
|--------------------|--|---------------------|--|--|-------------------------------------|-------------------|--|------------------------------|
| | | | Breeding habitats may have up to 50 cm of standing water, but typically nesting sites are less than 15 cm deep | | | May 1 to July 15 | Nest site setback; 100m(low); 150m (Mod) and 350m (High); | MOE (2017) |
| Bank Swallow | Not observed. | Appendix 9-D | The Bank Swallow readily breeds in a wide variety of low-elevation (< 900 m), natural and anthropogenic habitats, including: lake and ocean bluffs; stream and river banks; sand and gravel pits; roadcuts; and piles of sand, topsoil, sawdust, coal ash, and other materials. | Survey key habitat features identified as important. | Visual survey during timing window. | May 15 to July 31 | Nesting Colony Setback; 50m (low); 150m (Mod) and 300m (High); | Manitoba Conservation (2021) |
| | | | Nest burrows are nearly always in a vertical or near-vertical bank (range: 76-105° slope; | | | | | COSEWIC (2013b) |
| | | | In some cases, Bank Swallows have nested in drain pipes and in structures designed and built specifically for nesting Bank Swallows | | | | | |
| Barn Swallow | Four visual/auditory detections. | Appendix 9-D | Nest on horizontal and vertical structures that include natural sites, such as cliffs and caves, as well as human-made structures, such as barns, bridges, and culverts . The nesting substrate must be rough, or have a ledge or projecting objects, such as bolts or light fixtures, to provide additional structural support to the nest. | Open areas in proximity to water. All buildings and man made structures. | Visual. | May 15 to Sept 30 | Nest site setback; 50m (low); 100m (Mod) and 100m (High); | Manitoba Conservation (2021) |
| | | | Nesting sites must provide access to open areas with an abundant supply of aerial insects to feed on; features such as wetlands, waterbodies, watercourses, meadows, grazed grassland, and farmland are preferred . Proximity to a waterbody or moist area with a supply of wet mud is needed to facilitate nest construction. | | | | | COSEWIC (2021a) |
| Common Nighthawk | Two nests, five visuals and 76 auditory/visual detections. | Section 9.4 | Nests are typically in open sites with dry, well-drained substrates that will not overheat and that have shade nearby for young to shelter from the sun and predators. Nest sites include forest clearings, bare patches in grassland, gravel pits, outcrops, road or rail sides, and, rarely, fenceposts. | All upland habitat. | Visual searches. | May 1 to Aug 31 | Nest site setback; 0-50m (low); 150m (Mod) and 300m (High); | MOE (2017) |
| Horned Grebe | One observation. | Appendix 9-D | More than 90% of the Horned Grebes in North America breed in ponds and lakes in western and northern Canada. | Water bodies within the project area. | Visual searches. | May 1 to Sept 15 | Nest site setback; 100m (low); 200m (Mod) and 400m (High); | Manitoba Conservation (2021) |
| | | | | | | | | COSEWIC (2009) |

| Species of Concern | Baseline Survey Results | Assessed in the EIS | Important Habitat and Needs | Survey Target Areas | Survey Technique | Timing | Action if Species Detected | Information Source |
|------------------------|-------------------------|---------------------|---|---|-----------------------------------|-------------------|---|---------------------------|
| Olive-sided Flycatcher | Fourteen observations. | Section 9.4 | Olive-sided Flycatcher has been widely observed in open coniferous or mixed coniferous forests, often located near water or wetlands with the presence of tall snags or trees | All conifer and/treed upland areas. | Call-playback or visual searches. | May 1 to Aug 31 | Nest setback; 100m (low); 300m (Mod) and 500m (High); | MOE (2017) |
| | | | Data gathered from points across Canada indicate that mature conifer stands within patchy landscapes influenced by natural disturbance (e.g., recent burns) support the highest densities | | | | | Environment Canada (2016) |
| | | | Olive-sided Flycatcher prefers post-burn areas or wetlands that create open habitats for the species to forage | | | | | |
| Short-eared Owl | Not observed. | Section 9.4 | Nesting generally occurs in large open areas | Open upland and lowland areas with no trees and some shrub cover. | Call-playback or visual searches. | March 25 to Aug 1 | 100m (low); 300m (Mod) and 500m (High); | MOE (2017) |
| | | | Requires a minimum area of about 50-100 ha, consistent with the mean territory size of 82 ha reported in Manitoba. | | | | | COSEWIC (2021b) |
| | | | In the north, nests are primarily in tundra (Sinclair et al. 2003), and sometimes beside a small shrub that provides cover | | | | | |

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Ministry of Environment (MOE 2017), Fish, Wildlife and Lands Branch. April 2017. Activity Restriction Guidelines for Sensitive Species. Regina, Saskatchewan. 4pp.

Resources Information Standards Committee (RISC). 2022. Inventory Methods for Bats, Standards for Components of British Columbia's Biodiversity No. 20. Version 3.0. B.C. Ministry of Land, Water and Resource Stewardship, Ecosystems Branch, Victoria, B.C.

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- Department: ECCC CNSC
- Project Effects Link: Wildlife and Wildlife habitat
- Reference to EIS, appendices, or supporting documentation: Section 9.3.5.2, Additional Wildlife- specific Mitigation Measures

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, June 2024) |
|--------------|----------------|---|---|--|--|---|---|---|
| IR-149 | - | <p>Context: The EIS describes that ongoing research is performed to inform the development of a Woodland Caribou Management Plan. This includes studies on the effectiveness of linear disruption features on predator/prey movements, and a field program for long-term reclamation planning. Moreover, it is stated that the Plan will include a detailed assessment of the need for habitat offsets.</p> <p>The draft EIS Section 9.3.5.2 states: “A wildlife monitoring plan and a Woodland Caribou Management Plan will be developed to address wildlife-specific mitigation measures based on proven and accepted mitigation following standard industry guidelines and BMPs. The plans will provide guidance to avoid or minimize potential adverse effects of the Project on wildlife and wildlife habitat, including monitoring and follow-up programs, as appropriate. It will be in place during all phases of the Project and will be subject to ongoing review and revision as required. If monitoring identifies a need for additional or revised mitigation measures, a process of adaptive management (as described in the plan) will be triggered.”</p> <p>Rationale: The draft EIS does not present sufficient species-specific mitigation measures for boreal caribou. ECCC is not able to assess potential residual impacts to caribou without specific mitigations.</p> <p>Since the Woodland Caribou Management Plan is still under development, it is difficult to judge whether the measures will be adequate to mitigate and/or offset potential project effects on Woodland caribou and its critical habitat.</p> | <p>Provide the Woodland Caribou Management Plan, to demonstrate effective mitigation of potential project effects, along with wildlife-specific mitigation measures for review.</p> <p>The Plan should be informed by and consistent with the Boreal Caribou Recovery Strategy and demonstrate that avoidance and minimization measures will be applied to mitigate for predicted Project effects to boreal caribou and its critical habitat prior to considering offsetting measures. That is, the Plan should follow the mitigation hierarchy and information should be provided as outlined below:</p> <p>1. AVOID: Describe all measures that will be taken to avoid effects to boreal caribou and avoid the destruction or alteration boreal caribou critical habitat.</p> <p>2. MINIMIZE: Describe all measures that will be taken to minimize the effects to boreal caribou and minimize the destruction of boreal caribou critical habitat.</p> <p>3. RESTORE ON-SITE: describe the measures that will be taken to restore disturbed areas of the project, related to construction, operation and maintenance, on boreal caribou critical habitat, remaining after considering the avoidance and minimization measures.</p> <p>4. Characterize the risk of the adverse effects that are likely to result from the project on boreal caribou and its critical habitat after avoidance minimization, and onsite restoration measures have been considered.</p> <p>5. OFFSET: Describe the measures that will be implemented outside the Designated Project area to mitigate adverse effects, destruction or alteration of boreal caribou critical habitat by the Designated Project during construction and operation.</p> <p>6. Characterize the risk of the adverse effects that are likely to result from the project on boreal caribou and its critical habitat after avoidance, minimization, onsite restoration, and offset measures have been considered.</p> <p>Describe all relevant uncertainties on the effectiveness of the measures to address adverse effects on boreal caribou and the rationale for the selected measure, in light of the mitigation hierarchy.</p> <p>See also related IRs: IR-149 and IR-157.</p> | <p>Denison considers the EA to be a planning and decision-making tool that assesses the potential effects of the Project in a careful and precautionary manner and integrates results of engagement with Indigenous nations and communities. As such, the EA is a process for identifying the Project’s potential interactions with the biophysical and human environment, predicting potential adverse effects, identifying mitigation measures, and evaluating residual and cumulative effects remaining after mitigation. The EA also outlines the proposed efforts for monitoring and reporting to verify compliance with the terms and conditions of EA approval and to assess the accuracy and effectiveness of predictions and mitigation measures presented in the EA. Denison views the EIS as an important planning tool that will be used to support future activities and represents one stage in the rigorous overall approvals process for a uranium mining facility in Canada. Denison is completing a sequential EA and licensing process for the Project. In the EIS, a framework for the Environmental Management System (EMS) is provided along with a clear commitment for Denison to include Project design and species-specific mitigation measures into the EMS documents as they are developed / as the Project proceeds through the licensing and permitting phases.</p> <p>The selection of valued components (VC), with key indicators (KI), and associated measurable parameters is an important part of scoping in each biophysical and human environment assessment. Woodland caribou were selected as a VC in the Terrestrial Environment assessment for a variety of reasons including a recognition of caribou as an important cultural and subsistence species, the conservation status of caribou, and that Project activities and infrastructure may affect woodland caribou populations. For the woodland caribou VC, the KI selected was also woodland caribou. The measurable parameters for the caribou VC/KI were: 1. amount of habitat that may be altered or lost relative to its availability in the Terrestrial RSA; and, 2. woodland caribou mortalities directly or indirectly attributable to the Project.</p> <p>The main Project interactions identified in the caribou assessment were: direct habitat loss, sensory disturbance, collisions with Project vehicles and equipment, and harvest and/or predation. Accordingly, the potential effects evaluated for caribou were: 1. amount of habitat that may be altered or lost relative to its availability in the Terrestrial RSA; and, 2. mortalities directly or indirectly attributable to the Project. Denison undertook the evaluation and assessment of potential effects on caribou in a conservative fashion to provide confidence in the assessment conclusions. For instance, where granular data concerning seasonal distribution and specific landscape uses were not available the approach was to assume the caribou at all life stages were present during all seasons. Additionally, the caribou assessment used conservative assumptions to categorize ‘available’ habitat. Denison also committed to important mitigation measures such as pre-clearance surveys, among other things.</p> <p>The EIS has demonstrated that the Project, as proposed and assessed, is predicted to minimize the potential for environmental adverse effects on caribou and their habitat before any Project specific construction occurs. The conclusions of the assessment predicted that the likely residual effects of the Project on caribou were not significant.</p> <p>Denison met with ECCC representatives on April 20, 2023, and agreed to provide a conceptual caribou mitigation plan as part of the IR response package, and also</p> | <p>This response has not been accepted.</p> <p>The Conceptual Caribou Management Plan does not provide sufficient detail to understand if using the restoration trials as an offset will produce satisfactory habitat compensation to address the Project effects to caribou.</p> <p>Additional clarity on the Proponent’s role in the Developing Eco-restoration Together program is required, such as how the outcomes of these programs will result in mitigation measures and offsetting requirements. Additional clarity on the scope of the program should also be provided so that ECCC can understand the objectives and deliverables of the program.</p> <p>See follow-up IR-149-R1A, IR-149-R1B and AD-71 in the Advice to Proponent table</p> | <p>For context, the responses that have been provided to caribou IR-related elsewhere in this response table (IRs 37, 143, 143-144-R1, 143-145-R1, 144, 145, 148, 151, 155, 156) have relevance to the this, and other IR responses, and it is recommended that all of this information be considered in its entirety. The afore-referenced IR responses include descriptions of additional data that have been obtained and collated and analyses and interpretation that have been completed in relation to the presence of caribou and suitable habitat in Project study areas. At time therefore, Denison and its SME believe there are no material data/information gaps the prevent or constrain the analysis of Project and cumulative effects, defining the appropriate mitigation measures, and establishing the required offset within the provincial offsetting framework.</p> <p>With respect to data gaps, the following is noted:</p> <p>• As described herein, additional data have been obtained and presented in Appendix 9-F. These data help to link caribou data, habitat/ecosite data and habitat suitable into the analysis. It is noted based on the new perspectives the overall conclusions of the caribou assessment are unchanged. While it is acknowledged that data may be lacking on the range level, Denison as a Project proponent is not responsible for and need not a complete a range assessment for the purpose of a Project-specific cumulative effects assessment.</p> <p>With respect to mitigation measures, the following is noted:</p> <p>• Denison and its SME have re-considered the mitigation measures presented in the EIS documentation to date in light of updated caribou-related information and does not see that further mitigation measures are needed at this time.</p> <p>With respect to offset, the following is noted:</p> <p>• Denison continues to work collaboratively with Saskatchewan Ministry of Environment (MOE) on their requirement for an offset for adverse effects on caribou habitat. Denison has advanced the Project-related Caribou Management Framework within the context of the province’s offsetting framework. The updated document is provided with this second round IR submission.</p> <p>With respect to monitoring, the following is noted:</p> <p>• Denison has committed to monitor for the presence of woodland caribou primarily within the Project Footprint as well as other areas within the Terrestrial RSA based on accepted methods that will be developed as part of its wildlife monitoring follow-up program as part of the implementation of its Environmental Management System. As it is understood, aerial surveys to document presence and habitat use are not permitted by the Saskatchewan Ministry of Environment at this time, Denison conceptually proposes to document the presence of woodland caribou using remote cameras placed strategically within representative habitat types within the Terrestrial RSA and a wildlife observation tracking log (based on the Project-wide implementation of the current wildlife card system Denison has in place). As Denison works collaboratively with the Saskatchewan Ministry of Environment to finalize the Caribou Management Framework, further details on monitoring in conjunction with the offset commitment will be developed.</p> <p>In direct response to the questions raised in the review comment the following is noted:</p> <p>• Denison continues to work collaboratively with Saskatchewan Ministry of Environment (MOE) on their requirement for an offset for adverse effects on caribou habitat. Denison has advanced the Project-related Caribou Management Framework within the context of the province’s offsetting framework. The MOE has reviewed the draft framework and has provided Denison a notification of their support. Subject to finalization and provincial acceptance, the framework will provide the means to address/offset all residual adverse effects (i.e., those remaining after the</p> | <p>Note to Denison: This would be accepted if Denison is able to make a commitment as noted below. The IR has not been fully resolved. The Proponent has updated Appendix 9-F to link caribou data, habitat/ecosite data and habitat suitability in its analysis which remain unchanged from conclusions provided in the EIS and has committed to monitoring using remote cameras for presence of caribou within the Project Footprint and within the Terrestrial RSA as part of the Environmental Management System. However, the Caribou Management Framework is still lacking the requested information on the amount of offset required to mitigate effects to caribou. Without the intended outcomes of the offsetting plan, there remains uncertainty regarding whether effects are adequately addressed in a manner that is consistent with the species Recovery Strategy. Additionally, the generic mitigation measures have not been updated to include factors, such as sensory disturbances, during important life stages.</p> <p>In order for ECCC and CNSC to provide additional technical advice on potential impacts to caribou, the Proponent would need to provide the previously requested information on the amount of habitat required to mitigate the adverse effects to caribou resulting from the Project and update the mitigation measures to include factors, such as sensory disturbances, during important life stages.</p> <p>Given that ECCC and CNSC understand that the Province of Saskatchewan and ECCC’s Canadian Wildlife Service are in communication on the Denison’s caribou management plans, and the province’s offsetting plan is underway, if Denison are willing to add a commitment to the Commitments Register, this IR could be resolved. The commitment text would include the commitment that “Denison’s offsetting plan will meet the objectives of the Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal population, in Canada.”</p> <p><i>Proposed rationale text for posting: Denison has captured their commitment related to caribou management and offsetting in the Commitments Register, so this IR has been accepted.</i></p> | <p>Denison’s understanding is that by meeting the Provincial offset requirements, as part of the Saskatchewan range planning, the company will be meeting the objectives of the recovery strategy since the Province is responsible for caribou management. To provide a clear affirmation of Denison’s commitment to offsetting, we have added the following commitment to the Commitment Register (version 2) as Commitment 9-35:</p> <p>“Denison will develop an offsetting plan to satisfy the requirements of the Province of Saskatchewan offsetting framework that the province has created to fulfill its obligations as it concerns implementing the objectives of the Recovery Strategy for the Woodland Caribou (<i>Rangifer tarandus caribou</i>), Boreal population, in Canada.”</p> |

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, June 2024) |
|--------------|----------------|--|--------------------------|---|--|--|--|---|
| | | | | <p>include the conceptual plan in the final EIS. As such, the Project’s Conceptual Caribou Mitigation Plan is provided as Attachment IR-149 and will be included in the final EIS.</p> <p>The framework for the Conceptual Caribou Mitigation Plan (the Plan) was developed during discussions between Denison and Saskatchewan Ministry of Environment (ENV) in May and June 2023. The Plan is an evergreen document. It will be consistent with the management goals of ENV for the SK-1 caribou conservation unit and will be developed/refined in consultation with local communities including English River First Nation and Kineepik Métis Local in Pinehouse and ENV. Since the boreal caribou range plan for SK-1 is under development, it is understood that this Plan will be updated as more information becomes available. The conceptual nature of the Plan at this time is in part due to the absence of range plan priorities and reflects Denison’s commitment to continue to work with ENV to meet the management objectives and management strategies for the SK1 range. This approach acknowledges that the responsibility for woodland caribou management lies with the Province of Saskatchewan. Broadly, the province is responsible for developing range plans or management plans which build on the federal recovery strategy by setting goals and objectives for maintaining sustainable population levels. The EIS has demonstrated that the Project, as proposed and assessed, is predicted to minimize the potential for environmental adverse effects on caribou and their habitat before any Project specific construction occurs. The conclusions of the assessment predicted that the likely residual effects of the Project on caribou were not significant.</p> | | <p>application of the proposed mitigation measures) of the Project on caribou that are under provincial jurisdiction.</p> <p>• We also note that the Eco-restoration Together (ERT) program is no longer considered within the context of the Project-related Caribou Management Framework that outlines the offset plans that Denison has been working closely with Saskatchewan MOE to develop. The ERT program will focus primarily on site restoration techniques for decommissioning. The offset requirements that are being developed are those that will fulfill provincial requirements under their offsetting program scheme.</p> <p>• Further, Denison has committed to monitoring the effects on wildlife, as per the Wildlife Management Plan. The findings of the monitoring programs are expected to inform Denison, through an adaptive management process, of the need, if any, for additional mitigation measures.</p> | | |
| IR-149 | IR-149-R1A | <p>Context: Much of the information presented in the Conceptual Caribou Management Plan is qualitative in nature and does not present specific details regarding a quantitative assessment of impacts following measures to avoid, minimize, and restore on-site and then assess residual effects and determine the offset required to counterbalance the remaining impacts. This is required to understand if offsetting is sufficient to address impacts to caribou. The Proponent also does not provide details on methods that will be used for pre-disturbance wildlife clearance surveys. ECCC is aware that that the Proponent will be participating in restoration trials as part of the ‘Developing Eco-restoration Together’ program.</p> <p>Rationale: ECCC requires the quantitative details on the assessment of impacts to be included within the Conceptual Caribou Management Plan to adequately assess how the Proponent has applied the mitigation hierarchy. Details on the methods that will be used for pre-disturbance wildlife clearance surveys will also be required to verify that the Proponent has adequately considered how they have avoided, mitigated, or restored impacts to caribou.</p> <p>While ECCC understands that the Proponent will be participating in restoration trials as part of the ‘Developing Eco-restoration Together’ program, however, more clarity on the Proponent’s role in the program and the scope of the program is required. Details such as how the outcomes of these programs will result in mitigation measures and offsetting requirements and additional clarity on the scope of the program should also be provided so that ECCC can understand the objectives and deliverables of the program</p> | n/a | n/a | <p>1. Provide a quantitative assessment of impacts following measures to avoid, minimize and restore on-site and then assess residual effects and determine the offset required to counterbalance the remaining impacts.</p> <p>2. Provide details on methods to be used for pre-disturbance wildlife clearance surveys.</p> <p>3. Provide details on the Proponent’s role in the Developing Eco-restoration Together program and how that work may be used in offsetting requirements.</p> <p>4. Provide the scope (i.e., quantitative habitat amount) of the Eco-restoration Together program.</p> | <p>Please see response to IR-149.</p> <p>In addition, in direct response to IR-149-R1A the following is noted.</p> <p>1. Denison continues to work collaboratively with Saskatchewan Ministry of Environment (MOE) on their requirement for an offset for adverse effects on caribou habitat. Denison has advanced the Project-related Caribou Management Framework within the context of the province’s offsetting framework. The MOE has reviewed the draft framework and has provided Denison a notification of their support. Subject to finalization and provincial acceptance, the framework will provide the means to address/offset all residual adverse effects (i.e., those remaining after the application of the proposed mitigation measures) of the Project on caribou that are under provincial jurisdiction.</p> <p>2. For clarification, the pre-construction and pre-clearing surveys will consist of wildlife sweeps conducted by qualified biologists within 7 days prior to any clearing activity at a specific location, and a 100 m buffer, within the Project Footprint. The wildlife sweeps are intended to identify sensitive wildlife features such as hibernacula, dens, nests, cavities, mineral licks, that would require specific mitigation measures to avoid or minimize adverse effects on identified features and are not species-specific but will be based on timing of Project related activities (i.e., will be completed in advance of site clearing activities). This is a risk-based approach with the intent of reducing the potential of important wildlife features being adversely affected during vegetation or land disturbance activities. The methods associated with these pre-construction and pre-clearing sweeps will be tailored to species at risk (including woodland caribou) that may potentially be using habitats at certain times of the year. For example, in the event the sweeps are conducted during the winter period, methods would include snow tracking to identify woodland caribou presence based on tracks and feeding craters observed within the study areas, based on survey protocols provided by the Government of Saskatchewan (2014). This effort would also be combined with use of remote cameras that have been in place throughout the Terrestrial RSA for the past several years, and the photos captured from the cameras can be used to further verify caribou presence with the study areas. The wildlife sweeps would be conducted within 7</p> | <p>Note to Denison: The proposed path forward on this IR is to develop a commitment to be added to Denison’s Commitment Register, related to Denison’s offsetting plan meeting the objectives of the province’s Caribou, Boreal recovery strategy. The language around this is still in discussion, and the text in draft.</p> <p>Item two has not been resolved, but this is also in discussion, given overlap with IR-134.</p> <p>Updated Rationale (item two is still in discussion):</p> <p>In responding to item one, the Proponent has not provided a quantitative assessment of impacts following measures to avoid, minimize, restore on-site or offset. The updated draft Caribou Management Framework indicates that the Proponent will use the SK ENV caribou offset calculator to inform decisions on the required offset amount. Without information on the amount of offsetting that will be implemented, ECCC cannot advise on whether the amount is appropriate in the context of the species Recovery Strategy. A follow up to IR 149-R1A can be found within the Advice to the Proponent document.</p> <p>With regards to Item one, given that ECCC and CNSC understand that the Province of Saskatchewan and ECCC’s Canadian Wildlife Service are in communication on the Denison’s caribou management plans, and the province’s offsetting plan is underway, if Denison are willing to add a commitment to the Commitments Register, this IR could be resolved. The commitment text would include the commitment that “Denison’s offsetting plan will meet the objectives of the Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal population, in Canada.”</p> <p>Proposed rationale text for posting: Denison has captured their commitment related to one, with</p> | Refer to response to IR-149 (above) and response to IR-142-159-167-R1 (in a separate IR table). |

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, June 2024) |
|--------------|----------------|---|--------------------------|---|--|--|---|---|
| | | | | | | <p>days prior to disturbance activities, year-round, so that sensitive features can be identified, and appropriate mitigation measures (e.g., avoidance, timing delay) can be developed and implemented, as appropriate.</p> <p>Further, Denison has committed to monitoring the effects on wildlife, as per the Wildlife Management Plan. The findings of the monitoring programs are expected to inform Denison, through an adaptive management process, of the need, if any, for additional mitigation measures.</p> <p>3. The Eco-restoration Together program is no longer considered within the context of the Project-related Caribou Management Framework that outlines the offset plans that Denison has been working closely with Saskatchewan MOE to develop. The offset requirements that are being developed are those that will fulfill provincial requirements under their offsetting program scheme.</p> <p>4. The Eco-restoration Together program is no longer considered within the context of the Project-related Caribou Management Framework that outlines the offset plans that Denison has been working closely with Saskatchewan MOE to develop. The offset requirements that are being developed are those that will fulfill provincial requirements under their offsetting program scheme.</p> <p>References:</p> <p>Government of Saskatchewan. 2014. Snow Track Survey Protocol. Fish and Wildlife Branch, Ministry of Environment. 8 pp.</p> | <p>regards to caribou management and offsetting in the Commitments Register, so this IR has been accepted.</p> <p>In responding to item two, the Proponent has clarified that the use of wildlife sweeps will be used for pre-construction and pre-clearing surveys, however there is no information on the methodology that will be used to collect data. The Proponent notes that these sweeps will not be species-specific but will be based on timing of Project related activities. Without documenting how data will be collected (i.e., to identify which species are in the area) there is uncertainty as to whether the methodology implemented will provide relevant results. Additionally, the Proponent notes that methods associated with these surveys will be tailored to species at risk that may potentially be using habitats at certain times of the year; but have provided no method on how these sweeps will be tailored. ECCC suggests the Proponent explain how data will be collected during wildlife sweeps and provide the method on how the sweeps will be tailored to species at risk.</p> <p>Items three and four have been resolved as the Proponent is no longer using the Eco-Restoration Together Program as part of their offsetting plan. Items one and two remain outstanding.</p> | |
| IR-149 | IR-149-R1B | <p>Context: Section 4.2.2 of the Conceptual Caribou Mitigation plan states: "locating excessive noise generating activities such as the concrete batching operation as far away from sensitive wildlife locations as possible;". However, no specific mitigation measures are mentioned for impacts to caribou due to noise generated from the Project air strip.</p> <p>Rationale: Noise from the air traffic using the air strip will also generate excessive noise that can impact caribou. Additional information on the timing and frequency of air traffic, as well as specific mitigations related to impacts from air traffic, including mitigations related to frequency and timing of flights, will be necessary to evaluate impacts to caribou due to air strip noise.</p> | n/a | n/a | <p>1. Provide additional information on the timing and frequency of air traffic using the Project air strip.</p> <p>2. Provide specific mitigations related to impacts from air traffic, including mitigations related to frequency and timing of flights.</p> | <p>Please see response to IR-149.</p> <p>In addition, in direct response to IR-149-R1B the following is noted.</p> <p>The flight schedules have not yet been determined at this relatively early stage of planning for the Project.</p> <p>Mitigation measures likely to be incorporated into the operation of the airstrip, with respect to air traffic, would include, as safety allows, maintaining as direct approach and departure flight paths as possible, and obtaining appropriate altitudes, and leaving the LSA and RSA, as quickly as is safely reasonable.</p> | <p>Item two has been accepted as the Proponent has provided potential measures likely to be incorporated into operations of the airstrip, but item one remains outstanding. The information requested was not provided as the Proponent notes it is too early in the planning phase to provide this information. Once flight schedules have been determined, the Proponent should share them for review. If this cannot be provided at this time, the Proponent should provide information on the frequency and approximate timing of flights, as well as any periods of restricted activity planned for mitigation purposes.</p> <p>In addition, Denison is expected to provide details on specific mitigation measures to address sensory impacts to caribou, such as restricted activity periods to accommodate for the caribou calving season, or different flight paths.</p> <p>Please see the related follow up advice for IR-149-R1B in the Advice to the Proponent document.</p> | <p>The EIS concluded there are no significant adverse residual effects on caribou associated with the Project, which included the assessment of habitat alteration due to sensory disturbances, including the operation of an airstrip. We reiterate that the EIS was completed with the appropriate level of detail expected at this stage of the Project.</p> <p>Notwithstanding the above, Denison notes that the anticipated aircraft traffic at the Project airstrip is expected to include approximately five flights per week during Operation (this was noted in the EIS) and opportunities to optimize the flight schedule will be completed by Denison as the Project advances.</p> <p>Denison can commit to the following related to air traffic and this has been added to the commitment register as Commitment 9-36: "Denison will operate the airstrip and flights in a safe manner and will also seek to minimize interactions with wildlife by following guidance and best practice from Saskatchewan and other jurisdictions. Mitigation measures likely to be incorporated into the operation of the airstrip, with respect to air traffic, would include, as safety allows, maintaining as direct approach and departure flight paths as possible, and obtaining appropriate altitudes, and leaving the LSA and RSA, as quickly as is safely reasonable. Flight paths can be adjusted based on the location of caribou observations or known important areas during sensitive periods, as it safe and practical to do so. Details related to airstrip and flight management will be developed as part of Project licensing and permitting."</p> |

ATTACHMENT IR-149 Conceptual Caribou Mitigation Plan (included in Round 1 submission)

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Acronyms and Abbreviations

| Term | Definition |
|--|---|
| Anthropogenic | Caused or produced by humans |
| BSCs | biological soil crusts |
| Boreal Caribou | The boreal ecotype of woodland caribou occurs within the boreal forest of Canada. These non-migratory caribou form small aggregations throughout the year and disperse for solitary calving. |
| Committee on the Status of Endangered Wildlife in Canada (COSEWIC) | A committee made up of experts from academic, government and non-government organizations that assess the conservation status of wildlife species that may be at risk of extinction in Canada. |
| Critical Habitat | The habitat that is necessary for the survival of a listed wildlife species and is identified as the species critical habitat in the recovery strategy or action plans for the species. |
| DERT Project | Developing Eco-Restoration Together Project |
| Disturbed habitat (per ECCC 2020) | Habitat showing: i) anthropogenic disturbance visible on Landsat at a scale of 1:50,000, including habitat within a 500 m buffer of the anthropogenic disturbance; and/or ii) fire disturbance in the last 40 years, as identified in data from each provincial and territorial jurisdiction (without buffer). |
| ECCC | Environment and Climate Change Canada |
| EA | environmental assessment |
| EIS | environmental impact statement |
| EMS | environmental management system |
| ENV | Saskatchewan Ministry of Environment |
| ha | hectare |
| Local Populations (ECCC 2020) | Group of boreal caribou occupying a defined area distinguished spatially from areas occupied by other groups of boreal caribou. Local population dynamics are driven primarily by local factors affecting birth and death rates, rather than immigration or emigration among groups. In this recovery strategy, “local population” refers to a group of boreal caribou occupying any of the |

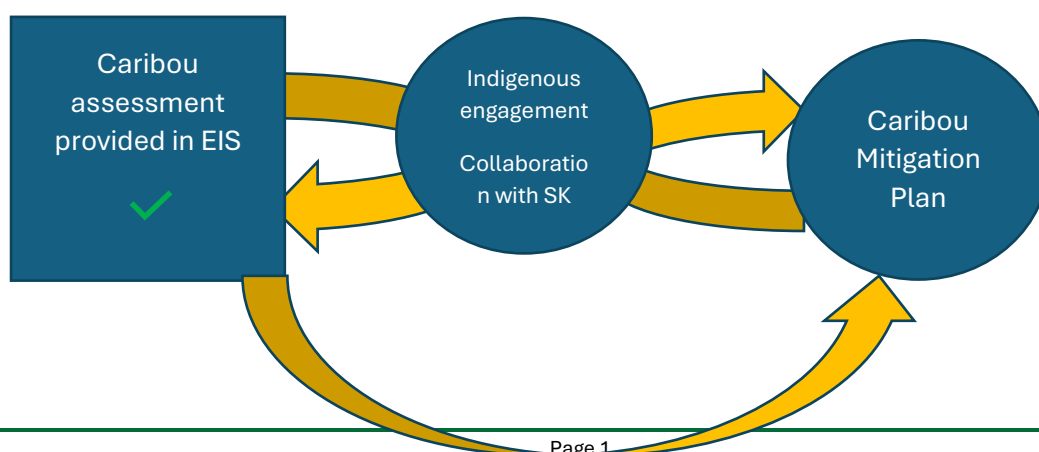
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|--|--|
| | three types of boreal caribou ranges (i.e., conservation unit, improved conservation unit, local population unit). |
| Plan | Conceptual Caribou Mitigation Plan |
| Project | Wheeler River Project |
| Range (per ECCC 2020) | <p>The geographic area occupied by a group of individuals that are subject to similar factors affecting their demography and used to satisfy their life history processes (e.g., calving, rutting, wintering) over a defined time frame.</p> <p>Environment and Climate Change Canada (2011) identified three types of boreal caribou ranges categorized based on the degree of certainty in the delineated range boundaries (i.e., conservation unit, improved conservation unit, local population unit).</p> |
| Recovery strategy | A planning document that identifies what needs to be done to stop or reverse the decline of a species. |
| SARA | Species at Risk Act |
| Self-sustaining local population (ECCC 2020) | A local population of boreal caribou that on average demonstrates stable or positive population growth over the short-term (≤ 20 years) and is large enough to withstand stochastic events and persist over the long-term (≥ 50 years), without the need for ongoing active management intervention. |
| Threatened species | A wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction. |
| Undisturbed habitat (per ECCC 2020) | Habitat not showing any: i) anthropogenic disturbance visible on Landsat at a scale of 1:50,000, including habitat within a 500 m buffer of the anthropogenic disturbance; and/or ii) fire disturbance in the last 40 years, as identified in data from each provincial and territorial jurisdiction (without buffer). Disturbance within the 500 m buffer would result in a reduction of the undisturbed habitat. |

Introduction

The Wheeler River Project (the Project) environmental impact statement (EIS) evaluates and assesses potential Project-related effects on the Boreal population of woodland caribou (*Rangifer tarandus caribou*; referred to herein as caribou or boreal caribou) following standard environmental assessment (EA) methodology. The assessment of potential effects considered both direct (i.e., habitat loss) and indirect effects (i.e., habitat alteration) on caribou and their habitat, while assuming that caribou were present year-round and during all of their life stages (i.e., calving, rearing, mating, over wintering). In this way, the EIS took a precautionary or conservative approach to understanding/addressing the likely residual effects (i.e., effects remaining after mitigation measures were considered) of the Project on caribou and their habitat and is using this approach as a planning tool to inform/support future Project-related regulatory approvals processes and follow-up monitoring. The EIS has demonstrated that the Project, as proposed and assessed, is predicted to minimize the potential for environmental adverse effects on caribou and their habitat before any Project specific construction occurs. The conclusions of the assessment predicted that the likely residual effects of the Project on caribou were not significant.

This Conceptual Caribou Mitigation Plan (the Plan), developed proactively by Denison, has a different objective than the EIS. The Plan builds on the assessment of potential Project effects and commitments to mitigate such effects made in the EIS and is expected to be advanced with ongoing consultation with the Saskatchewan Ministry of Environment (ENV), as ENV finalize the caribou range plan for SK1. The EIS is a conservative planning tool, whereas the Plan is a practical, living document designed to define management works associated with caribou. The Plan is not a requirement for EA determination but is provided as a guidance document to help Denison proactively describe and inform the development and implementation of appropriate mitigation measures related to caribou and their habitat.

The Plan is an evergreen document. It will be consistent with the management goals of ENV for the SK-1 caribou conservation unit, and will be developed/refined in consultation with local communities including English River First Nation and Kineepik Métis Local in Pinehouse and regulators (e.g., ENV). As noted above, the boreal caribou range plan for SK-1 is under development and it is understood that this Plan will be updated as more information becomes available. The conceptual nature of the Plan is in part due to the absence of range plan priorities and reflects Denison's commitment to continue to work with the province to meet the management objectives and management strategies for the SK1 range.



Guidance and Regulatory Framework

A brief review highlighting federal and provincial considerations of boreal caribou is provided below for reference.

Federal

Boreal caribou have been designated as *threatened* under the federal *Species at Risk Act* (SARA). Environment and Climate Change Canada (ECCC) released amended recovery strategy for woodland caribou in 2020 (ECCC 2020). A recovery strategy is a planning document that identifies what should be done to stop or reverse the decline of a species.

The Project is located in the Boreal Shield West ecoregion of the Boreal Shield ecozone. The Boreal Shield West ecoregion stretches from Alberta to Ontario (Figure 2-1).

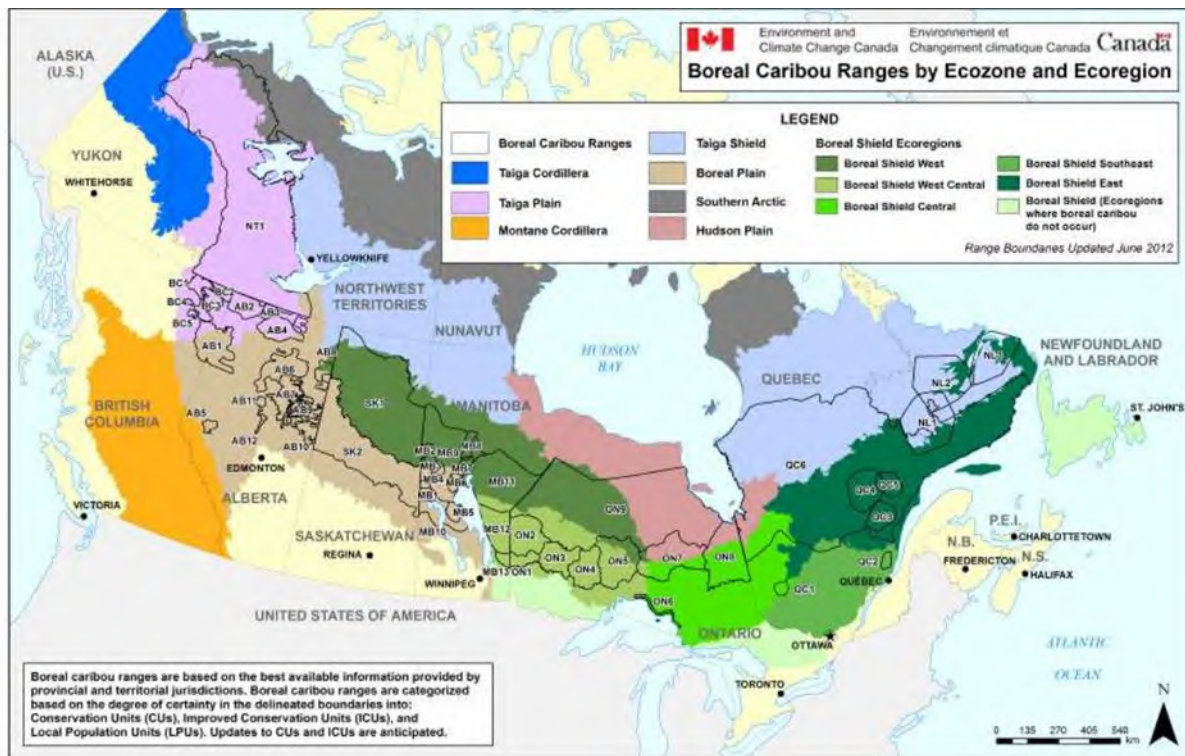


Figure 0-1: Boreal Caribou Distribution Across Ecozones and Ecoregions in Canada (source: ECCC 2020)

The SK1 range comprises more than 18,000,000 hectares (ha) and is characterized by high fire disturbance and low anthropogenic disturbance (ECCC 2020). The likelihood of caribou self-sustainability in the boreal shield range in SK1 is “likely” (ECCC 2020). For SK1, the amended recovery strategy (ECCC 2020) identifies 40% undisturbed habitat in the range as the disturbance management threshold, which provides a measurable probability (71%) for the local population to be self-sustaining. This threshold is considered a minimum threshold because at 40% undisturbed habitat there remains a risk (29%) that the SK1 local population cannot be self-sustaining. Disturbed

habitat (ECCC 2020) is habitat showing: i) anthropogenic disturbance visible on Landsat at a scale of 1:50,000, including habitat within a 500 m buffer of the anthropogenic disturbance; and/or ii) fire disturbance in the last 40 years, as identified in data from each provincial and territorial jurisdiction (without buffer). Undisturbed habitat (ECCC 2020) is habitat not showing any: i) anthropogenic disturbance visible on Landsat at a scale of 1:50,000, including habitat within a 500 m buffer of the anthropogenic disturbance; and/or ii) fire disturbance in the last 40 years, as identified in data from each provincial and territorial jurisdiction (without buffer). Disturbance within the 500 m buffer would result in a reduction of the undisturbed habitat.

Studies (e.g., McLoughlin et al. 2019) indicate that the SK1 local caribou population is likely self-sustaining at current levels of disturbance (60% total disturbance), with a 71% probability of persistence. Environment and Climate Change Canada's analyses also indicate that the SK1 local population is sensitive to small increases anthropogenic disturbance and sensitive to small decreases in adult survival. For these reasons, a higher probability of persistence was selected for critical habitat identification in SK1 (71%) than was selected for the other 50 ranges across Canada (60%) (ECCC 2019).

The precise location of the 40% undisturbed habitat within the range is expected to vary over time. The habitat within the SK1 range should exist in an appropriate spatial configuration such that boreal caribou can move throughout the range and access required habitat when needed. The key to this habitat delineation is achieving and maintaining an overall, ongoing range condition that allows for the dynamic habitat supply system, containing the biophysical attributes upon which caribou depend, to remain sustainable. It is this dynamic habitat supply system within the SK1 range that is the habitat condition considered to be necessary for the caribou.

Provincial

The responsibility for woodland caribou management lies with the Province of Saskatchewan. Broadly, the province is responsible for developing range plans or management plans which build on the federal recovery strategy by setting goals and objectives for maintaining sustainable population levels.

The Saskatchewan Conservation Data Centre (SK-CDC) is responsible for evaluating and assigning a conservation rank to each taxon, resident or transient, found in the province. Woodland caribou's subnational or S-rank conservation rank is S3. This ranking indicates that, provincially, the species is vulnerable/rare to uncommon which is associated with a moderate risk of extinction or extirpation due to a restricted range, relatively few populations, recent and widespread declines, threats, or other factors. Currently, the caribou population in SK-1 is stable (ENV 2023) and the range plan is under development. Engagement is a key component of the range plan process and will be completed with representatives from First Nation, Métis, industry, non-governmental organizations, and communities.

The provincial goal is to sustain and enhance woodland caribou populations, and maintain the ecosystems they require, throughout their current range (ENV 2013). Through the woodland caribou range assessment and range planning program, the province is:

- Gaining a better understanding of woodland caribou ecology;
- Working toward meeting objectives identified in provincial and federal strategies; and

- Improving how the province manages the species and related habitat.

The province's woodland caribou range assessment and range planning program incorporates two key components:

- Woodland caribou range assessment, which enhances the understanding of woodland caribou populations and their interactions with the environment; and
- Woodland caribou range planning, which provides a framework, strategies and objectives that allow for better decisions involving habitat management and self-sustaining caribou populations.

Although the management objectives and management strategies for caribou in SK1 are not yet defined, Denison is committed to working with ENV as the range plan is developed. The Plan will be updated as the Project advances so that it aligns with the conservation objectives as determined by the province as the primary steward of caribou in the province.

SK 1 Caribou Population – Background Information

Background information concerning the condition of the SK 1 caribou population is provided below.

Population Trends

The SK1 Boreal Shield management unit contains high-quality conifer-dominated caribou habitat with greater than 40-year-old stands of jack pine and black spruce forests suitable for lichen colonization, black spruce swamps, and open muskegs supporting relatively high densities of caribou, at 36.9 caribou/1,000 km² or approximately 4,000 caribou across the SK1 Boreal Shield Woodland Caribou Management Unit (McLoughlin et al. 2019).

Research has shown that up to 70% of the year-round diet of caribou may consist of ground and arboreal lichens. If the quantity of available lichen forage is low, caribou can exist without relying entirely on lichens (McLoughlin et al. 2019). Due to their physiology, lichens are resilient to periods of drought and cold temperatures, but because of their slow growth rate, exhibit a slow recovery time after depletion and fire events. In the SK1 range, McLoughlin et al. (2019) found that stand types with the highest potential for adequate lichen biomass for caribou are jack pine and poorly drained black spruce sites.

McLoughlin et al. (2019) observed that, from 2014 to 2018, the caribou population exhibited a high average adult female survival rate and moderate recruitment (0.192 calves per cow in March), ranging from a low of 0.134 calves/cow in March 2016 to 0.244 calves/cow in March 2018. These demographic parameters led the authors to assess the SK1 Boreal Shield caribou population as being stable at the time of their study (McLoughlin et al. 2019).

While calving areas have not been documented within the SK1 range, it is recognized that caribou may use open fen and treed bog habitat types for calving during the spring/summer period. In Saskatchewan, caribou habitat used during the calving season in the SK2 range demonstrated a strong selection for treed muskegs, but avoidance of jack pine, mixed hardwood stands, and roads (Dyke 2008).

Neufeld et al. (2021) summarized results from aerial surveys over a period of eight years in an 87,193 km² study area in the Athabasca Plain and Churchill River Upland ecoregions in the north, that are inclusive of the Terrestrial RSAs that were used in the EIS. During 11 of 16 aerial caribou surveys conducted between 2008 and 2015, woodland caribou were detected in the surveyed areas. The average density of the 16 surveys was estimated at 36.9 caribou/1,000 km² (95% CI = 26.7 to 47.2 caribou/1,000 km²). Across the Neufeld et al. (2021) study area and all years, estimated caribou densities were higher in comparison to averages reported for most other boreal woodland caribou ranges in Canada (i.e., caribou density reported in other areas ranged 4.3 to 18.7/1,000 km²) indicating that caribou can tolerate natural disturbance. One exception to the relatively high caribou densities in northern Saskatchewan was noted: the 2,285 km aerial the Millennium Project in March 2014, 10 km west of the Terrestrial RSA, resulted in lower woodland caribou densities at 5 caribou/1,000 km² (Neufeld et al. 2021).

Eight of the sixteen caribou surveys reported the ratios of male to female and calf to female in their results with the average male:female ratio calculated at 0.571 (95% CI = 0.444 to 0.699) and calf:female at 0.195 (0.158 to 0.232). Again, the 2014 Millennium survey reported a different

male:female ratio, outside the reported range (1.6), concurring with the reported low caribou densities.

Predation

In addition to relatively low predator densities in their study area, McLoughlin et al. (2019) found some spatial separation between caribou and wolves. Caribou did not seem to avoid existing linear features (such as roads, trails, and transmission lines) in the area, while wolves established their territories away from linear features. Unlike caribou, who preferred mature conifer stands, wolves selected for wetlands and patches of deciduous-mixed forest, avoiding stands of mature conifers. Other prey species, such as moose, also occurred at relatively low densities (i.e., 45.7 moose/1,000 km²) (McLoughlin et al. 2019).

McLoughlin et al. (2019) observed that mortality of adult caribou occurred mostly during the snow-free season and only 1 of 94 collared caribou was harvested by a hunter during the four years of the study.

While predation is believed to be a key limiting factor for woodland caribou (Bergerud 1974; Stuart-Smith et al. 1997, DeMars et al. 2011 from ECCO 2020), Neufeld et al. (2021) suggested that habitat- or disturbance-mediated apparent competition only plays a minor role in the Saskatchewan woodland caribou population. Habitat- or disturbance-mediated apparent competition occurs when natural (e.g., forest fires) and anthropogenic (e.g., human development or activities) disturbances increase the abundance of other ungulates, which in turn may increase predator densities, which then increases predation risk to caribou. Neufeld et al. (2021) concluded that Northern Shield and Taiga ecoregions are of low productivity where caribou may compete with only one ungulate species (i.e., moose) and therefore, caribou and wolf dynamics do not follow general habitat- or disturbance-mediated apparent competition models.

Harvest

Indigenous peoples in Saskatchewan have an inherent right to harvest woodland caribou for subsistence purposes (ENV 2013). No other harvest of woodland caribou is currently permitted. Under provincial and federal recovery planning and effective species management, self-sustaining caribou populations will support long-term subsistence use of the species and protect treaty rights. Subsistence harvest levels are assumed to be low but actual numbers are not available because most communities or Indigenous groups are not collecting and/or publishing this information.

No Net Loss and Mitigation Hierarchy

A generic biodiversity mitigation hierarchy (OECD 2016) to achieve no net loss is provided in Figure 0-1. As shown in the hierarchy, an offset can be used to achieve no net loss if residual effects remain following efforts to avoid, minimize, and restore potential project effects. This generic hierarchy is generally consistent with the approach of ENV to manage effects on caribou and their habitat.

The balance of Section 4 of this Plan outlines Denison's approach to avoid, minimize, and restore caribou habitat per commitments made in the draft EIS associated with the Wheeler River Project.

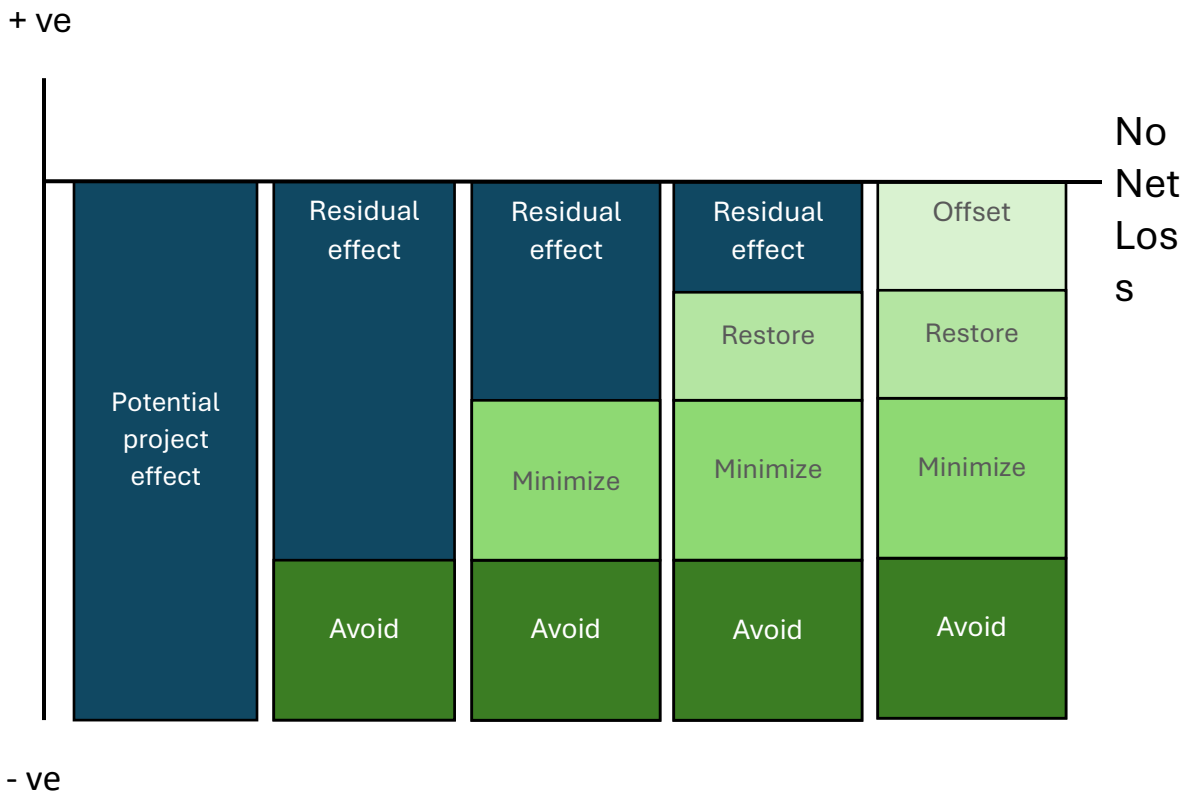


Figure 0-1: Generic No Net Loss and Mitigation Hierarchy (modified from OECD 2016)

Avoid

Potential adverse effects on the caribou have been avoided to the extent possible through Project design, including:

- Selection of in-situ recovery (ISR) mining avoids some direct and indirect effects compared to conventional underground or open-pit mining methods. ISR mining avoids the need for spatially expansive infrastructure such as waste rock piles and tailings management facilities reducing the Project footprint (i.e., avoids direct effects on caribou and their habitat). ISR mining also reduces the potential for interactions between caribou and Project components / activities as it concerns sensory disturbance as it is inherently a less intensive form of mining with reduced noise/light/vibration generation (i.e., avoids indirect effects on caribou and their habitat).

- Site clearing and other works that involve disturbance of vegetation and/or soil will be completed during least-risk timing windows for caribou (for example, outside of wintering/calving period from April 1-July 31, per ENV 2013), where practical, to avoid disturbance during sensitive time periods.
- Pre-disturbance wildlife surveys will be completed to identify caribou presence and work will be postponed if caribou are present.

Minimize

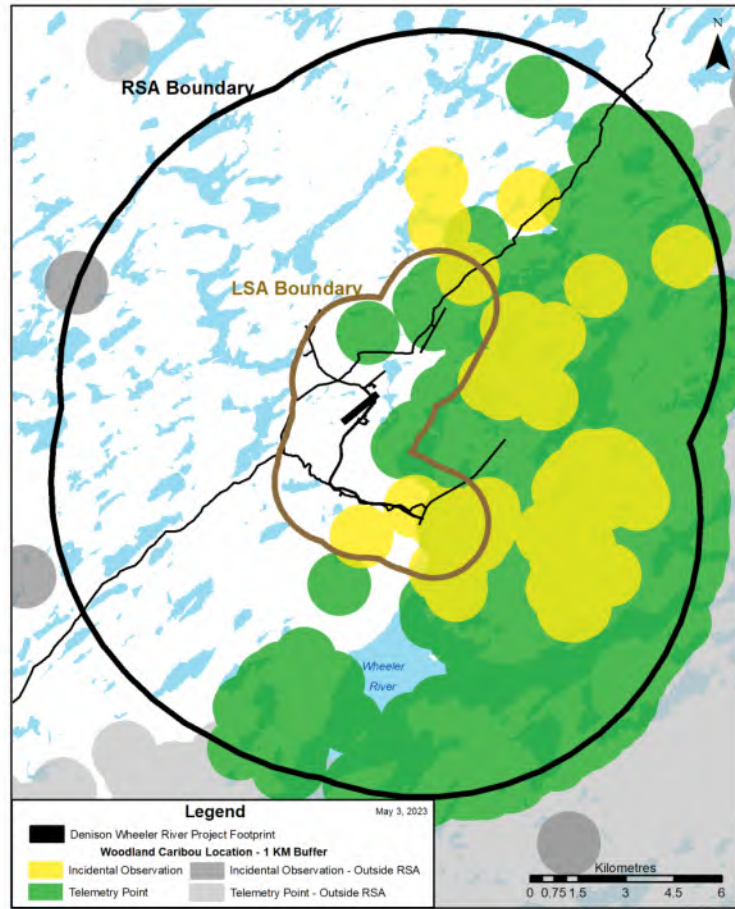
Additional mitigation measures to minimize effects on caribou and their habitat and tailored to Project features have been incorporated into the various Project management and monitoring plans within the Environmental Management System (EMS) including but limited to erosion and sediment controls, soil and vegetation monitoring, Decommissioning Plan, air quality monitoring, fuel spill control and response, Radiation Protection Plan, surface water and effluent monitoring, and Waste Management Plan.

The Project's EMS plans provide direction on monitoring and adaptive management so that issues are identified and mitigation measures are developed and implemented in a timely and effective manner. Mitigation measures specific to caribou are applicable during all Project phases, within all seasons and expected to be effective following appropriate implementation. Examples of the measures to minimize Project effects on wildlife in general, and caribou in particular, are highlighted below.

Disturbance Footprint

- Siting Project components in close proximity to the ISR mining area minimizes indirect effects on caribou and their habitat. The Project components are also west of the known home range of woodland caribou (based on tracking data received by the Ministry of Environment; Figure 0-2), although the absence of data does not mean the absence of caribou and Denison has observed caribou in the area. . Appropriate siting is anticipated to minimize the potential for interactions with woodland caribou and Project activities.
- The Project footprint (i.e., the area of maximum physical disturbance) has been reduced to the extent safely practicable, resulting in limited/minimal habitat loss/disturbance and noise propagation.
- Portions of the proposed Project footprint will be developed within previously disturbed areas, including roads currently used for exploration activities, thereby minimizing additional habitat disturbance.

Denison-Wheeler Study Area - Woodland Caribou Location Data



| RSA Boundary | | |
|------------------------|-------------------|---------------------|
| Data Type | Years | Number of Locations |
| Incidental Observation | 1987, 2017 – 2022 | 89 |
| Telemetry Point* | 2013 – 2016 | 3,848 |

*Data from 15 individual woodland caribou cows

| LSA Boundary | | |
|------------------------|-------------------|---------------------|
| Data Type | Years | Number of Locations |
| Incidental Observation | 2017 – 2022 | 19 |
| Telemetry Point* | 2013, 2015 – 2016 | 62 |

*Data from 4 individual woodland caribou cows

NOTE: Absence of data does not mean absence of woodland caribou.

Figure 0-2 Saskatchewan Ministry of Environment Woodland Caribou Location Data Provided to Denison

Wildlife and Habitat Protection

- Project activities have been assessed for their potential to disturb or remove wildlife and/or wildlife habitat (e.g., site clearing, soil disturbance) to determine potential effects on wildlife and wildlife habitat and the assessment, including proposed mitigation measures, for the Project will guide Project activities.
- Pre-disturbance wildlife clearance surveys will be conducted within the Project Area; results of the clearance surveys will inform the development and implementation of appropriate mitigation (e.g., delay of work) to address the identified issue (e.g., presence of caribou).
- Personal firearms for employees and contractors will be prohibited within the Project Area to prevent hunting activities.
- Policies will be implemented prohibiting employees and contractors from feeding, approaching, or harassing wildlife species within the Project Area.
- To support wildlife habitat regeneration, progressive restoration including ecosystem-based revegetation will be conducted on disturbed areas as soon as practicable in accordance with the Decommissioning Plan.

Wildlife Deterrence and Prevention of Wildlife Entrapment

- In addition to installing secure fencing around all contaminated areas to prevent accidental contaminant exposure, buildings and other Project components will be designed and maintained to exclude wildlife from using buildings for refuge or shelter, and to deter wildlife from potentially becoming entrapped.

Sensory Disturbance

- Noise emitting Project activities will be managed to minimize sensory disturbance of wildlife, especially during sensitive time periods, such as calving. This would include:
 - locating excessive noise generating activities such as the concrete batching operation as far away from sensitive wildlife locations as possible;
 - directing the generator discharge openings away from sensitive locations; and
 - making use of available on-site obstructions to control sound exposure at sensitive areas (i.e., locate sources behind buildings).
- The main sources of noise will be related to transport of people and goods, drilling of holes for the freeze wall and wellfield, operation of the batch plant, operation of the processing plant, and operation of the pumphouses. Low sound emission equipment and the use of silencers or mufflers (whenever practical) will be used to reduce noise

associated with Project activities. There will be regular maintenance of equipment to ensure it is in proper working order and not emitting noise unduly.

- Lighting will be focused on work sites and not surrounding areas, to minimize light trespass and other light-related pollution sources.
- Facilities will be illuminated only to meet standards set for the protection of workers to avoid over-illumination.
- Battery-powered, light vehicles and mobile equipment, and an AC powered dual rotary drill will be used for ISR wellfield development instead of a traditional diesel-powered unit, where practical, to reduce air emissions and noise levels and improve energy efficiency.
- Fugitive dust sources that could lead to deposition of dust on vegetation and waterbodies (including potential deposition of trace metals and radionuclides) will be reduced by:
 - dust suppression techniques on site roadways, such as road watering and traffic management;
 - directing processing plant exhaust from drying and packaging areas through a stack prior to release outside of the building;
 - designing the stack height based on results of air dispersion modelling to be an appropriate height for optimal dispersion;
 - making a wash bay available to clean items, equipment, and vehicles that may have been in contact with potentially contaminated materials. Contaminated water from the wash bay will be collected in a sump tank and routed to the water treatment plant for treatment and discharge; and,
 - conducting radiological clearance scanning as required for any items, equipment, and vehicles leaving the Project Area.

Road and Traffic Management

- Traffic and access control measures will be implemented, including managing traffic volume by scheduling truck convoys, using high-volume haul trucks, and restricting public access (e.g., private vehicles, snowmobiles, all-terrain vehicles, and foot traffic) to the Project site and roads with both north and south security access gates. It is important to note that if any individual were seeking access around the Project area to undertake Aboriginal and / or Treaty Rights, Denison staff would facilitate this, provided it was safe to do so given Project activities in the area.
- Appropriate road signage will be installed (e.g., speed limits, identification of wildlife crossings and areas of high activity) along Project roads to minimize the risk of wildlife-vehicle collisions.
- Speed limits will be implemented to reduce the risk of wildlife-vehicle collisions.

- Wildlife will have the right-of-way on Project roads, unless it is unsafe to stop (i.e., if a collision is imminent). Vehicles will not be used to encourage caribou to move off Project roads and processes will be implemented for employees and contractors to slow down and/or stop vehicles/equipment to allow caribou to move away or off the road before resuming normal road speeds for the area.
- Road watering and regular road maintenance to limit dust dispersion.
- Employees and contractors will report and communicate the location and circumstances of any roadkill observed on or alongside Project roads. Large-bodied wildlife carcasses found will be promptly reported to ENV and disposed of as directed to prevent scavenging.
- Vegetation along Project roads will be managed to reduce attractiveness to wildlife (e.g., forage plants) and maintain appropriate sightlines for drivers to minimize wildlife-vehicle collisions.
- Alternative measures on Project roads for de-icing and winter traction (e.g., sand, gravel) or dust suppression (e.g., water) will be implemented, whenever practicable, to limit the use of specialty chemicals and potential exposure of wildlife including caribou to them.
- Appropriately sized gaps in the roadside snowbanks during winter will be maintained to facilitate caribou crossing and escape and, with that, reducing their risk of vehicle collisions.
- New Project site and access roads will be designed to minimize sightlines for predators, whenever practicable, while still maintaining general road safety.
- Ditches and culverts along Project roads will be designed and maintained to minimize pooling of water as roadside pools may attract caribou.

Water Management, Waste Management, Emissions, and Hazardous Materials Management

- Education on and enforcement of proper water, waste, emissions and hazardous materials management practices will be provided to employees and contractors.
- A freeze wall will be established around the uranium deposit to reduce potential for groundwater disturbance or contamination mitigating the likelihood of exposure of caribou to contaminants in local areas of groundwater discharge to surface.
- The ISR wellfield and processing plant will be designed to re-use most of the solutions inside each circuit, reducing water use requirements to the extent feasible. Make-up water will be preferentially sourced from site runoff (instead of freshwater) where possible.

- Contaminated wastes (e.g., mineralized drill cuttings, process precipitates) will be temporarily stored on double lined pads with leak detection capabilities and an associated monitoring program until final disposal at an approved facility. An adjacent pond will be used to collect contact water from these pads.
- All contact water will be routed to the Industrial Wastewater Treatment Plant for treatment and eventual release to the environment. All treated effluent released to surface water will meet federal and provincial regulatory discharge limits. This will mitigate exposure of caribou to Project-related contaminants released to the environment.
- Surface pipelines will be designed to have secondary containment or catchment and have leak detection systems in place at key locations to mitigate the likelihood of the release of such chemicals to the environment that could result in exposure of caribou to the chemicals.
- Double-walled high-density polyethylene (HDPE) or equivalent piping will be used in the wellfields and will be freeze protected and secured to minimize pipe movement to mitigate the likelihood of the piping failure and the associated release of wellfield chemicals to the environment that could result in exposure of caribou to the chemicals.
- Denison is proposing to segregate and compost organic wastes on site in a composting system, reducing the volume of material in the domestic landfill generating odours and thereby minimizing wildlife attractants.
- Domestic waste will be collected and temporarily stored in wildlife-proof containers to avoid attracting wildlife and reduce the risk for human-wildlife interactions. The wildlife-proof containers will be inspected regularly for evidence of wildlife presence or access to waste disposal facilities. If evidence of wildlife presence or access to waste disposal facilities is detected, modified systems will be implemented and/or off-site waste disposal/incineration frequencies will be increased.
- A "no littering policy" for employees and contractors will be implemented within the Project Area.
- Air emissions will be reduced to the extent practical through implementation of the development of air emissions management and monitoring plans within the EMS.
- All vehicles and equipment will be equipped with industry-standard emission control systems; unnecessary idling of vehicles will be prohibited to reduce emissions.
- The use of hazardous materials will be limited as much as possible.
- Appropriate hazardous materials management practices will be implemented in accordance with industry guidelines to minimize the risk of accidental spills or leakage.

This will mitigate the likelihood of release to the environment that could result in exposure of caribou to the hazardous materials.

- Hazardous materials will be handled, stored, and disposed of appropriately and in accordance to avoid attracting wildlife (e.g., wildlife-proof containers, exclusion fencing) to mitigate the likelihood of exposure of caribou to hazardous materials.
- Physical deterrents (e.g., fencing) will be employed around contaminated areas (e.g., waste ponds and waste pads), the domestic landfill, or hazardous materials storage areas to discourage wildlife use / interaction. The deterrents will be monitored and maintained .
- Appropriate spill response kits will be positioned adjacent to areas where hazardous materials are stored in accordance with the Spill Response Plan to mitigate the likelihood of the release of hazardous material to the environment that could result in exposure of caribou to the material.
- A minimum 100 m distance from any waterbody will be maintained for fuel storage, refueling activities, or equipment servicing in accordance with the Spill Response Plan. This will mitigate the likelihood of a fuel spill to water that could result in exposure of caribou to fuel.
- Appropriate fuel, chemical, and materials management practices will be followed in accordance with the Spill Response Plan to minimize the risk of accidental spills or leakage of diesel fuel, other hydrocarbons, and other hazardous materials and mitigate the likelihood of exposure of caribou to such chemicals.
- All vehicles and equipment will be maintained in good working condition (e.g., no leaks) and furnished with industry-standard spill response kits.

Wildlife Education

- Employees and contractors will be provided with wildlife education and awareness training, including education about potential caribou issues on site and training on the mitigation measures summarized with the EMS and specifically in this Plan to avoid or minimize potential Project effects on caribou and caribou habitat.
- Employees and contractors will be educated on waste and hazardous waste management practices / policies that limit human-wildlife interactions and the potential exposure of wildlife to those wastes.
- Designated employees will be trained in appropriate wildlife deterrent techniques to minimize wildlife interactions with the Project.
- Employees and contractors will be requested to report wildlife observations, including prompt reporting of caribou observations and immediate communication to on-site staff. Wildlife encounters and outcomes will be monitored, and logbooks will be used to

record wildlife observations. Logbooks and reports will be available to employees. Incidental observations recorded by staff will be entered into Species Detection Loadforms and submitted to the Saskatchewan Conservation Data Centre annually.

Restore

The temporal bounds for the Project as stated in the EIS are years 1 to 3 for construction, years 3 to 18 for operation, years 18 to 23 for decommissioning, and fifteen years of post-decommissioning monitoring and inspections from years 23 to 38. Importantly, during physical decommissioning the majority of Project components are scheduled to be removed from site which is expected to facilitate restoration activities. Also, because of the selected ISR mining method, there are no large, permanent Project components, such as waste rock piles or tailings management facilities, for which large scale and potentially complex restoration strategies are needed.

Denison's decommissioning commitment is to return the land back to the Province of Saskatchewan for unrestricted surface land use post-closure. The Project's Conceptual Decommissioning Plan (CDP) is included in the draft EIS. The details of decommissioning and restoration will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan (PDP) will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan (DDP) to regulators for their review and acceptance, which builds on the PDP.

The CDP outlines plans for physical decommissioning (mining area remediation; asset removal; and decontamination, demolition, and disposal), followed by restoration. A summary of the CDP is provided here.

- Ongoing decommissioning of Project components will be completed when possible.
- Denison has committed to progressively restore areas no longer necessary to support/facilitate Operations to limit the amount of disturbance at any given time. Restoration of inactive areas will take place when/as these areas become available. The progress and success of these activities will be assessed regularly at a schedule commensurate with the expectations of the activities per the decommissioning plan. Progressive restoration including ecosystem-based revegetation will be conducted on disturbed areas as soon as safely and logistically practicable with the use of suitable/appropriate native species and in accordance with the decommissioning plan.
- Once the asset removal, decontamination, demolition, and disposal are completed, and the site has been cleared and leveled, restoration activities, including planting, will take place. Currently this would largely be with jack pine seedlings, but the mix of plants will depend on location and available species. Restoration activities monitored until it is deemed self-sustaining and viable wildlife habitat.
- Future discussions will be held with Indigenous and general public Interested Parties to determine the amount of access to the area they wish to maintain in the future (post-

decommissioning). Based on results of these discussions, transportation corridors including roads or trails associated with the Project site that are no longer needed will be graded, scarified, and vegetated with native, self-sustaining species as required. Access to facilitate safe post-closure monitoring or requested by appropriate Interested Parties (e.g., to facilitate land use) may be left in place. Access to the site may be restricted by gates and/or berms.

- Laydown areas will be scarified, covered with 0.5 to 1.0 m of stockpiled overburden, and vegetated with native, self-sustaining species. The footprints of other infrastructure, such as the camp, will be scarified and vegetated with native, self-sustaining species as required. The topsoil and brush stockpiled during pre-construction activities will be used during restoration.
- Lessons learned from progressive decommissioning and any site-specific restoration studies will be incorporated into the DDP. Additionally, information from other northern Saskatchewan mine sites will be examined to help Denison select the restoration tools, including revegetation options, that will contribute towards decommissioning success.

Closure of the entire Project will be completed in accordance with provincial and federal regulations and guidance documents with the fundamental considerations being to confirm physical and chemical stability of the site to protect human health and the environment.

Progressive decommissioning and restoration will be completed throughout the life of the Project, whenever feasible, and reported to the regulatory agencies as part of the annual reporting requirements throughout Operation. Associated activities will focus on the decontamination, demolition, and disposal of unused buildings and infrastructure, as well as the removal of unused equipment and machinery. Progressive decommissioning and restoration are expected to continue and result in positive effects as revegetation is continued and regeneration occurs. Following decommissioning and restoration, wildlife habitat is expected to recover to baseline conditions.

Habitat Loss Calculation

Habitat Loss in Context of the Disturbance Management Threshold for SK1

To support the Plan with respect to the calculation of habitat loss, a mapping exercise was completed to provide context on the Project-related habitat loss in consideration of the woodland caribou range (SK1) disturbance management threshold (ECCC 2020).

Approach

First the Project infrastructure footprint area was delineated and estimated to be 80 ha. Next, a 500 m buffer was applied to the Project footprint, resulting in a total potential disturbance area of 1,350 ha. This is consistent with the approach for determining direct and indirect effects, as outlined in ECCC (2020).

Finally, an analysis was undertaken to quantify the amount of caribou habitat that is currently disturbed within the Project footprint + 500 m buffer. According to ECCC (2020), there are two contributors to disturbed habitat in SK1: 1. anthropogenic disturbance + 500 m buffer and 2. fire disturbance in the last 40 years, without a buffer. The two factors for disturbed habitat were considered as follows:

1. Existing anthropogenic disturbance + 500 m: For anthropogenic disturbance calculations to inform the Plan, mapping was completed and evaluated to determine the existing anthropogenic disturbance. Although the EIS considered anthropogenic disturbances on IKONOS imagery at the 1:5,000 scale, the mapping exercise to support habitat loss calculations in the Plan used anthropogenic disturbances visible on Landsat at the 1:50,000 scale, to be consistent with the definitions of disturbed habitat from the amended recovery strategy (ECCC 2020).
2. Fire disturbance in the last 40 years, without buffer: To determine ecosites that were in a regenerating phase or having experienced fire disturbance in the last 40 years, the ecosites BS3/BS7-Jack pine-blueberry/Black spruce-blueberry/lichen were used, based on previous ecosite classification work completed to support the EIS.

Results

As shown in Table 0-1 and Figure 0-1, the proposed Project footprint + 500 m buffer is almost entirely located within existing, buffered anthropogenic disturbance. This means the Project footprint + 500 m buffer is located within already disturbed habitat, according to ECCC (2020). Additionally, the mapping exercise shows that approximately half of the Project footprint + 500 m buffer is located within regenerating forest, i.e., forest burned less than 40 years ago (Figure 0-2).

Table 0-1: Existing Disturbed Habitat within Buffered Project Footprint

| | Area within Project Footprint + 500 m buffer (1,350 ha) |
|--|---|
| Existing anthropogenic disturbance (+ 500 m buffer) | 1,298 ha |
| Regenerating forest (fire disturbance in the last 40 years; no buffer) | 730 ha |

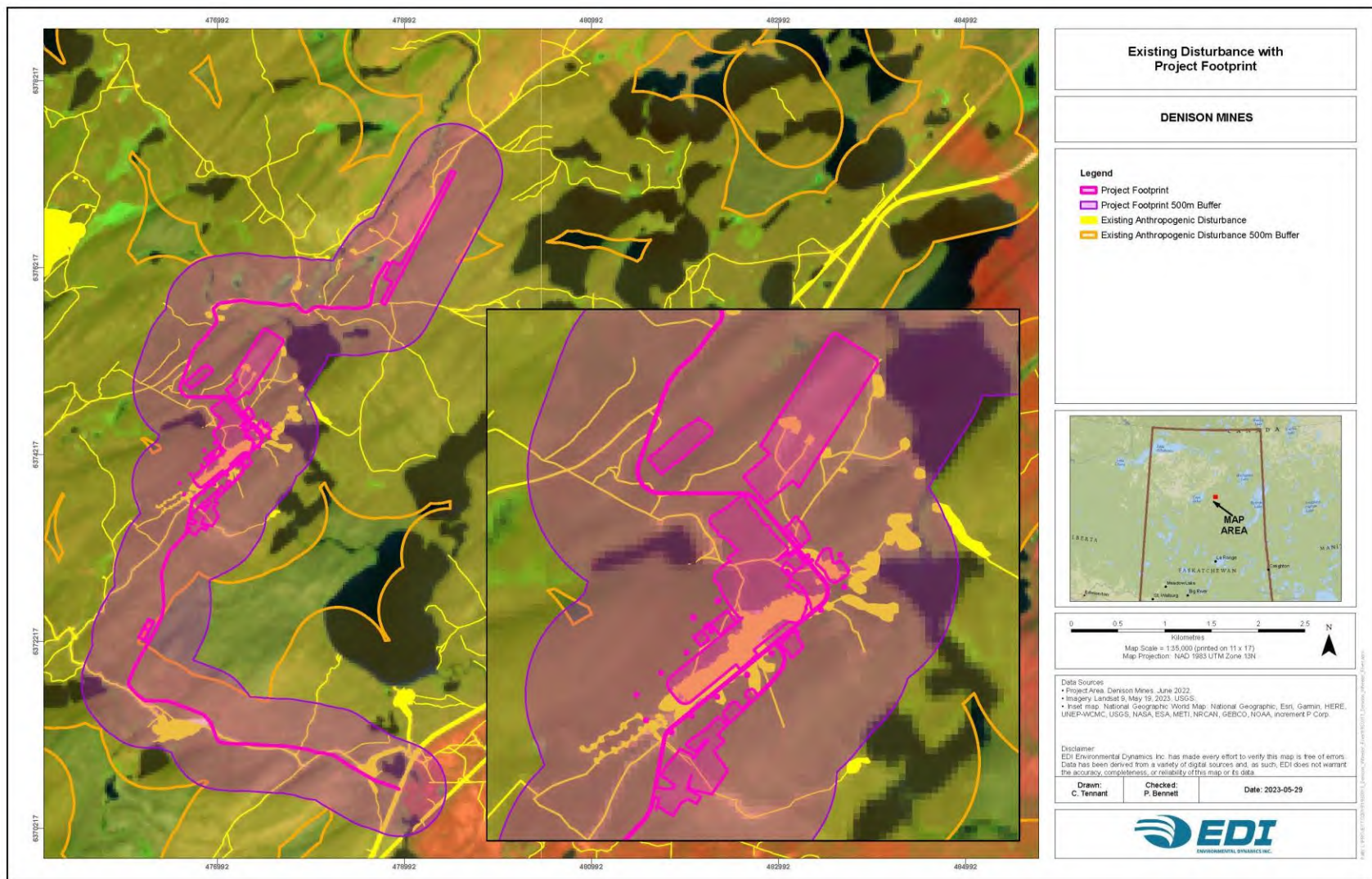


Figure 0-1: Proposed Project Footprint (+ 500 m buffer) with Existing Anthropogenic Disturbance (+ 500 m buffer) Visible on Landsat at 1:50,000

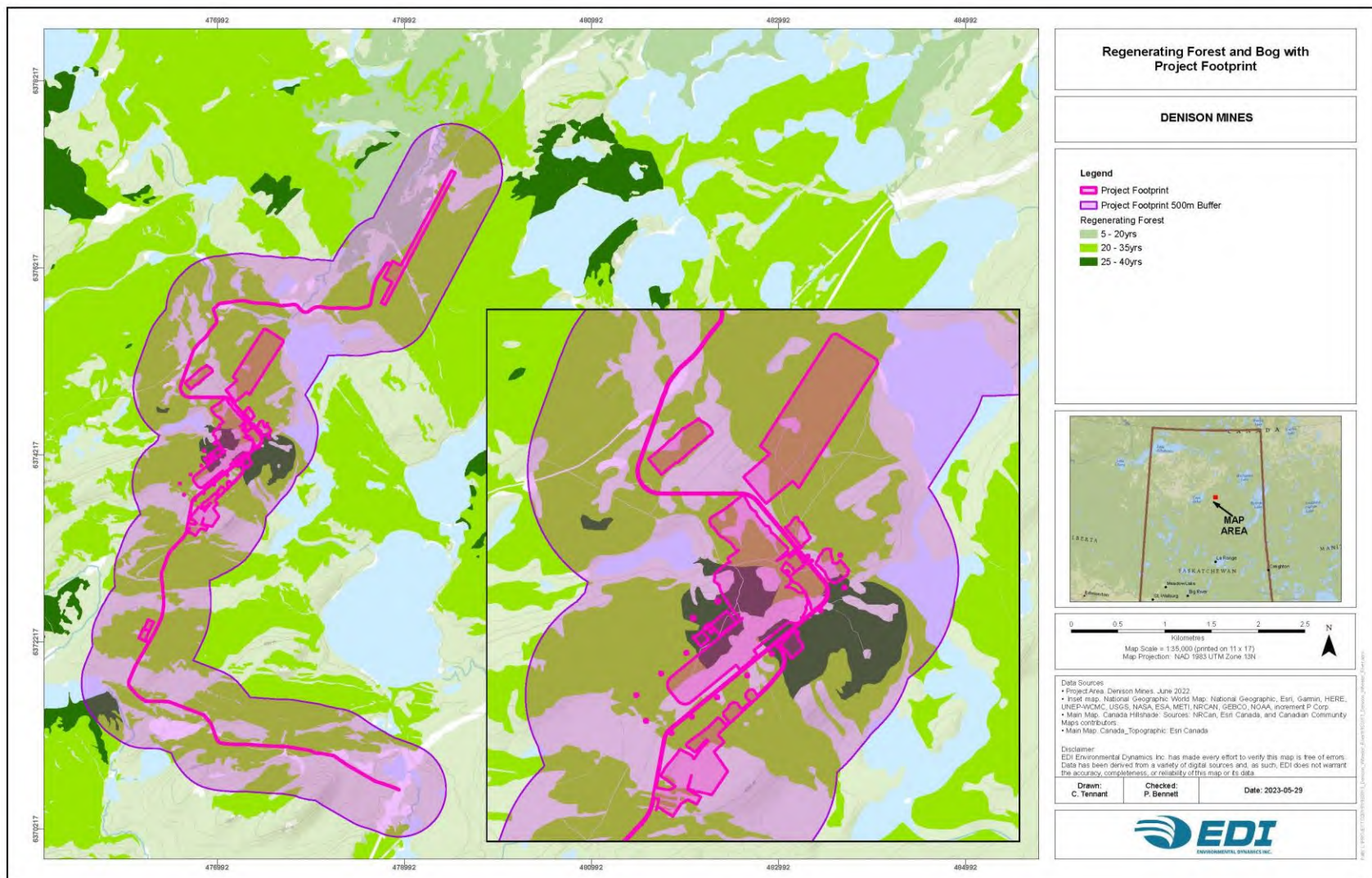


Figure 0-2: Proposed Project Footprint (+ 500 m buffer) with Regenerating Forest

Based on the above analysis using ECCC (2020) criteria, should the Project proceed, the disturbance management threshold for SK1 range would remain unchanged.

Additionally, ECCC (2020) identified the caribou population in the SK1 range as being self-sustaining at a threshold of 40% undisturbed habitat and recommended that total anthropogenic disturbance in the SK1 Boreal Shield range should not exceed 5% with the remainder (i.e., 55%) being attributed to natural disturbance (while maintaining a minimum of 40% undisturbed habitat in the range). ECCC (2020) calculated that approximately 58% of the SK1 Boreal Shield range is currently affected by past forest fires and 3% of the range is affected by anthropogenic disturbances. For additional context, the size of the SK1 Boreal Shield range is estimated at 18,034,870 ha (ECCC 2020). The Project footprint + 500 m buffer (1,350 ha) would represent an estimated Project-related disturbance of 0.007% at the scale of the SK1 Boreal Shield Woodland Caribou Management Unit.

Direct Loss Calculation

The Project infrastructure footprint has been delineated and the area was determined to be 80 ha. Of this area, 12 ha are comprised of previously disturbed land resulting from past activities (e.g., access, exploration camp and laydown areas). The remainder of the Project footprint is comprised of regenerating forest (forest less than 40 years old) habitat which is typically considered to be low quality habitat for caribou (Figure 5.3).

Table 0-2: Land Cover Types within the Project Footprint

| Total Area | |
|--|-------|
| Project footprint | 80 ha |
| Existing anthropogenic disturbance | 12 ha |
| Regenerating forest habitat (i.e., low quality caribou habitat) | 68 ha |

Denison understands that the Project will likely result in a limited residual effect on caribou and their habitat within the RSA; however, these effects are considered to be small in a relative sense when considered in the context of the SK1 range, as described in Section 5.1.

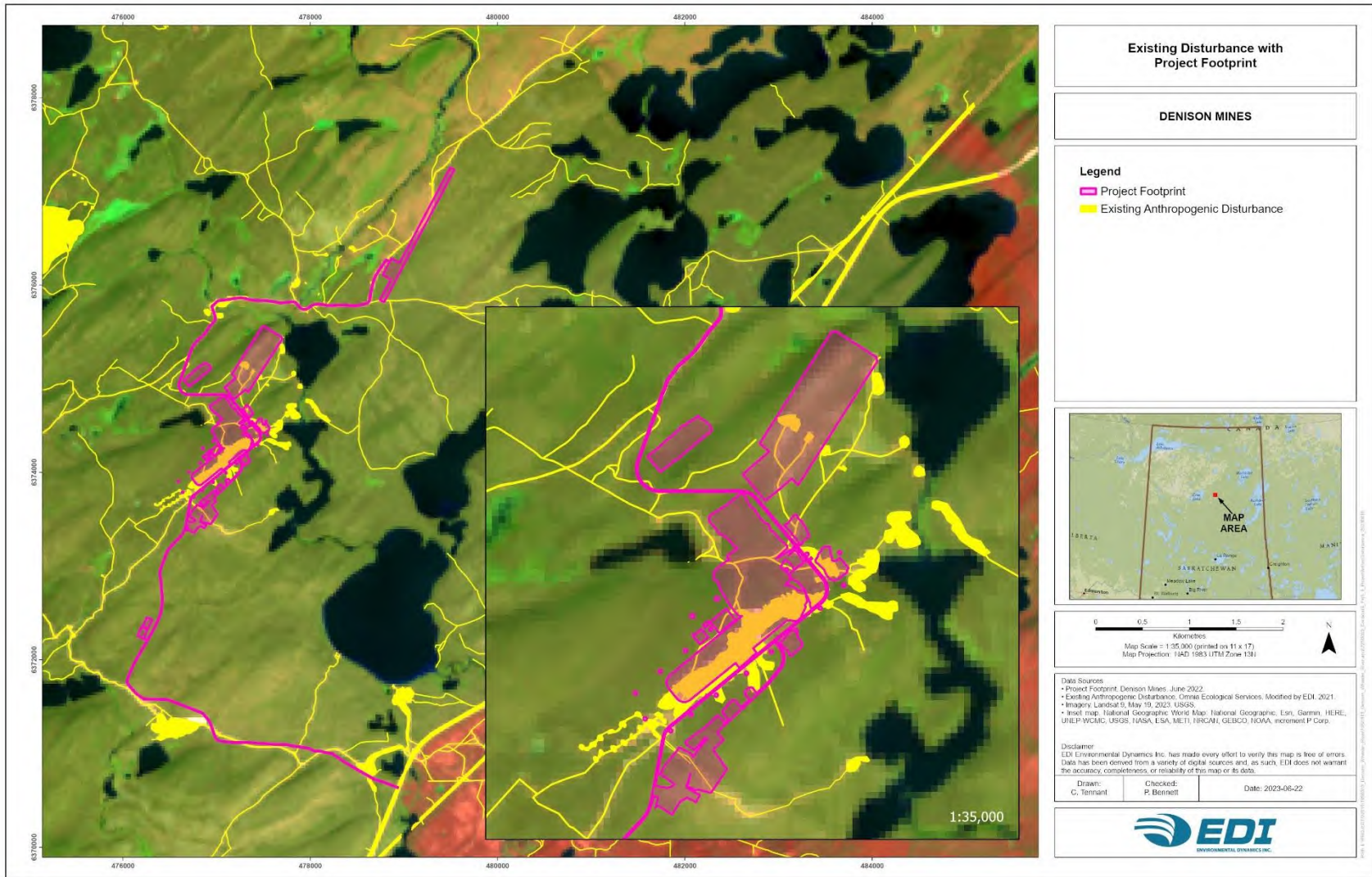


Figure 0-3: Proposed Project Footprint with Existing Anthropogenic Disturbance Visible on Landsat at 1:50,000

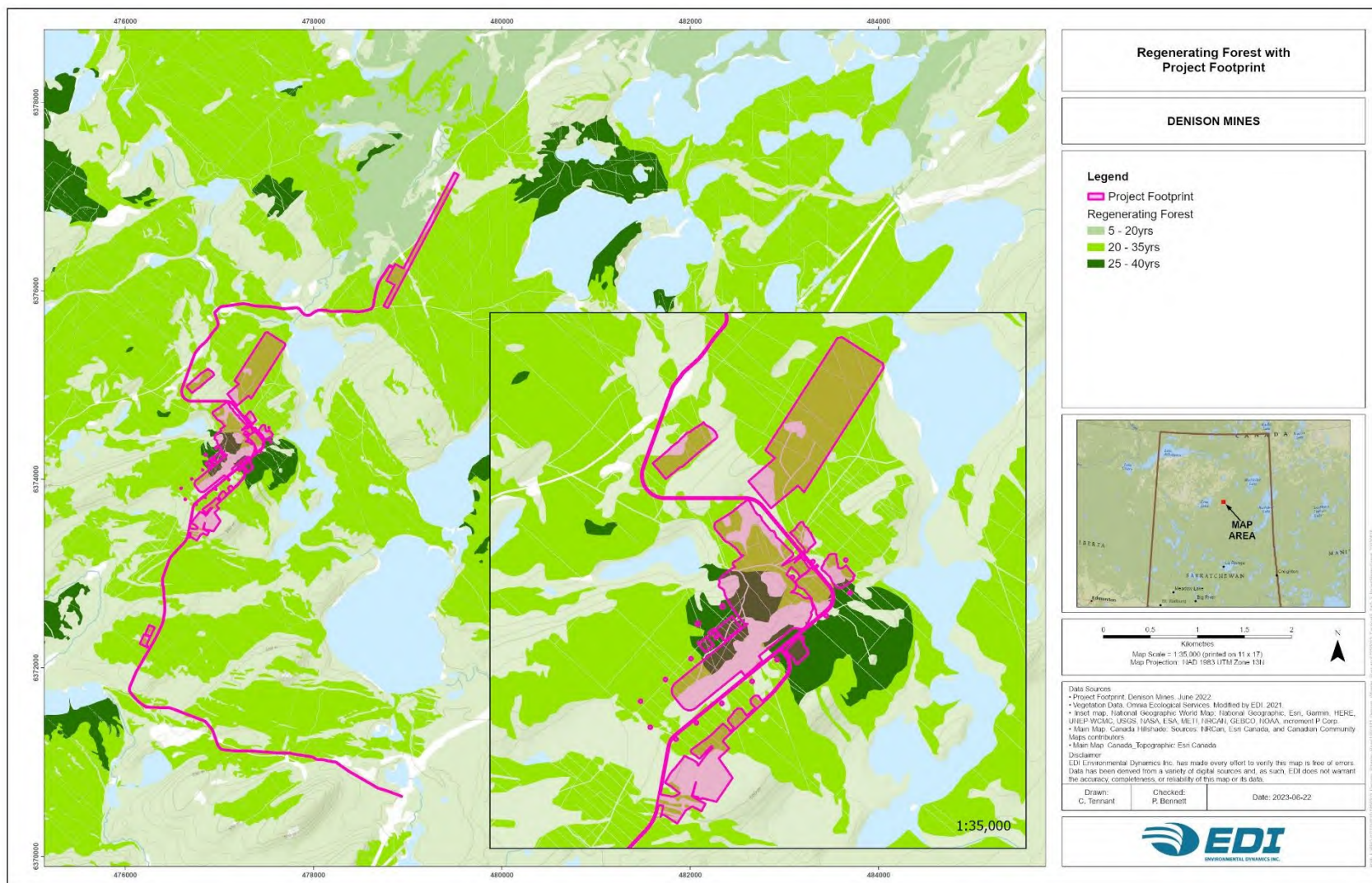
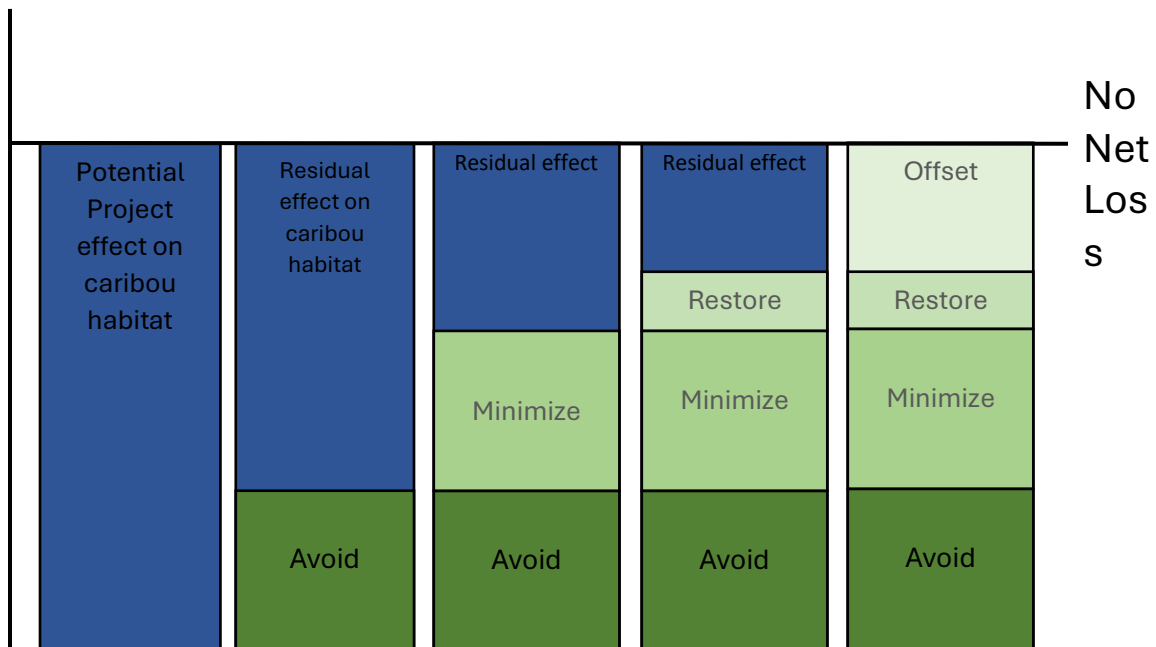


Figure 0-4: Proposed Project Footprint with Regenerating Forest

It is Denison's understanding that currently there are no provisions/requirements for caribou habitat offset by the ENV for projects within the SK1 range. Denison recognizes the importance of woodland caribou to Indigenous groups, the general public, other Interested Parties in Saskatchewan, and Canada. As such, as part of this Plan, Denison is proposing to continue to work with ENV to determine an appropriate offset based on the habitat loss as a result of the Project. Denison expects that the proposed offset calculations would likely include aspects of additionality, temporal considerations, spatial considerations, and other aspects, depending on the expectations/requirements of the caribou habitat offset process that the ENV is currently refining/finalizing. The proposed offset calculations are expected to be refined through ongoing communications with ENV to appropriately address issues at the provincial level related to caribou and habitat.

Future versions of the Plan will include detailed options to develop and advance restoration work and initiatives to provide responsible, proactive environmental stewardship. These offsets (Figure 0-55) are expected to be further refined/defined through Plan updates as the Project proceeds and consultations with ENV advance. Some initial options are presented at a conceptual level in Section **Error! Reference source not found..**

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Figure 0-5: Wheeler River Project Conceptual Caribou Mitigation Plan to Achieve No Net Loss

Offset Framework

This section provides a discussion on offset options will become more defined as the Plan advances, in consultation with ENV. This is expected to offset residual effects over the life-of-the-Project and enhance the restoration activities occurring within the Project footprint to result in no net loss of habitat within the RSA as a result of the Project.

Conceptual Offset Opportunities

An opportunity that Denison has proactively identified is a combined linear feature mitigation and restoration option. Denison has implemented a practical and experimental pilot study to investigate the design, implementation, testing, and monitoring of several functional and structural habitat mitigation options. This opportunity involves two components: 1) applying treatments to address (i.e., reduce) lines-of-sight and discourage linear feature use by both caribou and their predators, and 2) restoration focused on re-establishing terrestrial lichen communities co-established with a biological soil crust (BSC) component.

Importantly, to complete this pilot program, Denison has partnered with the University of Saskatchewan and Northwest Communities Environmental Services (an Indigenous-owned environmental company) under the Developing Eco-Restoration Together (DERT) program. This unique project aims to co-create ecological restoration practices that centre Indigenous peoples, worldviews, and values while also braiding knowledge from the land, Indigenous knowledge, and western science. The project is supported by the three partners but is ultimately guided by the Indigenous Project Advisory Board, and the Community Liaison/Education Coordinator. Through restoration trials, community engagement, and various planting techniques, Denison, with their partners are seeking to return ecosystem functions in areas where they have been previously disturbed (e.g., exploration cutlines). Through collaboration with community members, University of Saskatchewan, industry partners, two graduate students, and local youth, this project is expected to ultimately inform the creation of a framework for effective restoration practices in northern Saskatchewan that centre on caribou and Indigenous communities.

Caribou Trail Study

Wildlife, particularly bears, wolves, and woodland caribou, are using anthropogenic linear features to move throughout their habitat with greater ease. This can result in increased chance encounters between predators and prey and could contribute to the reduction in woodland caribou populations (Omnia 2022). Denison is conducting research on the use of linear features predators and prey in the Athabasca Basin to collect relevant data to inform an effective plan designed to disrupt the current risk related to predator/prey movements/interactions.

Currently, ENV has no guidelines or protocols for assessing the status of disturbance features or for evaluating the need for linear feature mitigation. Denison proactively initiated research to collect field-based findings on the effectiveness of linear disruption features on predator/prey movements in the vicinity of the Project. This field program was designed and implemented to deploy and monitor the effectiveness of five linear feature treatments across nine locations. Treatment types include, seeding and/or planting of jack pine, spreading coarse woody debris, tree tipping, constructing biodegradable fencing, and earth/debris mounding. Methods vary by location

but have a common goal: to discourage prolonged disturbance and encourage new growth in areas of disturbance (Omnia 2022). Each treatment area is monitored by game cameras year-round to determine how wildlife interact with the created physical and visual barriers. All treatments are temporary and biodegradable with the purpose of reducing trail use in the near-term so that the forest can regenerate naturally.

Preliminary results are encouraging and indicate that bear use of treated lines was reduced by 43% compared to untreated lines, caribou use was reduced by 95%, and wolf and moose use was reduced by approximately 94%. Overall, use of treated lines by species of interest was reduced by approximately 83% when compared to baseline monitoring rates. These successful preliminary results will guide future work to define potential offset options associated with linear feature mitigation and restoration.

Biological Soil Crust Research

To support restoration planning, additional research will be designed to investigate BSCs and conducted by a soil science graduate student at the University of Saskatchewan. This research is expected to contribute to the goals of the Developing Eco-Restoration Together Project. BSCs are communities of lichen, bryophytes, cyanobacteria, and microorganisms found in the top layer of the soil (Heindel et al. 2019). These surface soil mats are rich in diversity, and play an important role in the broader ecosystem, especially in locations with extreme climate, little moisture, and nutrient-poor soil (Cowden et al., 2022). Research on BSCs has been focused on desert regions, and this research provides insight to BSC's role in boreal ecosystems, specifically in northern Saskatchewan. By gaining a better understanding of how to support BSC establishment and growth, it is expected that the findings can inform restoration activities that would ultimately benefit caribou.

Sampling of BSCs within the region will be based on a fire chronosequence. This is expected to provide a foundation to better understand the functions and species present in BSCs, and how they develop post-disturbance (Coxson and Marsh 2001). Understanding how these communities develop and interact is important, especially considering the gap in knowledge on soil microbial communities, non-vascular species, and their role in restoration techniques.

A critical element in supporting caribou populations is the consideration of caribou forage lichens. Due to the slow-growing nature of lichens, it can be difficult to include them in restoration activities (McMullin and Rapai 2020). Denison is planning to focus on caribou forage, primarily through transplanting and propagation of the appropriate lichen species. Natural regrowth of lichen communities after fires takes place in a complex setting, where BSCs and bryophyte communities stabilize soil surfaces, providing habitats where lichen propagules can establish and grow (Coxson and Marsh 2001). Denison hypothesizes that reestablishment of terrestrial lichen communities will have a better chance of success where these supporting BSC components can be co-established at the same time. The findings from the BSC research within post-fire environments is expected to support lichen communities, restoration activities for the DERT project, and ultimately caribou and caribou habitat within the Wheeler River Project area.

Monitoring and Adaptive Management Framework

An adaptive management framework will be developed to support the implementation of this Plan (Figure 0-1). In this context the adaptive management framework provides the means for the integration of Plan scope, management, and monitoring to systematically evaluate assumptions to adapt and learn. In practical terms the framework will consider the outcomes of actions taken/implemented, whether they have been successful and, if not, how can such actions be adapted to increase the likelihood of success. Outcomes of the Plan would be measured by establishing performance indicators as the way to define and measure progress toward achieving the objectives.

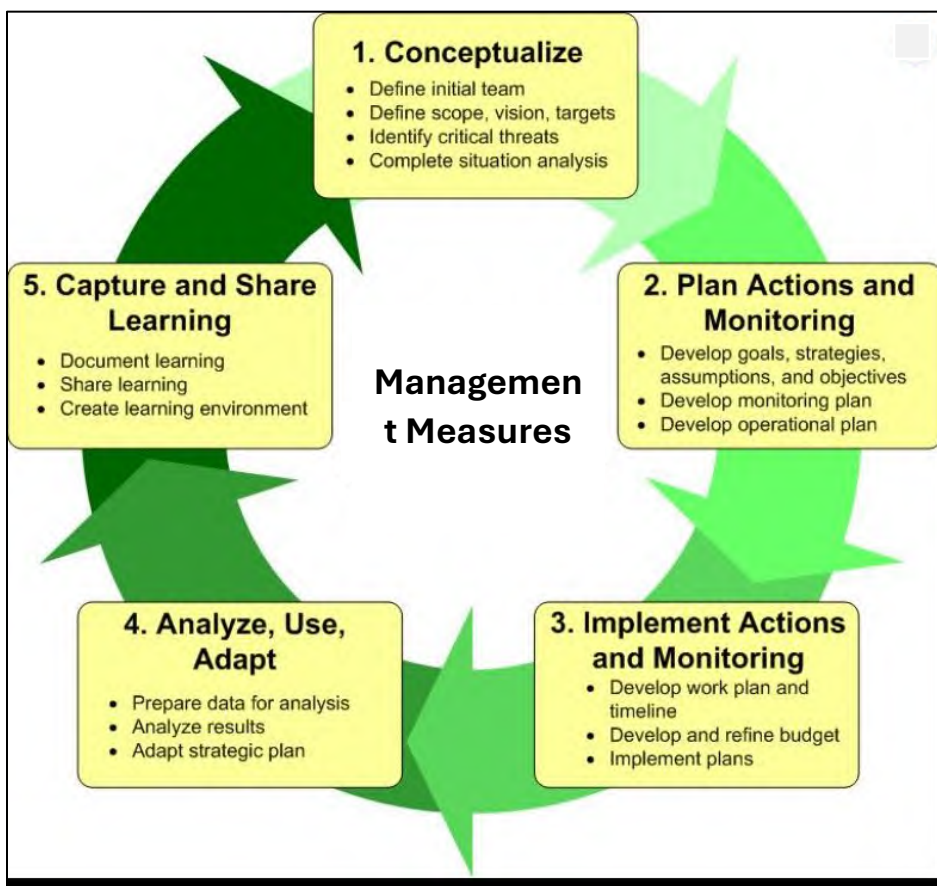


Figure 0-1:

Adaptive Management Cycle

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ATTACHMENT IR-149 / Revised Draft EIS Appendix 9-E Caribou Management Framework (included in Round 2 submission)

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Draft for Discussion

Acronyms and Abbreviations

| Term | Definition |
|-----------------------------------|--|
| Anthropogenic | Caused or produced by humans |
| Boreal Caribou | The boreal ecotype of woodland caribou occurs within the boreal forest of Canada. These non-migratory caribou form small aggregations throughout the year and disperse for solitary calving. |
| CDP | Conceptual Decommissioning Plan |
| Critical Habitat | The habitat that is necessary for the survival of a listed wildlife species and is identified as the species critical habitat in the recovery strategy or action plans for the species. |
| Disturbed habitat (per ECCC 2020) | Habitat showing: i) anthropogenic disturbance visible on Landsat at a scale of 1:50,000, including habitat within a 500 m buffer of the anthropogenic disturbance; and/or ii) fire disturbance in the last 40 years, as identified in data from each provincial and territorial jurisdiction (without buffer). |
| ERFN | English River First Nation |
| ECCC | Environment and Climate Change Canada |
| EA | environmental assessment |
| EIS | environmental impact statement |
| EMS | Environmental Management System |
| ENV | Saskatchewan Ministry of Environment |
| Framework | Caribou Management Framework |
| ha | hectare |
| IK | Indigenous knowledge |
| ISR | in-situ recovery |
| KML | Kineepik Métis Local |
| Project | Wheeler River Project |

| Term | Definition |
|--------------------|--|
| Recovery strategy | A planning document that identifies what needs to be done to stop or reverse the decline of a species. |
| Threatened species | A wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction. |

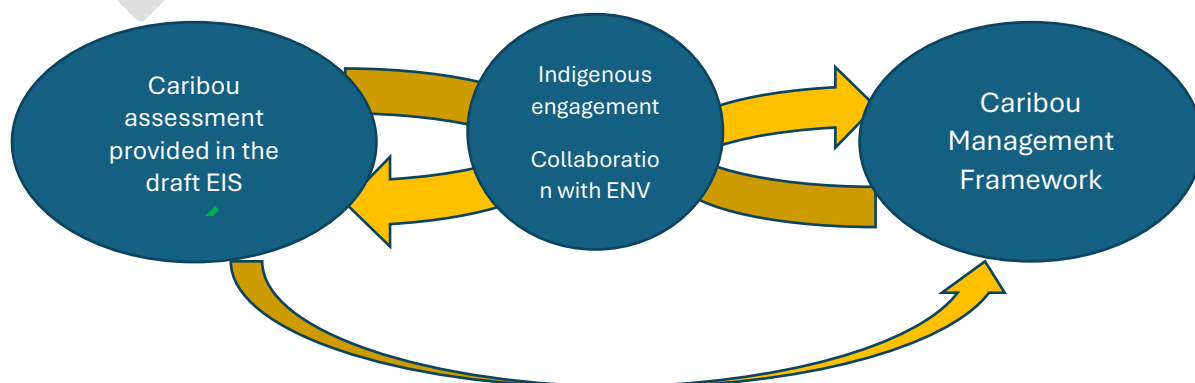
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Introduction

The Wheeler River Project (the Project) draft environmental impact statement (EIS; Denison 2022) evaluated and assessed potential effects on the boreal population of woodland caribou (*Rangifer tarandus caribou*; referred to herein as caribou or boreal caribou) following standard environmental assessment (EA) methodology. The assessment of potential effects, including the assessment of Project-related and cumulative effects, considered both direct (e.g., habitat loss) and indirect effects (e.g., habitat alteration) on caribou and their habitat, while assuming that caribou were present year-round and during all of their life stages (i.e., calving, rearing, mating, over wintering). In this way, the EIS took a precautionary or conservative approach to understanding / addressing the potential residual effects (i.e., effects remaining after mitigation measures were considered) of the Project on caribou and their habitat. Moreover, this precautionary approach provides the basis for planning to inform/support future Project-related regulatory approvals processes and follow-up monitoring. The EIS concluded that in consideration of proposed measures to avoid and minimize potential effects, as well as in consideration of proposed conceptual site restoration, residual Project-related and cumulative effects on caribou and their habitat were not significant.

This Caribou Management Framework (the Framework), developed by Denison for the Project, follows from the environmental assessment (EA) process, though its objective differs from that of related EA / EIS documentation. The Framework builds on the assessment of potential Project effects, including cumulative effects, and commitments to avoid and minimize such effects described in the EIS and provides a further Project-specific management tool to be employed in relation to caribou and their habitat. The Framework is expected to be advanced through ongoing consultation with the Saskatchewan Ministry of Environment (ENV) as ENV finalizes the caribou range plan for the SK1 conservation unit, the caribou conservation unit in which the Project is located. The EIS is a conservative planning tool, whereas the Framework is a practical, living document intended to contribute to the province's overall caribou conservation strategy. The Framework is not a requirement for EA determination but is provided as a guidance document to help Denison proactively describe and inform the development and implementation of appropriate management measures related to caribou and their habitat.

The Framework is an evergreen document but has been developed based on Denison's current understanding of range plan development for SK1 to date. As needed, the Framework will be updated to be consistent with the management goals defined by ENV for SK1 (once established) and will be developed / refined in consultation with local communities including English River First Nation (ERFN), Kineepik Métis Local (KML) in Pinehouse, and regulators (e.g., ENV) as depicted graphically below.



As noted above, the boreal caribou range plan for SK1 is under development, and it is understood that this Framework will be updated as more range plan details become available. Developing the Framework at this early stage is consistent with and reflects Denison's commitment to continue to work with the province to meet the management objectives and management strategies for the SK1 range. It is envisioned that this Framework will be included as a component of the provincial environmental impact statement and should it be accepted through the issuance of a Ministerial Approval, form the basis of a condition of approval pursuant to *The Environmental Assessment Act*.

Draft for Discussion

Regulatory Setting and Indigenous Perspectives Related to Boreal Caribou

A brief review highlighting provincial and federal governments, and Indigenous nations and communities considerations of boreal caribou is provided below for reference. Briefly, in 2002, boreal woodland caribou were recommended for “threatened” status by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and were listed as “threatened” under the Species at Risk Act (SARA) when it was proclaimed in 2003. As required under SARA, the Government of Canada developed a Recovery Strategy for the Woodland Caribou Boreal Population in Canada (the Recovery Strategy) which was released in October 2012. Saskatchewan is responsible for managing woodland caribou on provincial and private lands, and as signatory to the Accord for the Protection of Species at Risk in Canada, has a responsibility to prepare a provincial range plan for woodland caribou. Range plans, which involve close collaboration between the provincial government and Indigenous nations and communities, provide a path forward for effective landscape management. They provide the federal government with clear information on the measures, tools and targets for woodland caribou habitat management being deployed, and that they effectively protect woodland caribou habitat.

Provincial Government

The responsibility for woodland caribou management lies with the Province of Saskatchewan. As noted above, the province is responsible for developing range plans or management plans which build on the federal recovery strategy by setting goals and objectives for maintaining sustainable population levels.

The Saskatchewan Conservation Data Centre is responsible for evaluating and assigning a conservation rank to each taxon, resident or transient, found in the province. Woodland caribou’s subnational or S-rank conservation rank is S3. This ranking indicates that, provincially, the species is vulnerable/rare to uncommon which is associated with a moderate risk of extinction or extirpation due to a restricted range, relatively few populations, recent and widespread declines, threats, or other factors.

Based on work completed by McLoughlin et al. (2019), which was confirmed by ENV in November 2023 (SK ENV 2023b), the caribou populations in SK1 are stable. The amended federal recovery strategy identifies 40% undisturbed habitat in the SK1 conservation unit as the disturbance management threshold as well as the maintenance of total anthropogenic disturbance in the range at or below 5% while maintaining the minimum 40% undisturbed habitat (ECCC 2020). The SK1 conservation unit has high levels of natural disturbance (fire), but very low levels of human-caused disturbance. At present, the habitat disturbance level in SK1 is 53% (that is, 47% undisturbed habitat) (SK ENV 2023b). Approximately 50% of SK1 is disturbed by wildfires and 3% by anthropogenic features such as roads, communities, power transmission lines, forestry, mineral exploration, and mining (3%).

The provincial goal is to sustain and enhance woodland caribou populations, and maintain the ecosystems they require, throughout their current range (ENV 2013). Through the woodland caribou range assessment and range planning program, the province is:

- Gaining a better understanding of woodland caribou ecology;
- Working toward meeting objectives identified in provincial and federal strategies; and
- Improving how the province manages the species and related habitat.

The province's woodland caribou range assessment and range planning program incorporates two key components:

- Woodland caribou range assessment, which enhances the understanding of woodland caribou populations and their interactions with the environment; and
- Woodland caribou range planning, which provides a framework, strategies and objectives that allow for better decisions involving habitat management and self-sustaining caribou populations.

Additionally, the province has identified that engagement is a key component of the range plan process and will be completed with representatives from First Nation, Métis, industry, non-governmental organizations, and communities¹.

Although the management objectives and management strategies for caribou in SK1 are not yet defined, Denison is committed to working with ENV as the range plan is developed to ensure this project-specific management framework aligns with the conservation objectives as determined by the province as the primary steward of caribou in the province.

Federal Government

Boreal caribou have been designated as *threatened* under the federal *Species at Risk Act*. Environment and Climate Change Canada (ECCC) released amended recovery strategy for woodland caribou in 2020 (ECCC 2020). A recovery strategy is a planning document that identifies what should be done to stop or reverse the decline of a species.

The Project is located in the Boreal Shield West ecoregion of the Boreal Shield ecozone. The Boreal Shield West ecoregion stretches from Alberta to Ontario (Figure 2-1).

¹ [Woodland Caribou Conservation | Woodland Caribou Program | Government of Saskatchewan](#)

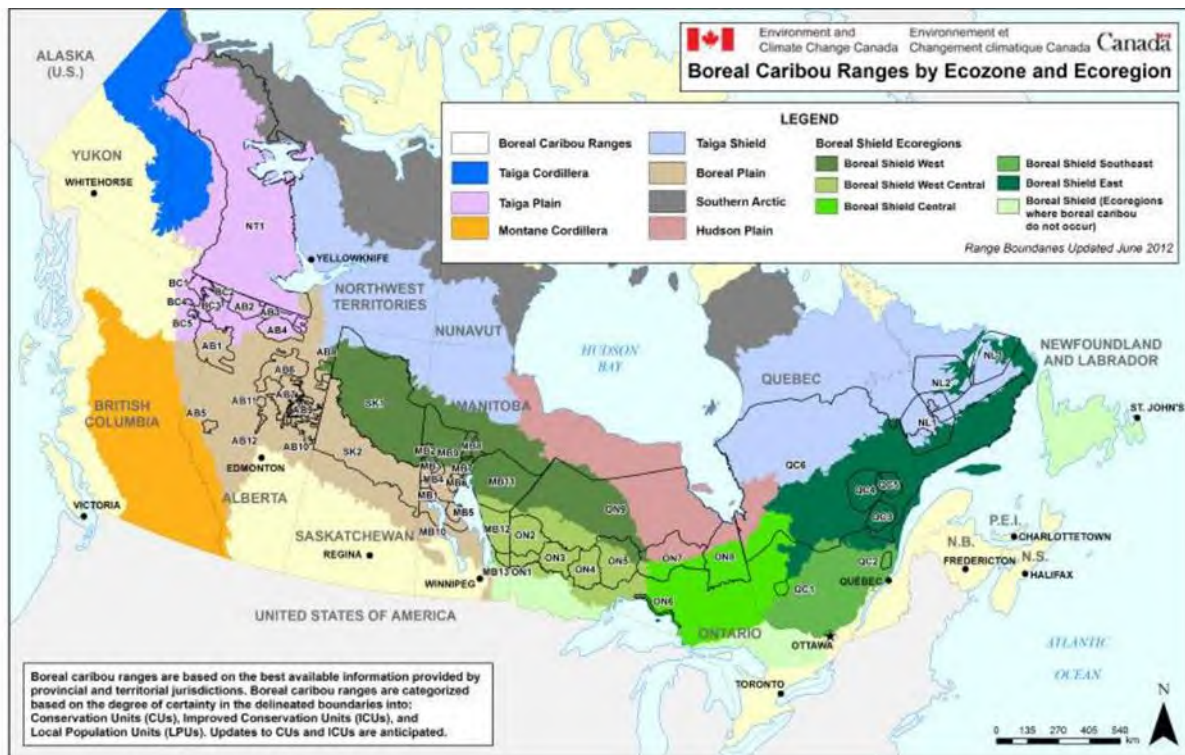


Figure 0-1: Boreal Caribou Distribution Across Ecozones and Ecoregions in Canada (source: ECCC 2020)

The SK1 range comprises more than 18,000,000 hectares (ha) and is characterized by high fire disturbance and low anthropogenic disturbance (ECCC 2020). The likelihood of caribou self-sustainability in the boreal shield range in SK1 is “likely” (ECCC 2020). For SK1, the amended recovery strategy (ECCC 2020) identifies 40% undisturbed habitat in the range as the disturbance management threshold, which provides a measurable probability (71%) for the local population to be self-sustaining. This threshold is considered a minimum threshold because at 40% undisturbed habitat there remains a risk (29%) that the SK1 local population cannot be self-sustaining. Disturbed habitat (ECCC 2020) is habitat showing: i) anthropogenic disturbance visible on Landsat at a scale of 1:50,000, including habitat within a 500 m buffer of the anthropogenic disturbance; and/or ii) fire disturbance in the last 40 years, as identified in data from each provincial and territorial jurisdiction (without buffer). Undisturbed habitat (ECCC 2020) is habitat not showing any: i) anthropogenic disturbance visible on Landsat at a scale of 1:50,000, including habitat within a 500 m buffer of the anthropogenic disturbance; and/or ii) fire disturbance in the last 40 years, as identified in data from each provincial and territorial jurisdiction (without buffer). Disturbance within the 500 m buffer would result in a reduction of the undisturbed habitat.

Studies (e.g., McLoughlin et al. 2019) indicate that the SK1 local caribou population is likely self-sustaining at current levels of disturbance (60% total disturbance), with a 71% probability of persistence. Environment and Climate Change Canada’s analyses also indicate that the SK1 local population is sensitive to small increases anthropogenic disturbance and sensitive to small decreases in adult survival. For these reasons, a higher probability of persistence was selected for critical habitat identification in SK1 (71%) than was selected for the other 50 ranges across Canada (60%) (ECCC 2019).

The precise location of the 40% undisturbed habitat within the range is expected to vary over time. The habitat within the SK1 range should exist in an appropriate spatial configuration such that boreal caribou can move throughout the range and access required habitat when needed. The key to this habitat delineation is achieving and maintaining an overall, ongoing range condition that allows for the dynamic habitat supply system, containing the biophysical attributes upon which caribou depend, to remain sustainable. It is this dynamic habitat supply system within the SK1 range that is the habitat condition considered to be necessary for the caribou.

Indigenous Nations and Communities

Woodland caribou has historically been and continue to be an important part of the culture and diet of Indigenous people in northern Saskatchewan and identified as part of the subsistence harvest by EFRN, and KML. Athabasca Denesųtiné have also described hunting woodland caribou along with Barren-ground caribou and identify deeply with caribou and define their territorial extent with that of the Beverly and Qamanirjuaq caribou ranges. Elders from EFRN have shared that their people have always respected the land and animals and that the tradition to take only what is needed has been passed on through generations (EFRN 2011).

Forest fires are considered the main threat to woodland caribou in the EFRN Traditional Territory. Predators pose a threat as well, but their presence never seemed to have affected the caribou population in the past. In addition, it was pointed out that industry (such as mining and exploration), tourism (in the summer), and hunting by other Indigenous groups may pose additional threats to the caribou population (EFRN 2011).

Knowledge from Indigenous nations and communities will be used to support the management and conservation of caribou in SK1 through the province's range planning process.

SK 1 Caribou Population – Background Information

Background information concerning the condition of caribou populations in the SK1 conservation unit is provided below.

SK1 Conservation Unit

Saskatchewan's boreal woodland caribou range is divided into two woodland caribou conservation units that are based on the boundaries of the boreal ecozones - the Boreal Shield Woodland Caribou Conservation Unit (SK1) and the Boreal Plain Woodland Caribou Conservation Unit (SK2). Per ECCC (2020) information available to delineate boreal caribou ranges varies in certainty and therefore caribou ranges are categorized into three types: conservation units (low certainty), improved conservation units (medium certainty) and local population units (high certainty). ECCC (2020) also recognizes that there will be changes to conservation units and improved conservation units as more information becomes available, which is aligned with the province's range planning work to date in SK2.

While the two conservation units represent important differences in ecological conditions (e.g., habitat types, fire regimes, landforms, etc.) and human land use and management (e.g., overall levels and types of land use, fire management, etc.), the boundary between SK1 and SK2 does not represent a population boundary, as caribou move freely between the two areas, as well as within the individual units.

The Project is located in SK1, with SK1 encompassing the rocky shield, sandy plains and many lakes of northern Saskatchewan. Despite its relatively large size (~176,000 km² or 18 million ha), at present the SK1 unit has not been sub-divided into administrative units, as has been the case with SK2 through its range planning process. The province has noted that SK1 is an area with considerable fire disturbance, ecological differences from west to east, and different levels of development.

Population Trends

Western Science

The SK1 Boreal Shield management unit contains high-quality conifer-dominated caribou habitat with greater than 40-year-old stands of jack pine and black spruce forests suitable for lichen colonization, black spruce swamps, and open muskegs supporting relatively high densities of caribou, at 36.9 caribou/1,000 km² or approximately 4,000 caribou across the SK1 Boreal Shield Woodland Caribou Management Unit (McLoughlin et al. 2019).

Research has shown that up to 70% of the year-round diet of caribou may consist of ground and arboreal lichens. If the quantity of available lichen forage is low, caribou can exist without relying entirely on lichens (McLoughlin et al. 2019). Due to their physiology, lichens are resilient to periods of drought and cold temperatures, but because of their slow growth rate, exhibit a slow recovery time after depletion and fire events. In the SK1 range, McLoughlin et al. (2019) found that stand types with the highest potential for adequate lichen biomass for caribou are jack pine and poorly drained black spruce sites.

McLoughlin et al. (2019) observed that, from 2014 to 2018, the caribou population exhibited a high average adult female survival rate and moderate recruitment (0.192 calves per cow in March), ranging from a low of 0.134 calves/cow in March 2016 to 0.244 calves/cow in March 2018. These demographic parameters led the authors to assess the SK1 boreal shield caribou population as being stable at the time of their study (McLoughlin et al. 2019).

While calving areas have not been documented within the SK1 range, it is recognized that caribou may use open fen and treed bog habitat types for calving during the spring/summer period. In Saskatchewan, caribou habitat used during the calving season in the SK2 range demonstrated a strong selection for treed muskegs, but avoidance of jack pine, mixed hardwood stands, and roads (Dyke 2008).

Neufeld et al. (2021) summarized results from aerial surveys over a period of eight years in an 87,193 km² study area in the Athabasca Plain and Churchill River Upland ecoregions in the north, that are inclusive of the Terrestrial Regional Study Areas that were used in the EIS. During 11 of 16 aerial caribou surveys conducted between 2008 and 2015, woodland caribou were detected in the surveyed areas. The average density of the 16 surveys was estimated at 36.9 caribou/1,000 km² (95% CI = 26.7 to 47.2 caribou/1,000 km²). Across the Neufeld et al. (2021) study area and all years, estimated caribou densities were higher in comparison to averages reported for most other boreal woodland caribou ranges in Canada (i.e., caribou density reported in other areas ranged 4.3 to 18.7/1,000 km²) indicating that caribou can tolerate natural disturbance. One exception to the relatively high caribou densities in northern Saskatchewan was noted: the 2,285 km aerial the Millennium Project in March 2014, 10 km west of the Terrestrial Regional Study Area, resulted in lower woodland caribou densities at 5 caribou/1,000 km² (Neufeld et al. 2021).

Eight of the sixteen caribou surveys reported the ratios of male to female and calf to female in their results with the average male:female ratio calculated at 0.571 (95% CI = 0.444 to 0.699) and calf:female at 0.195 (0.158 to 0.232). Again, the 2014 Millennium survey reported a different male:female ratio, outside the reported range (1.6), concurring with the reported low caribou densities.

Indigenous and Local Knowledge

Information provided by Indigenous knowledge (IK) holders to Denison as part of the Wheeler River Project EA process generally agrees with the science-based findings that show the population of woodland caribou in northern Saskatchewan is stable; however, some IK perspectives differ from the narrative that holds that caribou populations are stable. The difference in perspectives may stem from changes in distribution, as opposed to density, as caribou alter their movements in response to landscape disturbances.

The ERFN trapper, fisher, and resource harvester (ERFN Trapper), whose ancestral lands overlap with the Wheeler River terrestrial RSA and SK1, shared that they have not observed any changes in woodland caribou numbers (i.e., densities); woodland caribou numbers have remained stable over the years (19 -LK-ERFN Trap-134.156; Denison 2022). The ERFN trapper, fisher, and resource harvester (ERFN Trapper) have also shared that caribou are the most frequently sighted big game between Russell and McDougall lakes, which lie immediately to the east and south of the Wheeler River Project (19-LK-ERFNTrap-134.174; Denison 2022).

Some EFRN Elders have shown concern over woodland caribou populations, worrying that future generations will not experience the same abundance of wildlife that they themselves experienced (EFRN 2011). These concerns partly stem from EFRN observations of changing woodland caribou distribution, which is believed to be influenced by wildfire. According to EFRN Elders, wildfires play a role in calving success and impact caribou distribution and population by disturbing habitat and travel routes. Some Elders have also suggested a decline in caribou populations as a result of these wildfire disturbances (EFRN 2011). Participants in an EFRN traditional knowledge study also shared concerns over the potential decline of caribou and moose as an effect from increased access leading to more hunting pressure (EFRN and SVS 2022).

Predation

Western Science

In addition to relatively low predator densities in their study area, McLoughlin et al. (2019) found some spatial separation between caribou and wolves. Caribou did not seem to avoid existing linear features (such as roads, trails, and transmission lines) in the area, while wolves established their territories away from linear features. Unlike caribou, who preferred mature conifer stands, wolves selected for wetlands and patches of deciduous-mixed forest, avoiding stands of mature conifers. Other prey species, such as moose, also occurred at relatively low densities (i.e., 45.7 moose/1,000 km²) (McLoughlin et al. 2019).

McLoughlin et al. (2019) observed that mortality of adult caribou occurred mostly during the snow-free season and only 1 of 94 collared caribou was harvested by a hunter during the four years of the study.

While predation is believed to be a key limiting factor for woodland caribou (Bergerud 1974; Stuart-Smith et al. 1997, DeMars et al. 2011 from ECCC 2020), Neufeld et al. (2021) suggested that habitat- or disturbance-mediated apparent competition only plays a minor role in the Saskatchewan woodland caribou population. Habitat- or disturbance-mediated apparent competition occurs when natural (e.g., forest fires) and anthropogenic (e.g., human development or activities) disturbances increase the abundance of other ungulates, which in turn may increase predator densities, which then increases predation risk to caribou. Neufeld et al. (2021) concluded that Northern Shield and Taiga ecoregions are of low productivity where caribou may compete with only one ungulate species (i.e., moose) and therefore, caribou and wolf dynamics do not follow general habitat- or disturbance-mediated apparent competition models.

Indigenous and Local Knowledge

The perspective of Indigenous knowledge holders is generally consistent with western-scientific findings that show low impacts of wolf predation on woodland caribou; for instance, EFRN knowledge holders have stated that wolves do act as a predation threat to caribou, but their presence has never caused population declines in the past (EFRN 2011). However, the experiences of some knowledge holders contradict the findings that relate to spatial separation of the two species. The EFRN Trapper has described an increase in trails and roads as more cabins are built in the areas where they typically hunt and trap. According to the EFRN Trapper, trails and roads are used by wolves and caribou alike. As the EFRN Trapper recounts, “wolves travel on bush roads. [I] saw a pack of about 18 wolves recently” (19-LK-ERFNTrip-134.159; Denison 2022). On the other

hand, local trappers often see caribou tracks on roads, trails, and hand-cut lines (19-LK-ERFNTrip-134.153; Denison 2022).

The ERFN Trapper believes that wolf populations are increasing, and steps should be taken to curb this growth (21-LK-ERFNTrip-506.2; 21-LK-ERFNTrip-506.3; Denison 2022). One solution put forward was to remediate the extensive network of trails, roads, and cut-lines by blocking access to them (21-LK-ERFNTrip-506.4; Denison 2022). Other IK indicates that wolves are a natural presence on the landscape and not a serious threat to the long-term stability of woodland caribou populations; however, the growing presence of roads, trails, and cut lines poses a potential issue as both caribou and wolves utilize these landscape features, increasing the likelihood of predation opportunities, especially if the wolf population is on an upward trend.

Harvest

Indigenous peoples in Saskatchewan have an inherent right to harvest woodland caribou for subsistence purposes (ENV 2013). No other harvest of woodland caribou is currently permitted.

Under provincial and federal recovery planning and effective species management, self-sustaining caribou populations will support long-term subsistence use of the species and protect treaty rights. Subsistence harvest levels are assumed to be low but actual numbers are not available because most communities or Indigenous groups are not collecting and/or publishing this information.

The ERFN Country Foods Study (2017), highlights the importance of caribou in the diet of the people of this community. Of the traditional meats harvested by ERFN study participants, woodland caribou was the third most consumed mammal species. The Wheeler River ERFN Traditional Knowledge Study (2022), documented woodland caribou harvesting locations in the study area. Three areas that had been used for woodland caribou hunting in the last ten years were recorded (codes: 1003-10, 1004, 09, 1016-09).

Overall Status

As noted previously, based on work completed by McLoughlin et al. (2019), which was confirmed by ENV in November 2023 (SK ENV 2023b), the caribou populations in SK1 are stable. The amended federal recovery strategy specifies a unique disturbance threshold of 40% undisturbed habitat for SK1. Habitat disturbance is assessed by the combination of human-caused disturbance (e.g. roads, industrial infrastructure) with a 500 m buffer and wildfire perimeters (less than 40 years old). Based on the federal assessment and recent preliminary disturbance assessment from ENV, an estimated 53% of SK1 is considered disturbed, with 47% undisturbed (ENV 2023b), indicating that the land use and overall disturbance in the conservation unit remains below the recovery strategy disturbance threshold.

Mitigation Hierarchy

A generic biodiversity mitigation hierarchy is provided in Figure 0-1. As shown in the hierarchy, an offset can be used to address any residual effects following efforts to avoid, minimize, and restore potential project effects. This generic hierarchy is generally consistent with the approach of ENV to manage effects on caribou and their habitat.

The balance of Section 4 of this Plan outlines Denison's approach to avoid, minimize, and restore caribou habitat per commitments made in the draft EIS associated with the Project. The discussion of additional management measures through offsetting is provided in Section 5.

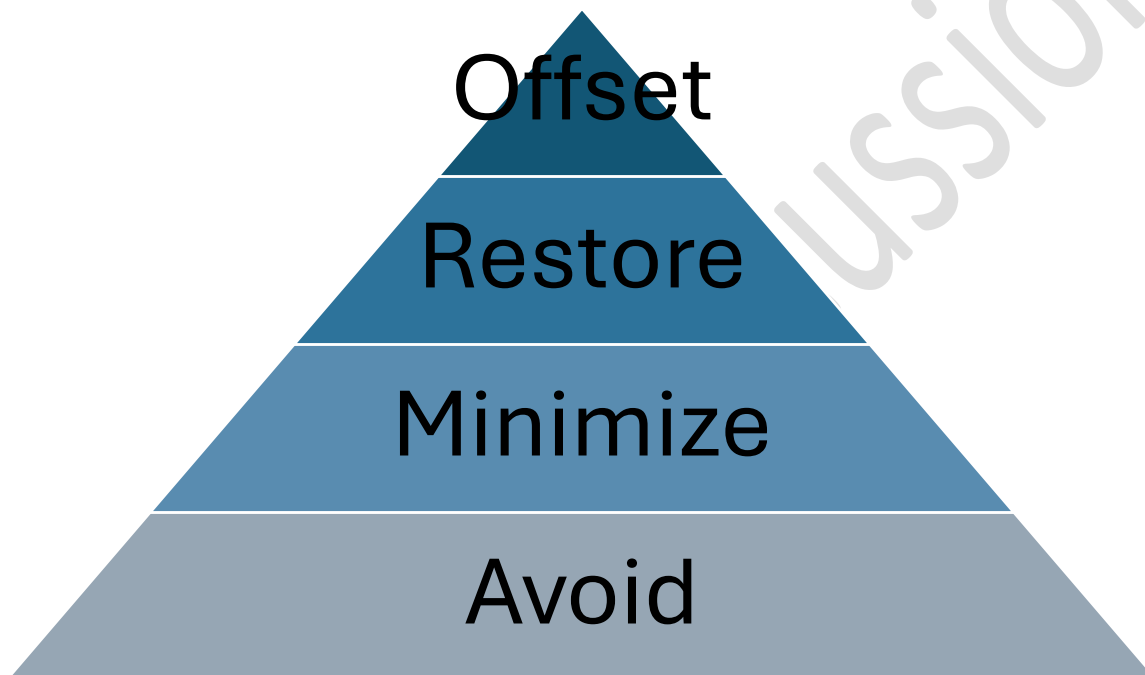


Figure 0-1: Mitigation Hierarchy

Avoid

Potential adverse effects on the caribou have been avoided to the extent possible through Project design, including:

- Selection of in-situ recovery (ISR) mining avoids some direct and indirect effects compared to conventional underground or open-pit mining methods. In-situ recovery mining avoids the need for spatially expansive infrastructure such as waste rock piles and tailings management facilities reducing the Project footprint (i.e., avoids direct effects on caribou and their habitat). In-situ recovery mining also reduces the potential for interactions between caribou and Project components / activities as it concerns sensory disturbance as it is inherently a less intensive form of mining with reduced noise/light/vibration generation (i.e., avoids indirect effects on caribou and their habitat).
- Site clearing and other works that involve disturbance of vegetation and/or soil will be completed during least-risk timing windows for caribou (for example, outside of

wintering/calving period from April 1-July 31, per ENV 2013), where practical, to avoid disturbance during sensitive time periods.

- Pre-disturbance wildlife surveys will be completed to identify caribou presence and work will be postponed if caribou are present.

Minimize

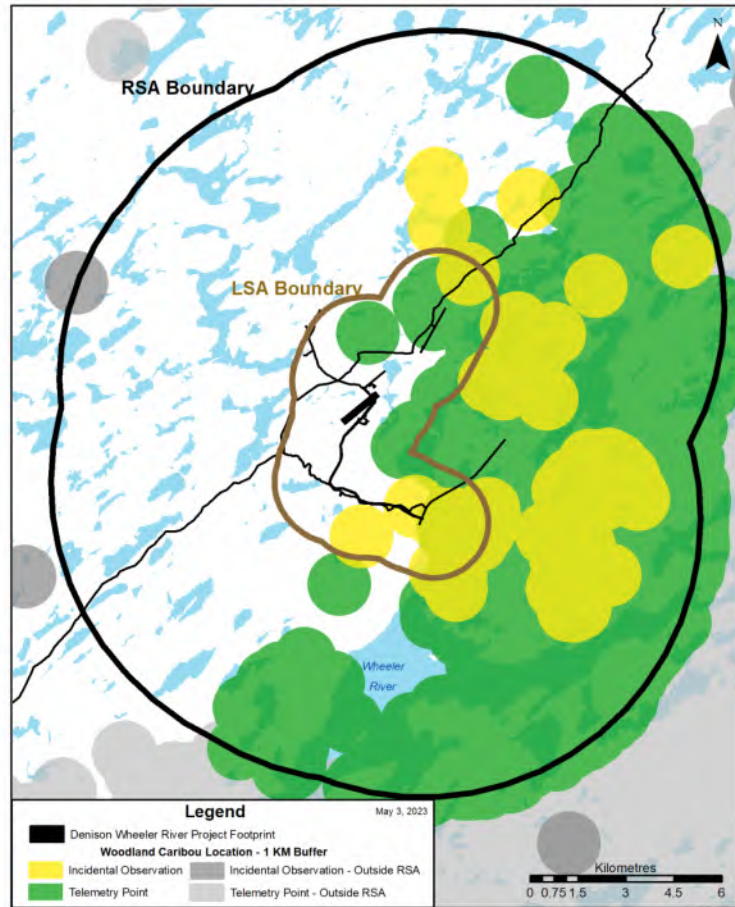
Additional mitigation measures to minimize effects on caribou and their habitat and tailored to Project features have been incorporated into the various Project management and monitoring plans within the Environmental Management System (EMS) including but limited to erosion and sediment controls, soil and vegetation monitoring, Decommissioning Plan, air quality monitoring, fuel spill control and response, Radiation Protection Plan, surface water and effluent monitoring, and Waste Management Plan.

The Project's EMS plans provide direction on monitoring and adaptive management so that if issues are identified, mitigation measures can be developed and implemented in a timely and effective manner. Mitigation measures specific to caribou are applicable during all Project phases, within all seasons and expected to be effective following appropriate implementation. Examples of the measures to minimize Project effects on wildlife in general, and caribou in particular, are highlighted below.

1.1.1 Disturbance Footprint

- Siting Project components in close proximity to the ISR mining area minimizes indirect effects on caribou and their habitat. The Project components are also west of woodland caribou observations from a large-scale caribou collaring program based on tracking data received by the Ministry of Environment (Figure 0-2), although the absence of data does not necessarily mean the absence of caribou and Denison has observed caribou in the area. Appropriate siting is anticipated to minimize the potential for interactions with woodland caribou and Project activities.
- The Project footprint (i.e., the area of maximum physical disturbance) has been reduced to the extent safely practicable, resulting in limited/minimal habitat loss/disturbance and noise propagation.
- Portions of the proposed Project footprint will be developed within previously disturbed areas, including roads currently used for exploration activities, thereby minimizing additional habitat disturbance.

Denison-Wheeler Study Area - Woodland Caribou Location Data



| RSA Boundary | | |
|------------------------|-------------------|---------------------|
| Data Type | Years | Number of Locations |
| Incidental Observation | 1987, 2017 – 2022 | 89 |
| Telemetry Point* | 2013 – 2016 | 3,848 |

*Data from 15 individual woodland caribou cows

| LSA Boundary | | |
|------------------------|-------------------|---------------------|
| Data Type | Years | Number of Locations |
| Incidental Observation | 2017 – 2022 | 19 |
| Telemetry Point* | 2013, 2015 – 2016 | 62 |

*Data from 4 individual woodland caribou cows

NOTE: Absence of data does not mean absence of woodland caribou.

Figure 0-2 Saskatchewan Ministry of Environment Woodland Caribou Location Data Provided to Denison

Wildlife and Habitat Protection

- Project activities have been assessed for their potential to disturb or remove wildlife and/or wildlife habitat (e.g., site clearing, soil disturbance) to determine potential effects on wildlife and wildlife habitat and the assessment, including proposed mitigation measures, for the Project will guide Project activities.
- Pre-disturbance wildlife clearance surveys will be conducted within the Project Area; results of the clearance surveys will inform the development and implementation of appropriate mitigation (e.g., delay of work) to address the identified issue (e.g., presence of caribou).
- Personal firearms for employees and contractors will be prohibited within the Project Area to prevent hunting activities.
- Policies will be implemented prohibiting employees and contractors from feeding, approaching, or harassing wildlife species within the Project Area.
- To support wildlife habitat regeneration, progressive restoration including ecosystem-based revegetation will be conducted on disturbed areas as soon as practicable in accordance with the Decommissioning Plan.

Wildlife Deterrence and Prevention of Wildlife Entrapment

- In addition to installing secure fencing around all contaminated areas to prevent accidental contaminant exposure, buildings and other Project components will be designed and maintained to exclude wildlife from using buildings for refuge or shelter, and to deter wildlife from potentially becoming entrapped.

Sensory Disturbance

- Noise emitting Project activities will be managed to minimize sensory disturbance of wildlife, especially during sensitive time periods, such as calving. This would include:
 - locating excessive noise generating activities such as the concrete batching operation as far away from sensitive wildlife locations as possible;
 - directing the generator discharge openings away from sensitive locations; and
 - making use of available on-site obstructions to control sound exposure at sensitive areas (i.e., locate sources behind buildings).
- The main sources of noise will be related to transport of people and goods, drilling of holes for the freeze wall and wellfield, operation of the batch plant, operation of the processing plant, and operation of the pumphouses. Low sound emission equipment and the use of silencers or mufflers (whenever practical) will be used to reduce noise associated with Project activities. There will be regular maintenance of equipment to ensure it is in proper working order and not emitting noise unduly.
- Lighting will be focused on work sites and not surrounding areas, to minimize light trespass and other light-related pollution sources.
- Facilities will be illuminated only to meet standards set for the protection of workers to avoid over-illumination.
- Battery-powered, light vehicles and mobile equipment, and an AC powered dual rotary drill will be used for ISR wellfield development instead of a traditional diesel-powered unit, where practical, to reduce air emissions and noise levels and improve energy efficiency.

- Fugitive dust sources that could lead to deposition of dust on vegetation and waterbodies (including potential deposition of trace metals and radionuclides) will be reduced by:
 - dust suppression techniques on site roadways, such as road watering and traffic management;
 - directing processing plant exhaust from drying and packaging areas through a stack prior to release outside of the building;
 - designing the stack height based on results of air dispersion modelling to be an appropriate height for optimal dispersion;
 - making a wash bay available to clean items, equipment, and vehicles that may have been in contact with potentially contaminated materials. Contaminated water from the wash bay will be collected in a sump tank and routed to the water treatment plant for treatment and discharge; and,
 - conducting radiological clearance scanning as required for any items, equipment, and vehicles leaving the Project Area.

Transportation Management

- Traffic and access control measures will be implemented, including managing traffic volume by scheduling truck convoys, using high-volume haul trucks, and restricting public access (e.g., private vehicles, snowmobiles, all-terrain vehicles, and foot traffic) to the Project site and roads with both north and south security access gates. It is important to note that if any individual were seeking access around the Project area to undertake Aboriginal and / or Treaty Rights, Denison staff would facilitate this, provided it was safe to do so given Project activities in the area.
- For Project air traffic, as safety allows, planes will be encouraged to use the most direct approach and departure flight paths in order to leave the terrestrial LSA and RSA in an expedient manner.
- Appropriate road signage will be installed (e.g., speed limits, identification of wildlife crossings and areas of high activity) along Project roads to minimize the risk of wildlife-vehicle collisions.
- Speed limits will be implemented to reduce the risk of wildlife-vehicle collisions.
- Wildlife will have the right-of-way on Project roads, unless it is unsafe to stop (i.e., if a collision is imminent). Vehicles will not be used to encourage caribou to move off Project roads and processes will be implemented for employees and contractors to slow down and/or stop vehicles/equipment to allow caribou to move away or off the road before resuming normal road speeds for the area.
- Road watering and regular road maintenance to limit dust dispersion.
- Employees and contractors will report and communicate the location and circumstances of any roadkill observed on or alongside Project roads. Large-bodied wildlife carcasses found will be promptly reported to ENV and disposed of as directed to prevent scavenging.
- Vegetation along Project roads will be managed to reduce attractiveness to wildlife (e.g., forage plants) and maintain appropriate sightlines for drivers to minimize wildlife-vehicle collisions.
- Alternative measures on Project roads for de-icing and winter traction (e.g., sand, gravel) or dust suppression (e.g., water) will be implemented, whenever practicable, to limit the use of specialty chemicals and potential exposure of wildlife including caribou to them.

- Appropriately sized gaps in the roadside snowbanks during winter will be maintained to facilitate caribou crossing and escape and, with that, reducing their risk of vehicle collisions.
- New Project site and access roads will be designed to minimize sightlines for predators, whenever practicable, while still maintaining general road safety.
- Ditches and culverts along Project roads will be designed and maintained to minimize pooling of water as roadside pools may attract caribou.

Water Management, Waste Management, Emissions, and Hazardous Materials Management

- Education on and enforcement of proper water, waste, emissions and hazardous materials management practices will be provided to employees and contractors.
- A freeze wall will be established around the uranium deposit to reduce potential for groundwater disturbance or contamination mitigating the likelihood of exposure of caribou to contaminants in local areas of groundwater discharge to surface.
- The ISR wellfield and processing plant will be designed to re-use most of the solutions inside each circuit, reducing water use requirements to the extent feasible. Make-up water will be preferentially sourced from site runoff (instead of freshwater) where possible.
- Contaminated wastes (e.g., mineralized drill cuttings, process precipitates) will be temporarily stored on double lined pads with leak detection capabilities and an associated monitoring program until final disposal at an approved facility. An adjacent pond will be used to collect contact water from these pads.
- All contact water will be routed to the Industrial Wastewater Treatment Plant for treatment and eventual release to the environment. All treated effluent released to surface water will meet federal and provincial regulatory discharge limits. This will mitigate exposure of caribou to Project-related contaminants released to the environment.
- Surface pipelines will be designed to have secondary containment or catchment and have leak detection systems in place at key locations to mitigate the likelihood of the release of such chemicals to the environment that could result in exposure of caribou to the chemicals.
- Double-walled high-density polyethylene or equivalent piping will be used in the wellfields and will be freeze protected and secured to minimize pipe movement to mitigate the likelihood of the piping failure and the associated release of wellfield chemicals to the environment that could result in exposure of caribou to the chemicals.
- Denison is proposing to segregate and compost organic wastes on site in a composting system, reducing the volume of material in the domestic landfill generating odours and thereby minimizing wildlife attractants.
- Domestic waste will be collected and temporarily stored in wildlife-proof containers to avoid attracting wildlife and reduce the risk for human-wildlife interactions. The wildlife-proof containers will be inspected regularly for evidence of wildlife presence or access to waste disposal facilities. If evidence of wildlife presence or access to waste disposal facilities is detected, modified systems will be implemented and/or off-site waste disposal/incineration frequencies will be increased.
- A "no littering policy" for employees and contractors will be implemented within the Project Area.

- Air emissions will be reduced to the extent practical through implementation of the development of air emissions management and monitoring plans within the EMS.
- All vehicles and equipment will be equipped with industry-standard emission control systems; unnecessary idling of vehicles will be prohibited to reduce emissions.
- The use of hazardous materials will be limited as much as possible.
- Appropriate hazardous materials management practices will be implemented in accordance with industry guidelines to minimize the risk of accidental spills or leakage. This will mitigate the likelihood of release to the environment that could result in exposure of caribou to the hazardous materials.
- Hazardous materials will be handled, stored, and disposed of appropriately and in accordance to avoid attracting wildlife (e.g., wildlife-proof containers, exclusion fencing) to mitigate the likelihood of exposure of caribou to hazardous materials.
- Physical deterrents (e.g., fencing) will be employed around contaminated areas (e.g., waste ponds and waste pads), the domestic landfill, or hazardous materials storage areas to discourage wildlife use / interaction. The deterrents will be monitored and maintained .
- Appropriate spill response kits will be positioned adjacent to areas where hazardous materials are stored in accordance with the Spill Response Plan to mitigate the likelihood of the release of hazardous material to the environment that could result in exposure of caribou to the material.
- A minimum 100 m distance from any waterbody will be maintained for fuel storage, refueling activities, or equipment servicing in accordance with the Spill Response Plan. This will mitigate the likelihood of a fuel spill to water that could result in exposure of caribou to fuel.
- Appropriate fuel, chemical, and materials management practices will be followed in accordance with the Spill Response Plan to minimize the risk of accidental spills or leakage of diesel fuel, other hydrocarbons, and other hazardous materials and mitigate the likelihood of exposure of caribou to such chemicals.
- All vehicles and equipment will be maintained in good working condition (e.g., no leaks) and furnished with industry-standard spill response kits.

1.1.2 Wildlife Education

- Employees and contractors will be provided with wildlife education and awareness training, including education about potential caribou issues on site and training on the mitigation measures summarized with the EMS and specifically in this Plan to avoid or minimize potential Project effects on caribou and caribou habitat.
- Employees and contractors will be educated on waste and hazardous waste management practices / policies that limit human-wildlife interactions and the potential exposure of wildlife to those wastes.
- Designated employees will be trained in appropriate wildlife deterrent techniques to minimize wildlife interactions with the Project.
- Employees and contractors will be requested to report wildlife observations, including prompt reporting of caribou observations and immediate communication to on-site staff. Wildlife encounters and outcomes will be monitored, and logbooks will be used to record wildlife observations. Logbooks and reports will be available to employees. Incidental

observations recorded by staff will be entered into Species Detection Loadforms and submitted to the Saskatchewan Conservation Data Centre annually.

Restore

The temporal bounds for the Project as stated in the EIS are years 1 to 3 for construction, years 3 to 18 for operation, years 18 to 23 for decommissioning, and fifteen years of post-decommissioning monitoring and inspections from years 23 to 38. Importantly, during physical decommissioning (years 18 to 23) the majority of Project components are scheduled to be removed from site which is expected to facilitate restoration activities. Also, because of the selected ISR mining method, there are no large, permanent Project components, such as waste rock piles or tailings management facilities, for which large scale and potentially complex restoration strategies are needed.

Denison's decommissioning commitment is to return the land back to the Province of Saskatchewan for unrestricted surface land use post-closure. The Project's Conceptual Decommissioning Plan (CDP) is included in the draft EIS. The details of decommissioning and restoration will be refined over time as the Project proceeds. A Preliminary Decommissioning Plan will be developed by Denison to support licensing and permitting applications. Prior to executing decommissioning activities, Denison will prepare and submit a Detailed Decommissioning Plan to regulators for their review and acceptance, which builds on the Preliminary Decommissioning Plan.

The CDP outlines plans for physical decommissioning (mining area remediation; asset removal; and decontamination, demolition, and disposal), followed by restoration. A summary of the CDP is provided here.

- Ongoing decommissioning of Project components will be completed when possible.
- Denison has committed to progressively restore areas no longer necessary to support/facilitate Operations to limit the amount of disturbance at any given time. Restoration of inactive areas will take place when/as these areas become available. The progress and success of these activities will be assessed regularly at a schedule commensurate with the expectations of the activities per the decommissioning plan. Progressive restoration including ecosystem-based revegetation will be conducted on disturbed areas as soon as safely and logistically practicable with the use of suitable/appropriate native species and in accordance with the decommissioning plan.
- Once the asset removal, decontamination, demolition, and disposal are completed, and the site has been cleared and leveled, restoration activities, including planting, will take place. Currently this would largely be with jack pine seedlings, but the mix of plants will depend on location and available species. Restoration activities monitored until it is deemed self-sustaining and viable wildlife habitat.
- Future discussions will be held with Indigenous and general public Interested Parties to determine the amount of access to the area they wish to maintain in the future (post-decommissioning). Based on results of these discussions, transportation corridors including roads or trails associated with the Project site that are no longer needed will be graded, scarified, and vegetated with native, self-sustaining species as required. Access to facilitate safe post-closure monitoring or requested by appropriate Interested Parties (e.g., to facilitate land use) may be left in place. Access to the site may be restricted by gates and/or berms.

- Laydown areas will be scarified, covered with 0.5 to 1.0 m of stockpiled overburden, and vegetated with native, self-sustaining species. The footprints of other infrastructure, such as the camp, will be scarified and vegetated with native, self-sustaining species as required. The goal of revegetation would be to restore the site to former state, or something similar including tree cover, to the extent possible. The topsoil and brush stockpiled during pre-construction activities will be used during restoration.
- Lessons learned from progressive decommissioning and any site-specific restoration studies will be incorporated into the Detailed Decommissioning Plan. Additionally, information from other northern Saskatchewan mine sites will be examined to help Denison select the restoration tools, including revegetation options, which will contribute towards decommissioning success.

Closure of the entire Project will be completed in accordance with provincial and federal regulations and guidance documents with the fundamental considerations being to confirm physical and chemical stability of the site to protect human health and the environment.

Progressive decommissioning and restoration will be completed throughout the life of the Project, whenever feasible, and reported to the regulatory agencies as part of the annual reporting requirements throughout Operation. Associated activities will focus on the decontamination, demolition, and disposal of unused buildings and infrastructure, as well as the removal of unused equipment and machinery. Progressive decommissioning and restoration are expected to continue and result in positive effects as revegetation is continued and regeneration occurs. Following decommissioning and restoration, wildlife habitat is expected to recover to baseline conditions.

Additional Caribou Management Measures

As part of its boreal caribou management efforts, the province is working with industry to develop effective and practical approaches to mitigate potential effects of activities on woodland caribou. To this end, the province describes a hierarchy of controls for caribou habitat management. The final element of this hierarchy of controls is termed offset, whereby restoration of habitats outside the project footprint are used to “offset” for project footprint effects where such footprint effects render a given area as unavailable to be functional habitat for an extended time period.

The ENV is developing a boreal caribou habitat offset calculator to address the above-referenced situation. The calculator’s objective is to consistently estimate and calculate appropriate offset requirements for applicable developments. The calculator recognizes that there are a number of key variables influencing both habitat loss and habitat gain calculations. As such, the following key concepts have been integrated into the calculator:

- 1. Not all projects are created equal**

Different types of projects/activities/footprints on the landscape have different potential effects on caribou habitat.

- 2. Reach of effects**

A project’s total effect on caribou habitat and associated habitat offset needs to integrate both direct and indirect (zone of influence) concepts. The total project effect includes the area of direct disturbance plus the surrounding indirect effects (Zone of Influence). Similarly, the total offset includes direct habitat gain or restoration plus indirect habitat benefits.

- 3. Location matters**

The location of the project/activity/footprint has different effects on caribou, based on habitat value. Similarly, the location of the offset has different benefits for caribou when habitat value is factored in.

In consideration of these key concepts, the calculator aims to balance functional habitat that is disturbed or removed with restored functional habitat. Through habitat loss and gain calculations, the calculator estimates habitat offset requirements for a project footprint, expressed as an equivalent length/area of linear features. In SK1 and SK2, legacy roads and trails are expected to be the primary candidate features for habitat offsets and restoration activities. It is also noted that the estimated cost to deliver the required offset is calculated. As an optional mechanism for proponents, Saskatchewan is working to establish a mechanism for in-lieu mitigation payments such that the province can allocate resources based on its caribou habitat restoration priorities.

Through refinements to our final project design, Denison is committed to continue working with the province to finalize our habitat offset requirement using the province’s habitat offset calculator.

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Draft for Discussion

- Department: ECCC
- Project Effects Link: Wildlife and Wildlife habitat
- Reference to EIS, appendices, or supporting documentation: Section 9.3.9 Ungulates, Furbearer and Woodland Caribou Summary

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, June 2024) |
|--------------|----------------|---|---|--|---|---|---|--|
| IR-157 | - | <p>Context and Rationale: The Proponent has committed to developing a Woodland Caribou Management Plan, which will include a “detailed assessment for the need for habitat offsets.” The Woodland Caribou Management Plan will support ECCC’s review of the Proponent’s assessment of residual effects following mitigation and offsetting.</p> <p>This plan should consider ECCC’s Operational Framework for Use of Conservation Allowances (ECCC, 2012). ECCC is available to assist the Proponent in the determination of appropriate offsets that would balance against Project adverse effects after the application of measures to avoid, minimize and restore on-site are adopted.</p> <p>Based on the Amended Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada 2020, anthropogenic impacts to local caribou populations experience a lag effect, which occurs over extended periods. This lag effect needs to be adequately considered when proposing offsets. ECCC is available to assist the Proponent in understanding how critical habitat is described in the Recovery Strategy and the determination of appropriate offsets that would balance against Project effects based on the predicted impacts to caribou habitat.</p> | <p>Provide the Woodland Caribou Management Plan for review. The plan should clearly demonstrate efforts to avoid and minimize any Project effects and restore on-site any disturbed areas prior to the consideration of offsetting. Details on how severity of disturbance and vulnerability of the species were considered should be explained.</p> <p>See also related: IR-149.</p> <p>Suggestions for mitigation and follow-up measures: ECCC notes that the Woodland Caribou Management Plan should clearly explain efforts to address Project effects, including any contribution to cumulative adverse effects, after it has been determined that all options in the previous steps of the mitigation hierarchy (i.e., avoidance, and minimization,) have been fully considered and applied.</p> <p>In the Woodland Caribou Management Plan, provide details on how the factors outlined in the Operational Framework for Use of Conservation Allowances (ECCC, 2012) were considered in determining the offsetting amounts, including the severity of disturbance and vulnerability of the caribou population. Important factors including time lag (the amount of time from restoration work to when the habitat would be considered caribou habitat) would also need to be considered.</p> <p>ECCC typically recommends a minimum offset multiplier of 4:1 (offset outcome: area disturbed). This is a benchmark ratio applied to a project that is in the lower end of the risk spectrum, such as one with a low severity impact adversely affecting a low vulnerability ecological component. In general, the minimum 4:1 multiplier accounts for time-lags to restoration, uncertainty in outcomes, a precautionary approach, and the adverse impact itself in its specific context. Offset multipliers are variable and determined by project-specific circumstances and associated risks and uncertainties.</p> | <p>Refer to response to IR-145 (<i>included here</i>):</p> <p>Denison considers the EA to be a planning and decision-making tool that assesses the potential effects of the Project in a careful and precautionary manner and integrates results of engagement with Indigenous nations and communities. As such, the EA is a process for identifying the Project’s potential interactions with the biophysical and human environment, predicting potential adverse effects, identifying mitigation measures, and evaluating residual and cumulative effects remaining after mitigation. The EA also outlines the proposed efforts for monitoring and reporting to verify compliance with the terms and conditions of EA approval and to assess the accuracy and effectiveness of predictions and mitigation measures presented in the EA. Denison views the EIS as an important planning tool that will be used to support future activities and represents one stage in the rigorous overall approvals process for a uranium mining facility in Canada. Denison is completing a sequential EA and licensing process for the Project. In the EIS, a framework for the Environmental Management System (EMS) is provided along with a clear commitment for Denison to include Project design and species-specific mitigation measures into the EMS documents as they are developed / as the Project proceeds through the licensing and permitting phases.</p> <p>The selection of valued components (VC), with key indicators (KI), and associated measurable parameters is an important part of scoping in each biophysical and human environment assessment. Woodland caribou were selected as a VC in the Terrestrial Environment assessment for a variety of reasons including a recognition of caribou as an important cultural and subsistence species, the conservation status of caribou, and that Project activities and infrastructure may affect woodland caribou populations. For the woodland caribou VC, the KI selected was also woodland caribou. The measurable parameters for the caribou VC/KI were: 1. amount of habitat that may be altered or lost relative to its availability in the Terrestrial RSA; and, 2. woodland caribou mortalities directly or indirectly attributable to the Project.</p> <p>The main Project interactions identified in the caribou assessment were: direct habitat loss, sensory disturbance, collisions with Project vehicles and equipment, and harvest and/or predation. Accordingly, the potential effects evaluated for caribou were: 1. amount of habitat that may be altered or lost relative to its availability in the Terrestrial RSA; and, 2. mortalities directly or indirectly attributable to the Project. Denison undertook the evaluation and assessment of potential effects on caribou in a conservative fashion to provide confidence in the assessment conclusions. For instance, where granular data concerning seasonal distribution and specific landscape uses were not available the approach was to assume the caribou at all life stages were present during all seasons. Additionally, the caribou assessment used conservative assumptions to categorize ‘available’ habitat. Denison also committed to important mitigation measures such as pre-clearance surveys, among other things.</p> <p>The EIS has demonstrated that the Project, as proposed and assessed, is predicted to minimize the potential for environmental adverse effects on caribou and their habitat before any Project specific construction occurs. The conclusions of the assessment predicted that the likely residual effects of the Project on caribou were not significant.</p> <p>The EIS uses "available caribou habitat" as a basis to assess the Project effects. Available habitat was determined as the ecosites in which caribou / caribou sign were detected most frequently during the baseline studies, and the EIS used a precautionary approach by assuming caribou use of these areas during all seasons and life stages.</p> <p>Subsequent to filing of the draft EIS and as committed to ECCC during an April 20, 2023 meeting between Denison and ECCC, Figure 9.3-8 has been updated (included in</p> | <p>This response has not been accepted.</p> <p>The Proponent provided a conceptual Woodland Caribou Monitoring Plan, however, this plan does not include an assessment of the Proponent’s determination of the required amount of habitat offset.</p> <p>ECCC currently recommends a minimum offset multiplier of 4:1 (offset outcome: residual adverse effect) for a project that has a low severity impact of adversely affecting a low vulnerability ecological component. This is a benchmark ratio applied to a project that is in the lower end of the risk spectrum; for example, for a project with a low severity impact adversely affecting a low vulnerability ecological component. In general, the minimum 4:1 multiplier accounts for time-lags to restoration, uncertainty in outcomes, a precautionary approach, and the adverse impact itself in its specific context.</p> <p>Offset multipliers are variable and determined by project-specific circumstances and associated risks and uncertainties.</p> <p>The Proponent provided a conceptual Woodland Caribou Monitoring Plan, however, this plan does not include an assessment of the Proponent’s determination of the required amount of habitat offset.</p> <p>ECCC currently recommends a minimum offset multiplier of 4:1 (offset outcome: residual adverse effect) for a project that has a low severity impact of adversely affecting a low vulnerability ecological component. This is a benchmark ratio applied to a project that is in the lower end of the risk spectrum; for example, for a project with a low severity impact adversely affecting a low vulnerability ecological component. In general, the minimum 4:1 multiplier accounts for time-lags to restoration, uncertainty in outcomes, a precautionary approach, and the adverse impact itself in its specific context.</p> <p>Offset multipliers are variable and determined by project-specific circumstances and associated risks and uncertainties.</p> <p>Based on the Amended Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada 2020, anthropogenic impacts to local caribou populations experience a lag effect, which occurs over extended periods. This lag effect needs to be adequately considered when proposing offsets.</p> <p>In the absence of sufficient data or information required to validate the level of risk that this Project is likely to have on the species recovery, the implementation of the mitigation hierarchy and offsetting measures to address Project adverse effects, ECCC’s views are based on the precautionary approach.</p> <p>Thus, ECCC preliminary analysis regarding the likelihood of this Project having an adverse effect on boreal caribou recovery is identified as moderate to high, resulting in a precautionary offsetting requirement that should be in terms of amount, much greater than 4:1. The assumptions of ECCC’s risk assessment include:</p> <ul style="list-style-type: none">• The biophysical attributes required for boreal caribou recovery (i.e. habitat for calving, post-calving, rutting, winter and travel) are present within the study area and will be directly or functionally lost,• Sensory disturbance arising from project activities (e.g. air traffic) will cause functional habitat loss for boreal caribou within important habitat areas required for different life stages. <p>Additionally, lack of information supporting the Proponent’s offsetting plans creates uncertainty and thereby warrants a higher offset ratio.</p> <p>ECCC is available to provide information to the Proponent on how critical habitat is described in the Recovery Strategy and the determination of appropriate offsets that would balance against</p> | <p>Please see response to IR-149 (<i>in separate Word file</i>).</p> <p>In addition, in direct response to IR-157 the following is noted.</p> <p>Denison continues to work collaboratively with Saskatchewan Ministry of Environment (MOE) on their requirement for an offset for adverse effects on caribou habitat. Denison has advanced the Project-related Caribou Management Framework within the context of the province’s offsetting framework. The MOE has reviewed the draft framework and has provided Denison a notification of their support. Subject to finalization and provincial acceptance, the framework will provide the means to address/offset all residual adverse effects (i.e., those remaining after the application of the proposed mitigation measures) of the Project on caribou that are under provincial jurisdiction.</p> <p>Further, Denison has committed to monitoring the effects on wildlife, as per the Wildlife Management Plan. The findings of the monitoring programs are expected to inform Denison, through an adaptive management process, of the need, if any, for additional mitigation measures.</p> | <p>Note to Denison: This would be accepted if Denison is able to make a commitment as noted below.</p> <p>Updated Rationale:</p> <p>The updated draft Caribou Management Framework provided by the Proponent is still lacking information regarding offsetting location, amount, habitat type, habitat quality, etc. The Proponent notes that SK ENV is developing a boreal caribou habitat offset calculator, and that the Caribou Management Framework will be finalized using that tool as part of the provincial approvals, but information gaps remain on the amount of habitat offset required to mitigate Project effects.</p> <p>The Caribou Management Framework should be updated with this outstanding information.</p> <p>Given that ECCC and CNSC understand that the Province of Saskatchewan and ECCC’s Canadian Wildlife Service are in communication on the Denison’s caribou management plans, and the province’s offsetting plan is underway, if Denison are willing to add a commitment to the Commitments Register, this IR could be resolved. The commitment text would include the commitment that “Denison’s offsetting plan will meet the objectives of the Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal population, in Canada.”</p> <p>Proposed rationale text for posting: Denison has captured their commitment related to caribou management and offsetting in the Commitments Register, so this IR has been accepted.</p> | <p>Denison’s understanding is that by meeting the Provincial offset requirements, as part of the Saskatchewan range planning, the company will be meeting the objectives of the recovery strategy since the Province is responsible for caribou management. To provide a clear affirmation of Denison’s commitment to offsetting, we have added the following commitment to the Commitment Register (version 2) as Commitment 9-35:</p> <p>“Denison will develop an offsetting plan to satisfy the requirements of the Province of Saskatchewan offsetting framework that the province has created to fulfill its obligations as it concerns implementing the objectives of the Recovery Strategy for the Woodland Caribou (Rangifer tarandus caribou), Boreal population, in Canada.”</p> |

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, June 2024) |
|--------------|----------------|-----------------------|--------------------------|--|---|---------------------------------------|----------------------------|---------------------------------------|
| | | | | <p>Attachment IR-143) to address seasonal use by caribou within the terrestrial study areas.</p> <p>In May 2023, Denison received caribou data from the Province of Saskatchewan that included both incidental observations and telemetry point data within the terrestrial study areas. These data were provided to Denison as a figure, and this figure has been included herein as Attachment IR-145. The information made available to Denison by the Province was not broken down to reflect the timing (seasonality) of the reported data and therefore does not specifically contribute to the description of seasonal use of the Project study areas by caribou.</p> <p>For reference, and based on the data that have been made available, the conservative assessment approach utilized in the draft EIS of assuming caribou presence in the terrestrial study areas throughout all seasons will not be changed.</p> | <p>Project effects based on the predicted impacts to caribou habitat.</p> | | | |

- Department: ECCC
- Project Effects Link: Migratory birds
- Reference to EIS, appendices, or supporting documentation: Section 9.4.6.4, Residual Effects Evaluation for Bird SAR, Table 9.4-19

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, July 8, 2024) |
|--------------|----------------|--|--|---|--|---|--|---|
| IR-170 | - | <p>Context and Rationale:</p> <p>The table and map presented by the Proponent do not appear representative of all available habitat for common nighthawk (CONI). Although CONI do preferentially use open areas such as gravel (often an anthropogenic disturbance) and regenerating forest, as identified in the draft EIS, they also use rock outcrops that can be within forested areas. As this area lies within the pre- Cambrian shield, there are likely rock outcrops that are also available habitat.</p> <p>As aerial insectivores, CONI select nesting areas in close proximity to wetlands or lakes where there is abundant forage.</p> <p>Habitat requirements and preferences for all species at risk is required for developing effective mitigations and adaptive management.</p> | <p>1. Provide an updated table and map that considers all available habitat for common nighthawk.</p> <p>2. Additionally, as part of environmental management plans the Proponent should include species-specific mitigations that are biologically relevant to all the species at risk for all Project phases and components.</p> | <p>1. The methodology for the habitat-based assessment appropriately evaluated potential adverse effects on avian species. The VCs and KIs were selected following extensive consultation with Indigenous nations and communities and other Interested Parties; the VCs and KIs appropriately focused the EA; no updated table or map is considered to be required. In addition, further mapping is not expected to affect or change the findings and conclusions of the draft EIS.</p> <p>2. Common Nighthawk were observed in the Project study areas during the baseline studies and are considered to be present and breeding. Rocky outcrops were not reported during the baseline studies (see Section 9.2.3). Pre-clearing surveys will be conducted, set-back buffers implemented, and pre-clearing survey and monitoring results will be used for adaptive management purposes (see also response to IR-159). Species-specific mitigation appropriate for Common Nighthawk is largely related to loss and/or alteration of habitat (including both direct and indirect effects).</p> | <p>This response has not been accepted.</p> <p>Part 1 of the IR was addressed, however, part 2 has not been addressed. ECCC requires this information to properly assess potential the mitigations and adaptive management for Common Nighthawk.</p> | <p>Based on the baseline field survey observations (n=38) for common nighthawk, the majority of observations (n=20) were in association with anthropogenic (disturbed) ecosite types, while the remainder (n=10) were associated with the jack pine-blueberry/black spruce-blueberry/lich (BS3/BS7) ecosite.</p> <p>Updates to Figure 9.4-7, Figure 9.4-12 and Table 9.4-19 of the revised draft EIS have been completed to include all habitat (ecosite) types. See separate response to IR-170: Available Habitat for Common Nighthawk. Figure 9.4-12 in the revised draft EIS has been replaced in the EIS with a revised figure that includes all ecosite types.</p> <p>Mitigation measures that would pertain to common nighthawks are included in Section 9.4.5.2.1 Work Timing Windows and Habitat Disturbance, which state that site clearing and other works that involve disturbance of vegetation and/or soil will be conducted outside of the nesting season, whenever practicable. The nesting season for the Raptors, Migratory Breeding Birds, and Bird Species at Risk VCs in Saskatchewan spans a period from March 15 to August 31.</p> <p>Further, in the event site clearing is necessary within this time frame, pre-clearance wildlife sweeps will be completed where common nighthawks are suspected of nesting; if an occupied nest is found, applicable activity restriction guidelines would be implemented (as per SK MOE 2017).</p> <p>References:</p> <p>Saskatchewan Ministry of Environment (SK MOE). 2017. Saskatchewan Activity Restriction Guidelines for Sensitive Species. https://publications.saskatchewan.ca/api/v1/products/79242/formats/89555/download (accessed July 2021).</p> | <p>Item one was accepted, but item two remains outstanding. In Section 9.4.5.2.1, the Proponent has not included species specific mitigations for all species at risk, including common nighthawk. The Proponent should include species specific mitigations for all species at risk, including common nighthawk, so that ECCC can provide advice on the extent of Project impacts to these species.</p> <p>Additionally, the Proponent indicates that prior to site clearing during the nesting season (period from March 15 to August 31), pre-clearing nest surveys will be conducted. ECCC does not typically recommend nest surveys as a pre-clearing activity (please refer to the Advice to the Proponent relating to IR-170). In some instances, surveying for breeding activity using non-invasive methods could be required to determine species presence, and for some migratory birds SAR it may be required to survey for nest trees (residences) prior to clearing as these have year-round protection through SARA and a permit may be required.</p> <p>Specifically, it is not adequate to group SAR together (e.g., all birds) due to the unique life history and habitat requirements of each individual SAR. Denison is expected to provide species-specific mitigation measures for each SAR separately.</p> | <p>See response to IR-142-159-167-R1.</p> |

- Department: ECCC
- Project Effects Link: SAR - Bats
- Reference to EIS, appendices, or supporting documentation: Appendix 9-B, Denison Mines Corporation Wheeler River Project, Terrestrial Environment, Wildlife and Vegetation Baseline Inventory, Section 2.1.4 Acoustic Bat Surveys

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, July 4, 2024) |
|--------------|----------------|---|---|---|--|--|--|---|
| IR-174 | - | <p>Context and Rationale: The Proponent conducted acoustic surveys for bats and confirmed presence of two Species at Risk Act (SARA) schedule 1 listed bat species in the Project area, little brown myotis (Myotis lucifugus) and northern myotis (Myotis septentrionalis). However, the Proponent did not do an effects assessment of either of these bat species.</p> <p>Although bats are present in the study area, no work was done to identify hibernaculum or maternal roosting sites. All species at risk that are expected to be present in the Project area should be assessed and species-specific mitigations detailed.</p> | <p>1. Conduct an effects assessment for little brown myotis and northern myotis, including the likelihood that tree clearing during the bat roosting period, is likely to ‘kill’, ‘harm’, or ‘harass’ Little Brown Myotis and Northern Myotis and its ability to carry out its life processes.</p> <p>2. Describe and map locations of suitable myotis hibernacula and/or maternal roost habitat within the Local Study Area and Regional Study Area and explain how these habitats may be affected by Project activities.</p> <p>3. Describe what mitigation measures will be taken to avoid the breeding period for bats.</p> <p>4. Describe any pre-construction/pre- clearing surveys will be conducted to identify any hibernaculum and maternal roosting sites. Describe how monitoring will support adaptive management.</p> | <p>As Key Indicators of Valued Components, the EIS includes terrestrial wildlife and avian species that may occur in the Project study areas and are listed on Schedule 1 of the federal Species at Risk Act. Project effects on these species and their habitats are described and assessed, and mitigation measures are included to avoid or reduce the potential for adverse effects on these species and their habitats. The Project effects and associated mitigation measures described in the draft EIS are broadly applicable to SAR species that occupy the same ecological niches.</p> <p>In response to a variety of IRs, including this IR, further information has been developed that is specific to SAR and included as Attachment IR-131. This includes a listing of all SAR species potentially occurring in the Project study areas, with links to applicable and appropriate mitigation measures described in the EIS. It is proposed the content of Attachment IR-131 will be added as a new appendix (Appendix 9-D) to Section 9 of the final EIS. The information provided in the SAR appendix includes a summary of the life history requirements, the expected Project effects, proposed mitigation measures, and anticipated residual effects on these listed species. This new EIS appendix provides information on little brown myotis and northern myotis. We note Denison's commitment to pre-construction surveys to identify potential for maternity and nursery roosting habitat. Refer to response to IR-134 for the timing of clearing activities outside of roosting periods. Results from pre-construction surveys and continuous monitoring (described in Section 9.3.8) will be used in the adaptive management process to update Project design and additional mitigation measures, if required.</p> | <p>This response has not been accepted.</p> <p>Items 1., 3. And 4. of IR-174 are accepted, however, item 2. Of IR-174, which asked for mapping of suitable myotis habitat, was not addressed.</p> <p>Mapping of suitable habitat or results from baseline studies is required to understand Project impacts to Species At Risk (SAR) bat species. This may include providing mapping of bat acoustic results, including locations along with frequency of detections.</p> <p>See also IR-134 and follow-up 134-R1.</p> | <p>Acoustic bat surveys were completed between July 22 and 23, 2019 with 61 survey points sampled across five ecosite types. The location of the survey points, species detected, and frequency of detections are included in Figure 2-9 of Appendix 9-F of the revised draft EIS.</p> <p>The EA used a habitat-based approach to predict the effects of the Project on bat species. Further, in the event that site clearing is necessary, pre-clearance wildlife sweeps will be completed and appropriate mitigation will be developed and implemented.</p> <p>The pre-construction and pre-clearing surveys will consist of wildlife sweeps conducted by qualified biologists within 7 days prior to any clearing activity at a specific location, and a 100 m buffer, within the Project Footprint. The wildlife sweeps will not be species-specific surveys focused on species at risk but will to be based on timing of Project related activities (i.e., will be completed in advance of site clearing activities). These sweeps are intended to identify sensitive wildlife features (including hibernacula or potential roosting sites for myotis species) that would require specific mitigation measures to avoid or minimize adverse effects on identified features and are not species-specific. The methods associated with these pre-construction and pre-clearing sweeps will be tailored to species at risk (including myotis species) that may potentially be using habitats at certain times of the year. Depending on the results of these surveys, appropriate mitigation measures will be developed and implemented. This is a risk-based approach with the intent of reducing the potential of important wildlife features being adversely affected during vegetation or land disturbance activities. The wildlife sweeps would be conducted within 7 days prior to disturbance activities, year-round, so that sensitive features can be identified, and appropriate mitigation measures (e.g., avoidance, timing delay) can be developed and implemented, as appropriate.</p> | <p>Note to Denison: There is additional text being drafted related to this topic, but it is still under review and may provide clarity on the outstanding request.</p> <p>Items one, three, and four have been accepted, but the response to item 2, regarding describing and mapping of locations of suitable myotis hibernacula and/or maternal roost habitat within the Local Study Area and Regional Study Area and an explanation of how these habitats may be affected by Project activities, is outstanding.</p> <p>In responding to item two, the Proponent has provided a map of species detected and frequency of detection in the local study area over two days on July 22 and 23, 2019. ECCC notes that analysis is lacking for the regional study area, despite a few autonomous recording units (ARUs) that were placed outside the LSA.</p> <p>Data from two consecutive days in the same month is not an accepted method to document baseline occurrences associated with suitable habitat. The legend for Figure 2-9 is not clear in that frequency of detection is mapped based on two criteria: little brown myotis and little brown/northern myotis.</p> <p>The Proponent should use a scientifically defensible method to document baseline occurrences associated with suitable habitat. The Proponent should clarify the legend and explain the values found within it, including if the turquoise dot represent occurrence of both little brown and northern myotis. Baseline data for bat SAR must be adequate to capture within and between year variability and to allow for statistically robust comparison to assess potential impacts on SAR over the lifecycle of the project. In this regard, Denison is expected to provide additional baseline data for bat SAR. If Denison chooses to rely on literature data, a justification of applicability to the project is required. Nevertheless, Denison is expected to at a minimum commit to additional baseline monitoring prior to any disturbance, and to provide a description of the monitoring methods for review. These baseline surveys must be focused on suitable habitat for bat SAR that is to be identified through the requested mapping.</p> <p>To close this IR, Denison must:</p> <ol style="list-style-type: none">1. Clarify the legend of Figure 2-9 with respect to frequency of detection2. Provide suitable bat SAR habitat information in the form of a map3. Provide additional baseline data for bat SAR based on literature sources and justify applicability to the project4. Provide a description of proposed methods for bat SAR field monitoring for review5. Commit to an EA commitment to collect additional bat SAR field baseline data prior to disturbance | <p>See IR-174 Round 3 Attachment below for supporting maps associated with responses to parts 2 and 3; the round 3 attachment is located at the end of this file.</p> <p>1. The legend of revised draft EIS Appendix 9-F, Figure 2-9 (with respect to frequency of detection) shows the total number of passes and/or buzzes detected. We note this was available in Appendix 9-B Terrestrial Baseline. For additional reference it is also noted that the acoustic survey method in Appendix 9-B did not reliably allow for differentiation between little brown myotis and northern myotis, hence the two criteria presented on the map: i) little brown myotis and ii) little brown/northern myotis. These clarifications are included in the figures below and are included in Appendix 9-F of the final EIS.</p> <p>2. Refer to IR-174 Round 3 Attachment below for ECCC’s requested map edits, that builds on the information presented in the map provided in revised draft EIS Appendix 9-F Figure 2-9 provided with the Round 2 response. Specifically, please see Figure IR-174 Round 3-1 and Figure IR-174 Round 3-2. These maps present the same information from Appendix 9-F Figure 2-9 only at a different spatial scale and with the Project Area unshaded to facilitate review.</p> <p>3. As noted in Appendix 9-D, habitat for the little brown myotis is composed of (1) overwintering hibernacula that are sufficiently cool and humid and (2) summering areas that provide foraging areas and suitable locations for roosting and maternity colonies (COSEWIC 2013). Hibernacula and maternity sites are reported as being the main limiting habitat features for this species (COSEWIC 2013), and this, as described below, is consistent with conditions at the Project site and surrounding area.</p> <p>Hibernacula occur in parts of caves, mines (openings to surface for ramps and raises for example), and buildings that have stable and specific temperature (~4 to 13°C) and humidity (>80%) conditions (COSEWIC 2013). Based on existing environment information presented in the EIS including the terrain and vegetation and ecosystem existing environment sections, there are no hibernacula anticipated in the Project Area (i.e., caves, mines, buildings with stable and specific temperatures per COSEWIC 2013). Terrain is low relief due to flat-lying sandstone and almost continuous cover of sandy glacial deposits (i.e., surface is predominately sand textured and there are no rocky outcrops or bedrock at surface for cave habitats); there are no man-made structures (e.g., mine openings or buildings) in the Project Area. As noted in the EIS, the terrain and vegetation communities are fairly uniform throughout the study areas and the habitat considerations in the Project Area are considered representative of the landscape in the wildlife LSA and RSA.</p> <p>Maternity sites can occur in large-diameter trees, rock crevices, buildings, and bat houses that offer warm and relatively stable microclimate conditions that allow females to avoid going into torpor so they can focus on caring for their young (COSEWIC 2013a, Slough and Jung 2020). As highlighted above, since there are no rock crevices, buildings, or bat houses in the Project Area, a consideration for maternal roost potential was focused on the areas where larger diameter trees may be present.</p> <p>Existing ecosite information was reviewed and ecosites with higher potential for maternity roosts (i.e., larger diameter trees) were selected. The ecosites with the potential for larger diameter trees are shown in Figure 2-10 below, and include ecosites RF1 (regenerating forest >5m tall; per Appendix 9-B), BS3 jack pine/blueberry/lichen, BS4 jack pine – black spruce/feathermoss, BS7 black spruce/blueberry/lichen, BS9 black spruce – jack pine/feathermoss, BS14 white birch/lingonberry – labrador tea, BS16 black spruce/ balsam poplar/river alder swamp, BS17 black spruce treed bog, and BS21 tamarack treed fen. While these ecosites were selected for the <i>potential</i> to have larger diameter trees, it is important to note that the majority of these ecosites have trees with diameter at breast height <10 cm. Refer Appendix 9-B for representative photos of the selected ecosites.</p> <p>Based on this conservative mapping exercise, the Project Area contains small areas of suitable potential maternal roost habitat. The total Project Area is around 170 ha and potential bat maternal roost ecosites represent less than 49 ha, when as noted above it is assumed that the ecosites identified above provide trees suitable for maternity roosts across their entirety.</p> <p>The above text has been added to Appendix 9-F of the final EIS along with Figure IR-174 Round 3-3. We reiterate that the additional information collated and displayed in the maps provided to support this IR response is consistent with and does not contradict anything presented in the draft EIS documentation.</p> |

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, July 4, 2024) |
|--------------|----------------|-----------------------|--------------------------|---|-----------------------------|---------------------------------------|----------------------------|---|
| | | | | | | | | <p>We also refer the reviewer to Appendix 9-D for a summary of species-specific mitigation measures for bats; text from Section 3.3.3 has been included below in <i>italicized font</i> for ease of review:</p> <p><i>Bat Species</i></p> <ul style="list-style-type: none"><i>Vegetation clearing activities will occur outside of roosting periods, when practical.</i><i>Pre- disturbance wildlife clearance surveys will be completed to identify site-specific habitat features such as maternal roosting sites and hibernacula used by bat species. If features are identified in the Project Footprint, appropriate setbacks and/or timing windows will be implemented in accordance with the SARGSS (SK MOE 2017 (that will also be defined in the Wildlife Management Plan).</i><i>In the event a maternal roosting site is identified on the Project Footprint, exclusionary methods (e.g., installing a one-way bat exit) will be implemented following the summer maternity roost season. This installation would allow for bats to leave but not the ability to re-enter the roosting site.</i><i>Locations of these site-specific habitat features used by bats will be communicated to the appropriate Project personnel and the requirement to limit disturbance in these areas will be implemented.</i><i>Specific exclusion methods will be added as mitigation measures (Section 9.4.5 of the final EIS) to prevent access to buildings and other infrastructure.</i> <p>4. Refer to response to IR-142, IR-159, IR-167-R1 for information on the bat-specific pre-clearance sweeps. We also note that Commitment 9-3 outlines Denison's commitment to pre-disturbance wildlife clearance surveys.</p> <p>5. A commitment to complete pre-construction / disturbance bat surveying has been added to the commitments register as 9-37, as follows:</p> <p>“Acoustic bat surveys will be completed prior to construction, building on the 2019 surveys (Appendix 9-B). The surveys will determine the presence/non-absence, diversity and relative abundance of bat species in the Project Area.”</p> <p>For clarity, this additional pre-construction / disturbance data will be used to inform the execution of site development activities and additionally provides further information that can be used within the context of follow-up monitoring as a basis for temporal comparison. At this time, the intent is not to integrate such information into the EIS, nor does Denison and its SMEs believe the additional information is necessary to for EA determination with respect to potential project-related effects on bats.</p> <p><u>References:</u></p> <p>COSEWIC. 2013. COSEWIC assessment and status report on the Little Brown Myotis <i>Myotis lucifugus</i>, Northern Myotis <i>Myotis septentrionalis</i>, and Tri-colored Bat <i>Perimyotis subflavus</i> in Canada. Committee on the Status of Endangered Wildlife in Canada, Ottawa. xxiv + 93 pp.</p> <p>Slough, B.G. and Jung, T.S. 2020. Little Brown Bats Utilize Multiple Maternity Roosts Within Foraging Areas: Implications for Identifying Summer Habitat. Journal of Fish and Wildlife Management 11(1):311–320.</p> |

Related information: Round 1 response – new EIS Appendix 9-D



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Denison Mines Corp.

Appendix 9-D Wildlife Species at Risk

New Appendix to final EIS, Section 9

Version 1

July 2023

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Acronyms and Abbreviations

| Term | Definition |
|---------|--|
| BBS | Breeding Bird Survey |
| BC | British Columbia |
| CEA | Cumulative effects assessment |
| COSEWIC | Committee on the Status of Endangered Wildlife in Canada |
| ECCC | Environment and Climate Change Canada |
| EIS | Environmental Impact Statement |
| EMS | Environmental Management System |
| FIRT | Federal-Indigenous Review Team |
| IRs | Information requests |
| ISR | In situ recovery |
| KI | Key Indicator |
| LSA | Local Study Area |
| Project | Wheeler River Project |
| QP | Qualified Professional |
| RSA | Regional Study Area |
| SAR | Species at risk |
| SARA | <i>Species at Risk Act</i> |
| SARGSS | Saskatchewan Activity Restriction Guidelines for Sensitive Species |
| SKCDC | Saskatchewan Conservation Data Centre |
| VC | Valued Component |

Introduction

Background

On October 21, 2022, Denison Mines Corp. (Denison) submitted a draft Environmental Impact Statement (EIS) for the proposed Wheeler River Project (the Project). Based on their initial review, the Canadian Nuclear Safety Commission indicated that the submission contained the required information to proceed with the Federal-Indigenous Review Team (FIRT) technical review of the draft EIS. On March 20, 2023, the FIRT provided Denison with a list of information requests (IRs) for Denison to respond to and eventually submit a final EIS document.

This Appendix provides additional information to address several IRs provided by Environment and Climate Change Canada (ECCC) as part of the initial round of Federal Indigenous Review Team (FIRT) comments. These IRs were related to 16 wildlife species at risk (SAR) listed under Schedule 1 of the federal *Species at Risk Act* (SARA). The draft EIS approach was conservative in that it considered appropriate representative species as Valued Components (VCs) and Key Indicators (KIs) in sections 9.3 Ungulates, Furbearers, and Woodland Caribou and 9.4 Raptors, Migratory Breeding Birds, and Bird SAR. Of the 16 wildlife SAR listed in Table 0.1, seven had been included as VCs or KIs in the EIS after a thorough scoping process (refer to Section 0 for additional information).

Nine of the sixteen were not included as individual VCs or KIs but are considered important from a regulatory perspective. The SARA-listed species identified by ECCC are listed in Table 0.1. Those noted in bold font indicate those for which further assessment is provided in this appendix.

Table 0.1 Wildlife Species at Risk Listed by Environment and Climate Change Canada

| Common Name | Scientific Name | Discussed in the draft EIS |
|---------------------------------|--|----------------------------|
| Nine-spotted lady beetle | <i>Coccinella ovemnotata</i> | No |
| Transverse lady beetle | <i>Coccinella transversoguttata</i> | No |
| Yellow-banded bumble bee | <i>Bombus terricola</i> | No |
| Northern leopard frog | <i>Lithobates pipiens</i> | No |
| Little brown myotis | <i>Myotis lucifugus</i> | No |
| Northern myotis | <i>Myotis septentrionalis</i> | No |
| Wolverine | <i>Gulo gulo</i> | Yes |
| Woodland caribou | <i>Rangifer tarandus caribou</i> | Yes |
| Bank Swallow | <i>Riparia riparia</i> | No |
| Barn Swallow | <i>Hirundo rustica</i> | No |
| Common Nighthawk | <i>Chordeiles minor</i> | Yes |
| Horned Grebe | <i>Podiceps auritus</i> | No |
| Olive-sided Flycatcher | <i>Contopus cooperi</i> | Yes |

| Common Name | Scientific Name | Discussed in the draft EIS |
|-----------------|-----------------------------------|----------------------------|
| Rusty Blackbird | <i>Euphagus carolinus</i> | Yes |
| Short-eared Owl | <i>Asio flammeus</i> | Yes |
| Yellow Rail | <i>Coturnicops noveboracensis</i> | Yes |

Of the 16 species listed in Table 0.1, seven had been included as VCs or KIs in the EIS after a thorough scoping process, as summarized below.

Valued Component Selection

The VCs considered in the effects assessment for the Project are aspects of the biophysical and human environments that were considered to be likely to be affected (adversely or positively) by the Project. The VCs reflect identified scientific, local knowledge, and Indigenous Knowledge, and community interests regarding the Project and its potential effects. The potential effects are typically identified early in the environmental assessment process as a result of questions and concerns raised through engagement with Indigenous and community groups, government departments and agencies, and the general public.

Denison reviewed and considered all received input to develop a VC list that reflects the key environmental, socio-economic, heritage, and human health components and interests to appropriately focus the EA.

The initial VCs selected to represent bird SAR in the habitat-based assessment that were provided in the Terms of Reference (Denison 2019) were evaluated, consolidated, and organized to allow for the logical assessment of Project effects, and are presented in Table 0.2 and Table 0.3, which formed the basis for the subsequent VC-specific assessment.

Table 0.2 Wildlife Species at Risk Valued Component and Rationale for their Inclusion in the Habitat-based Environmental Assessment for the Denison Wheeler River Project

| Valued Component | Rationale |
|---------------------------------------|---|
| Biophysical Environment | |
| <i>Terrestrial Environment</i> | |
| Furbearers | Project activities and infrastructure may affect local furbearer populations, including species at risk (SAR), resulting in non-compliance with permit conditions (e.g., <i>Species at Risk Act</i> [SARA; Government of Canada 2022], <i>The Wildlife Act 1998</i> [Government of Saskatchewan 2020]). |
| Woodland Caribou | Project activities and infrastructure may affect woodland caribou populations, resulting in non-compliance with permit conditions (e.g., SARA [Government of Canada 2022], <i>The Wildlife Act, 1998</i> [Government of Saskatchewan 2020]). |

| Valued Component | Rationale |
|----------------------|--|
| Bird Species at Risk | Project activities and infrastructure may affect bird SAR (specifically disturbance and/or destruction of eggs, young, and adults) resulting in non-compliance with regulatory requirements (e.g., SARA [Government of Canada 2022], <i>Migratory Birds Convention Act 1994</i> [Government of Canada 2017], <i>Saskatchewan Activity Restriction Guidelines for Sensitive Species</i> [Government of Saskatchewan 2017], <i>The Wildlife Act 1998</i> [Government of Saskatchewan 2020]). |

Table 0.3 Valued Components, Key Indicators, and Measurable Parameters for the Wildlife Component included in the Habitat-based Environmental Assessment for Denison Wheeler River Project

| Valued Component | Key Indicator | Measurable Parameter |
|----------------------|------------------------|---|
| Furbearers | Wolverine | Amount of habitat (km ²) (not necessarily occupied) that may be altered or lost relative to its availability in the Regional Study Area (RSA). The number of wolverine mortalities directly or indirectly attributable to the Project. |
| Woodland Caribou | Woodland caribou | Amount of habitat (km ²) (not necessarily occupied) that may be altered or lost relative to its availability in the RSA. The number of woodland caribou mortalities directly or indirectly attributable to the Project. |
| Bird Species at Risk | Common Nighthawk | Percentage of habitat for Common Nighthawk altered/lost directly or indirectly as a result of Project activities. The number of Common Nighthawk mortalities directly or indirectly attributable to the Project. |
| | Rusty Blackbird | Percentage of habitat for Rusty Blackbird altered/lost directly or indirectly as a result of Project activities. The number of rusty blackbird mortalities directly or indirectly attributable to the Project |
| | Olive-sided Flycatcher | Percentage of habitat for Olive-sided Flycatcher altered/lost directly or indirectly as a result of Project activities. The number of Olive-sided Flycatcher mortalities directly or indirectly attributable to the Project |
| | Short-eared Owl | Percentage of habitat for Short-eared Owl altered/lost directly or indirectly as a result of Project activities. The number of Short-eared Owl mortalities directly or indirectly attributable to the Project. |

| Valued Component | Key Indicator | Measurable Parameter |
|------------------|---------------|--|
| | Yellow Rail | <p>Percentage of habitat for Yellow Rail altered/lost directly or indirectly as a result of Project activities.</p> <p>The number of Yellow Rail mortalities directly or indirectly attributable to the Project.</p> |

The five bird species identified in Table 0.3 were selected as SAR VCs for the habitat-based EA in consideration of information/responses received during extensive Indigenous and community engagement completed by Denison, and they represent wildlife species of local importance. For these five species, additional information is not be provided in this Appendix. Rather, the reader is referred to the applicable sections in the EIS where appropriate information on existing conditions (Section 9.4.3.3), potential project-related effects (Section 9.4.4), mitigation measures (Section 9.4.5), residual effects and their significance (Section 9.4.6), and cumulative effects (Section 9.4.7) is provided.

Supplemental Information

As requested by ECCC, the following subsections provide supplemental information for the remaining nine species listed in Table 0.1 that were not included as VCs or KIs in the EIS. For these nine species, a brief overview of life history requirements (existing environment), a discussion on the effects assessment and mitigation measures, and a summary of residual and cumulative effects are included.

Table 0.1 Wildlife Species At Risk Considered in the Wheeler River Project Environmental Impact Statement

| Common Name | Scientific Name | Provincial Status | Federal Status ¹ | Preferred Habitat | Documented Occurrence in the Local Study Area ² | Reference in the Environmental Impact Statement (EIS) |
|--------------------------|-------------------------------------|-------------------|-----------------------------|---|--|---|
| Arthropods | | | | | | |
| Nine-spotted lady beetle | <i>Coccinella novemnotata</i> | S4 | Endangered | Habitat generalist – uses a diverse range of habitats and consumes a variety of prey. See Section 0 for further details. | Unlikely LSA is located within COSEWIC range; no observations in SKCDC and no Project-specific observations to date. | Not included as a Valued Component (VC) in the EIS. A review of life history requirements and discussion on effects assessment are included in this Appendix. |
| Transverse lady beetle | <i>Coccinella transversoguttata</i> | S4 | Special Concern | Habitat generalist – uses a diverse range of habitats and consumes a variety of prey. See Section 0 for further details. | Unlikely LSA is located within COSEWIC range; no observations in SKCDC and no Project-specific observations to date. | Not included as a VC in the EIS. A review of life history requirements and discussion on effects assessment are included in this Appendix. |
| Yellow-banded bumble bee | <i>Bombus terricola</i> | S4 | Special Concern | Habitat generalist – uses a variety of habitats and consumes nectar and pollen from many different flowering plants. See Section 0 for further details. | Unlikely LSA is located within COSEWIC range; no observations in SKCDC and no Project-specific observations to date. | Not included as a VC in the EIS. A review of life history requirements and discussion on effects assessment are included in this Appendix. |
| Amphibians | | | | | | |
| Northern leopard frog | <i>Lithobates pipiens</i> | S3 | Special Concern | Three district habitats: (1) overwintering waterbodies that are cold, well oxygenated, and do not freeze to | LSA is located within COSEWIC range; no observations in SKCDC | Not included as a VC in the EIS. A review of life history requirements and discussion on |

| Common Name | Scientific Name | Provincial Status | Federal Status ¹ | Preferred Habitat | Documented Occurrence in the Local Study Area ² | Reference in the Environmental Impact Statement (EIS) |
|---------------------|-------------------------------|-------------------|-----------------------------|--|--|--|
| | | | | bottom; (2) breeding and larval waterbodies with shallow, open habitats, neutral pH, and no fish; and (3) summering areas in shallow marshes, moist upland meadows where grass height is less than 1 m. See Section 0 for further details. | and no Project-specific observations to date. Amphibian nocturnal call and visual search surveys were completed in the LSA and Regional Study Area (RSA) as part of the baseline program; however, only boreal chorus frogs (<i>Pseudacris maculata</i>) were detected (Appendix 9-C). | effects assessment are included in this Appendix. |
| Bats | | | | | | |
| Little brown myotis | <i>Myotis lucifugus</i> | S4B, S4N | Endangered | Seasonal habitat requirements: (1) overwintering hibernacula that are sufficiently cool and humid and (2) summering areas that provide foraging areas and suitable locations for roosting and maternity colonies. See Section 0 for further details. | Documented during the acoustic bat surveys as part of the baseline field program as present in the LSA and RSA, and previously observed in the RSA (SKCDC 2023). | Not included as a VC in the EIS. A review of life history requirements and discussion on effects assessment are included in this Appendix. |
| Northern myotis | <i>Myotis septentrionalis</i> | S3 | Endangered | Seasonal habitat requirements: (1) overwintering hibernacula that are sufficiently cool and humid and (2) summering areas that provide foraging | Documented during the acoustic bat surveys as part of the baseline field program as | Not included as a VC in the EIS. A review of life history requirements and discussion on effects assessment are included in this Appendix. |

| Common Name | Scientific Name | Provincial Status | Federal Status ¹ | Preferred Habitat | Documented Occurrence in the Local Study Area ² | Reference in the Environmental Impact Statement (EIS) |
|-------------------------------------|----------------------------------|-------------------|-----------------------------|--|--|---|
| | | | | areas and suitable locations for roosting and maternity colonies. See Section 0 for further details. | present in the LSA and RSA (Appendix 9-C). | |
| Terrestrial Wildlife Species | | | | | | |
| Wolverine | <i>Gulo gulo</i> | S2 | Special Concern | See Section 9.3.3.2 of the EIS for details. | LSA is located within COSEWIC range; no observations in SKCDC and no Project-specific observations to date. | Included as a Key Indicator (KI) of the Furbearer VC in the EIS. A review of life history requirements and discussion on effects assessment are included in the EIS (Section 9.3). Additional information for this species is not provided in this Appendix. |
| Woodland caribou | <i>Rangifer tarandus caribou</i> | S3 | Threatened | See Section 9.3.3.3 of the EIS for details. | Documented within the RSA during the baseline field program (Appendix 9-C) | Included as a VC in the EIS. A review of life history requirements and discussion on effects assessment are included in the EIS (Section 9.3). Additional information for this species is not provided in this Appendix. |
| Avian Species | | | | | | |
| Bank Swallow | <i>Riparia riparia</i> | S4B, S5M | Threatened | Nesting colonies are typically characterized by steep embankments with a sand, silt, or clay substrate that can be easily excavated for burrows. They are often adjacent to slow-moving or still waterbodies and may occur in natural habitats or in anthropogenic features. Bank Swallows are aerial insectivores that forage over a variety of | LSA is located within COSEWIC range; no historical observations documented by the SKCDC (2023) and no Project-specific observations to date. | Not included as a KI of the Bird Species at Risk (SAR) VC in the EIS (Common Nighthawk was used as a surrogate species). A review of life history requirements and discussion on effects assessment are included in this Appendix. Any new species-specific mitigation measures identified in this appendix will be added to the final EIS (Section 9.4.5). |

| Common Name | Scientific Name | Provincial Status | Federal Status ¹ | Preferred Habitat | Documented Occurrence in the Local Study Area ² | Reference in the Environmental Impact Statement (EIS) |
|------------------------|-------------------------|-------------------|-----------------------------|--|---|---|
| | | | | open habitats. See Section 0 for further details. | | |
| Barn Swallow | <i>Hirundo rustica</i> | S4B | Threatened | Breeding habitat typically requires a suitable nesting site with a vertical or horizontal surface underneath a roof of some sort, open areas for foraging, and a waterbody with mud for nest building. Anthropogenic features such as barns, houses, bridges, and culverts are commonly used nesting sites. See Section 0 for further details. | Documented during the breeding bird surveys as part of the baseline field program as present in the LSA (Appendix 9-C), and previously observed in the RSA (SKCDC 2023) | Not included as a KI of the Bird SAR VC in the EIS (Common Nighthawk was used as a surrogate species). A review of life history requirements and discussion on effects assessment are included in this Appendix. Any new species-specific mitigation measures identified in this appendix will be added to the final EIS (Section 9.4.5). |
| Common Nighthawk | <i>Chordeiles minor</i> | S4B | Special Concern | See Section 9.4.3.3 of the EIS for details. | Documented during the baseline field program as present in the LSA (Appendix 9-C), and previously observed in the RSA (SKCDC 2023) | Included as a KI of the Bird SAR VC in the EIS. A review of life history requirements and discussion on effects assessment are included in the EIS (Section 9.3). Additional information for this species is not provided in this Appendix. |
| Horned Grebe | <i>Podiceps auritus</i> | S5B | Special Concern | Breeding habitat consists of small to medium-sized freshwater lakes, ponds, and marshes that are shallow with open water (at least 40%), emergent vegetation, anchorage for nests, and concealment for nests and young. See Section 0 for further details. | Documented during the baseline field program as present in the LSA (Appendix 9-C). | Not included as a KI of the Bird SAR VC in the EIS (Yellow Rail was used as a surrogate species). A review of life history requirements and discussion on effects assessment are included in this Appendix. Any new species-specific mitigation measures identified in this appendix will be added to the final EIS (Section 9.4.5).. |
| Olive-sided Flycatcher | <i>Contopus cooperi</i> | S4B | Special Concern | See Section 9.4.3.3 of the EIS for details. | Documented during the baseline field program | Included as a KI of the Bird SAR VC in the EIS. A review of life history requirements and |

| Common Name | Scientific Name | Provincial Status | Federal Status ¹ | Preferred Habitat | Documented Occurrence in the Local Study Area ² | Reference in the Environmental Impact Statement (EIS) |
|-----------------|-----------------------------------|-------------------|-----------------------------|---|--|---|
| | | | | | as present in the LSA (Appendix 9-C), and previously observed in the RSA (SKCDC 2023) | discussion on effects assessment are included in the EIS (Section 9.3). Additional information for this species is not provided in this Appendix. |
| Rusty Blackbird | <i>Euphagus carolinus</i> | S3B, SUN | Special Concern | See Section 9.4.3.3 of the EIS for details. | LSA is located within COSEWIC range; no historical observations documented by the SKCDC (2023) and no Project-specific observations to date. | Included as a KI of the Bird SAR VC in the EIS. A review of life history requirements and discussion on effects assessment are included in the EIS (Section 9.3). Additional information for this species is not provided in this Appendix. |
| Short-eared Owl | <i>Asio flammeus</i> | S3B, S2N | Special Concern | See Section 9.4.3.3 of the EIS for details. | LSA is located within COSEWIC range; no historical observations documented by the SKCDC (2023) and no Project-specific observations to date. | Included as a KI of the Bird SAR VC in the EIS. A review of life history requirements and discussion on effects assessment are included in the EIS (Section 9.3). Additional information for this species is not provided in this Appendix. |
| Yellow Rail | <i>Coturnicops noveboracensis</i> | S3B | Special Concern | See Section 9.4.3.3 of the EIS for details. | LSA is located within COSEWIC range; no historical observations documented by the SKCDC (2023) and no Project-specific observations to date. | Included as a KI of the Bird SAR VC in the EIS. A review of life history requirements and discussion on effects assessment are included in the EIS (Section 9.3). Additional information for this species is not provided in this Appendix. |

Note: shaded rows indicate SAR was included as a VC or KI in the draft EIS

1 Schedule 1 under the *Species at Risk Act*.

- 2 Potential for Occurrence – based on known species occurrence data from Saskatchewan Conservation Data Centre (2023), Omnia (Appendix 9-C), Birds of Saskatchewan (2019), and Atlas of Saskatchewan Birds (Smith 1996) and/or presence of suitable habitat.

Arthropods

Nine-Spotted Lady Beetle

The nine-spotted lady beetle is a small beetle species found across southern Canada and the continental United States (COSEWIC 2016a). Its northern range limit in Saskatchewan is reported to occur near Lake Athabasca (COSEWIC 2016a). Based on records provided by the Saskatchewan Conservation Data Centre Hunting, Angling and Biodiversity of Saskatchewan (HABISask) database (SKCDC 2023), there are no historical observations of this species documented in the Regional Study Area (RSA).



Source: COSEWIC (2016a).

The nine-spotted lady beetle is a habitat generalist that uses a diverse range of habitats (e.g., open to semi-open forests, grasslands, riparian areas) and consumes a variety of prey (e.g., many species of arthropods [particularly aphids], sap, nectar and pollen) (COSEWIC 2016a). Being a habitat generalist allows the nine-spotted lady beetle to exploit seasonally available prey sources, with prey availability influencing the species' distribution more than habitat availability (COSEWIC 2016a).

The nine-spotted lady beetle has four life stages (i.e., egg, larva, pupa, and adult) and may produce two generations per year (i.e., spring and fall) depending on regional climate conditions (COSEWIC 2016a). Lady beetles, in general, are highly mobile and may undertake short (few hundred metres) and long-distance (18 to 120 km) movements (COSEWIC 2016a). The nine-spotted lady beetle is not migratory nor does it display strong site fidelity (COSEWIC 2016a). The nine-spotted lady beetle overwinters in aggregations in well-ventilated habitats (e.g., in rock crevices, grass tussocks, or leaf litter, or under stones or tree bark), becoming active in the early spring when temperatures start to increase (COSEWIC 2016a).

The nine-spotted lady beetle is federally listed under Schedule 1 of SARA as Endangered (Government of Canada 2023) and is designated as an S4 species in Saskatchewan (i.e., Apparently Secure) (Saskatchewan Conservation Data Centre 2023). The species has undergone significant population declines in Canada since 1975, going from one of the more common lady beetles collected to being rarely collected relative to other lady beetles, despite comprehensive and targeted surveys (COSEWIC 2016a). Reasons for these population declines are currently unknown but are thought to be driven by competition, predation, and introduced diseases from non-native species (including non-native lady beetles), agricultural pesticide use to control aphids, habitat loss via urban expansion, and other human disturbances (COSEWIC 2016a).

Transverse Lady Beetle

The transverse lady beetle is a small beetle species found across the United States and Canada, including all provinces and territories (COSEWIC 2016b). The species is a habitat generalist and uses similar habitat types and consumes similar prey as the nine-spotted lady beetle, which means it is also able to exploit seasonally available prey sources (COSEWIC 2016b). According to the information from the HABISask database, there are no historical observations of this species documented in the RSA.



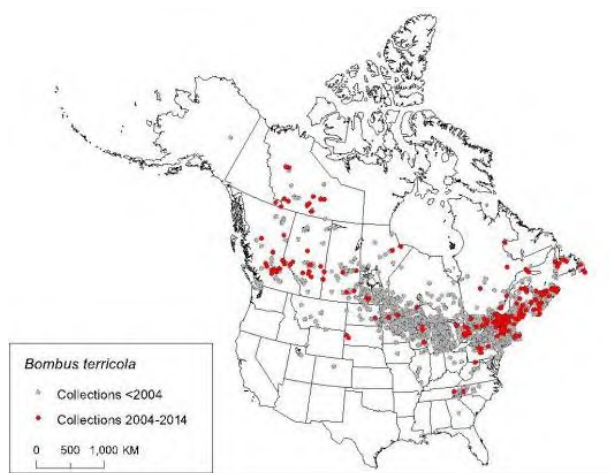
Source: COSEWIC (2016b).

The transverse lady beetle has four life stages (i.e., egg, larva, pupa, and adult) and may produce two generations per year (i.e., spring and fall) depending on regional climate conditions (COSEWIC 2016b). Lady beetles in general are highly mobile and may undertake short (few hundred metres) and long-distance (18 to 120 km) movements (COSEWIC 2016b). The transverse lady beetle is not migratory nor does it display strong site fidelity (COSEWIC 2016b). The transverse lady beetle overwinters in aggregations in well-ventilated habitats (e.g., in rock crevices, grass tussocks, or leaf litter, or under stones or tree bark), becoming active in the early spring when temperatures start to increase (COSEWIC 2016b).

The transverse lady beetle is federally listed under Schedule 1 of SARA as Special Concern (Government of Canada 2023) and is designated as an S4 species in Saskatchewan (i.e., Apparently Secure) (Saskatchewan Conservation Data Centre 2023). The species was once abundant across its range in Canada and was one of the most common lady beetles collected; however, since 1986, the species is now absent, below detection limits, or present in low numbers in many parts of its range (COSEWIC 2016b). The transverse lady beetle has not been detected in Saskatchewan since 2001 (COSEWIC 2016b). Reasons for these population declines are currently unknown but are thought to be driven by the same factors listed for the nine-spotted lady beetle in Section **Error! Reference source not found..**

Yellow-banded Bumble Bee

The yellow-banded bumble bee is a medium-sized bumble bee species found throughout eastern North America, from eastern British Columbia (BC) to Newfoundland and Labrador and from the northern United States up to the southern portion of the territories (COSEWIC 2015). The species is a habitat generalist (e.g., boreal habitats, mixed woodlands, montane meadows) and consumes nectar and pollen from many different flowering plants (COSEWIC 2015). According to the information from the HABISask database, there are no historical observations of this species documented in the RSA.



Source: COSEWIC (2015).

The yellow-banded bumble bee has four life stages (i.e., egg, larva, pupa, and adult) and produces one generation per year, with mated queens establishing new colonies each year (COSEWIC 2015).

After overwintering underground in loose soil or decomposing organic material, the mated queens emerge in the spring and search for potential nest sites, which are typically located underground in existing cavities (e.g., abandoned rodent burrows, rotten logs, openings in dead wood, and grassy hummocks) (COSEWIC 2015). Once a queen has found a suitable nest site, she forages for nectar and pollen and then returns to her nest site to lay eggs, which will develop into her future workers (i.e., unmated daughters that do not typically reproduce) (COSEWIC 2015). After the initial eggs hatch and the larva and pupa develop into adult workers, the workers take over nest and brood care, foraging duties, and colony protection while the queen continues to lay eggs (COSEWIC 2015). Males and potential queens are produced by late summer once the colony reaches maximum worker production, at which point they leave the colony and mate (COSEWIC 2015). All males and workers die by fall while the mated queens hibernate through the winter in suitable overwintering sites (COSEWIC 2015).

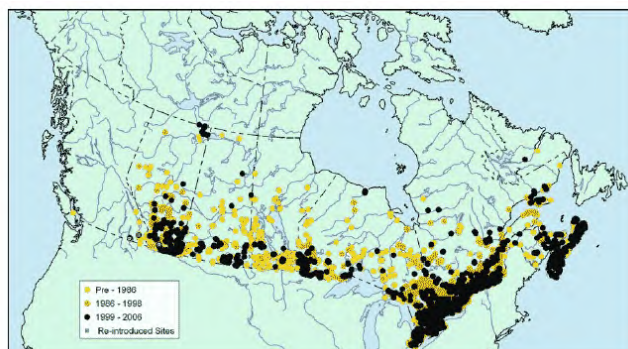
The yellow-banded bumble bee is federally listed under Schedule 1 of SARA as Special Concern (Government of Canada 2023) and is designated as an S4 species in Saskatchewan (i.e., Apparently Secure) (Saskatchewan Conservation Data Centre 2023). Prior to the 1990s, the yellow-banded bumble bee was one of the more common bumble bees collected in eastern and boreal Canada (COSEWIC 2015, Environment and Climate Change Canada 2022a). Population declines started to occur in the early 1990s, with an average rate of decline of 66.5% in proportional abundance across central and southern Canada between 1992 and 2011 (COSEWIC 2015, Environment and Climate Change Canada 2022a). The species is no longer found at several historical collection sites (COSEWIC 2015).

The status of the yellow-banded bumble bee in boreal habitats and Arctic regions is unknown (COSEWIC 2015, Environment and Climate Change Canada 2022a). Reasons for these population declines are currently unknown but are thought to be driven by introduced diseases from managed bumble bee species, agricultural pesticide use, habitat loss via urban and agricultural expansion, and climate change (COSEWIC 2015). The species' unique type of sex determination, where colonies must reach maximum worker production to produce males and potential queens, has been identified as a limiting factor (COSEWIC 2015, Environment and Climate Change Canada 2022a).

Amphibians

Northern Leopard Frog

The northern leopard frog is found across most of west-central and northeastern North America (COSEWIC 2009a). The species is widespread in Canada, ranging from southeastern BC to Labrador, and from southcentral Northwest Territories (COSEWIC 2009a, NCC 2023).



Source: COSEWIC (2009a).

Three distinct habitats are used by the northern leopard frog on an annual basis: (1) overwintering waterbodies that are cold, well oxygenated, and do not freeze to bottom (e.g., rivers, streams, deep lake ponds and creeks, and spillways below dams); (2) breeding and larval waterbodies with shallow, open habitats (e.g., ponds, lakeshores, marshes, and slow-moving streams; may be permanent or semi-permanent), neutral

pH, well vegetated, and no fish; and (3) summering areas in shallow marshes, moist upland meadows, forests and grasslands where grass height is less than 1 m (COSEWIC 2009a, NCC 2023). These habitats must be in proximity with suitable dispersal corridors interconnecting them (e.g., riparian areas and waterways) as the species is not capable of long-distance movements (COSEWIC 2009a, Environment Canada 2013).

Northern leopard frogs emerge from their overwintering waterbodies in early spring shortly after ice off (COSEWIC 2009a). The breeding season extends from mid-April to June, with exact timing dependent on location and latitude (COSEWIC 2009a). Females lay several thousand eggs, attaching them to submerged vegetation, which develop into tadpoles within two weeks depending on water temperatures (COSEWIC 2009a). The tadpoles in turn develop into small frogs over a two-to-three-month period, after which they migrate to their summering areas and forage on a variety of arthropods, worms, and snails, sometimes preying on small birds and smaller frogs (COSEWIC 2009a).

Three populations are recognized for the northern leopard frog in Canada: the Rocky Mountain, the Western Boreal/Prairie, and the Eastern (COSEWIC 2009a, NCC 2023). The Western Boreal/Prairie population is found in Alberta, Saskatchewan, Manitoba, and the Northwest Territories (COSEWIC 2009a, NCC 2023). The Western Boreal/Prairie population is federally listed under Schedule 1 of SARA as Special Concern (Government of Canada 2023) and is designated as an S3 species in Saskatchewan (i.e., Vulnerable) (Saskatchewan Conservation Data Centre 2023).

Population data are limited for the northern leopard frog in Canada (COSEWIC 2009a, Environment Canada 2013). Large-scale population declines occurred in the early 1970s, with populations in western Canada (i.e., BC and Alberta) most dramatically affected (COSEWIC 2009a). Information is lacking on the current status of northern leopard frog populations in Saskatchewan (COSEWIC 2009a, Environment Canada 2013).

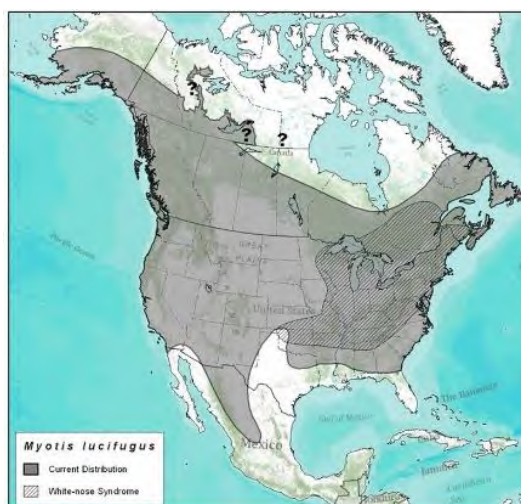
Threats to the northern leopard frog include emerging diseases (e.g., *Chytridiomycosis*), introduced non-native species, habitat loss and fragmentation, environmental contamination, and increased frequency and severity of droughts (COSEWIC 2009a). The species' specific habitat requirements and vulnerability to diseases and prolonged periods of drought have been identified as limiting factors (Environment Canada 2013).

Bats

Little Brown Myotis

The little brown myotis is a small bat species found across North America, including across Canada south of the treeline (COSEWIC 2013a). The species is considered a short-distance regional migrant between its summer and winter ranges, with the distance travelled dependent on the location of suitable overwintering hibernacula (COSEWIC 2013a).

Habitat for the little brown myotis is composed of (1) overwintering hibernacula that are sufficiently cool and humid and (2) summering areas that provide foraging areas and suitable locations for roosting and maternity colonies (COSEWIC 2013a). Hibernacula and maternity



Source: COSEWIC (2013a).

sites are the main limiting habitat features for this species (COSEWIC 2013a). Hibernacula occur in parts of caves, mines, and buildings that have stable and specific temperature (-4 to 13°C) and humidity ($>80\%$) conditions (COSEWIC 2013a). Maternity sites occur in large-diameter trees, rock crevices, buildings, and bat houses that offer warm and relatively stable microclimate conditions that allow females to avoid going into torpor so they can focus on caring for their young (COSEWIC 2013a, Slough and Jung 2020). Males are more versatile in their summer roosting requirements and use tree cavities, raised bark, foliage, rock crevices, buildings, and bridges with a broader range of microclimate conditions (COSEWIC 2013a, Johnson et al. 2019). Foraging areas for the little brown myotis include a variety of habitats situated close to roosting and maternity sites, including over water (e.g., wetlands, lakes, ponds, and rivers), along riparian areas and forest edges, and in forest gaps (COSEWIC 2013a).

The little brown myotis is federally listed under Schedule 1 of SARA as Endangered (Government of Canada 2023) and is designated as an S4B, S4N species in Saskatchewan (i.e., Apparently Secure breeding population, Apparently Secure non-breeding population) (Saskatchewan Conservation Data Centre 2023).

The current size of the little brown myotis population in Canada is unknown. Prior to the arrival of White-nose Syndrome in 2010, the population in Canada was estimated to be over one million individuals (COSEWIC 2013a, Environment and Climate Change Canada 2018). White-nose Syndrome is a disease that causes high rates of mortality among hibernating bats, and it has been identified as the main threat for bat populations in Canada (COSEWIC 2013a). Other threats to the little brown myotis include habitat loss, colony eradication, chemical contamination, and wind turbines (COSEWIC 2013a).

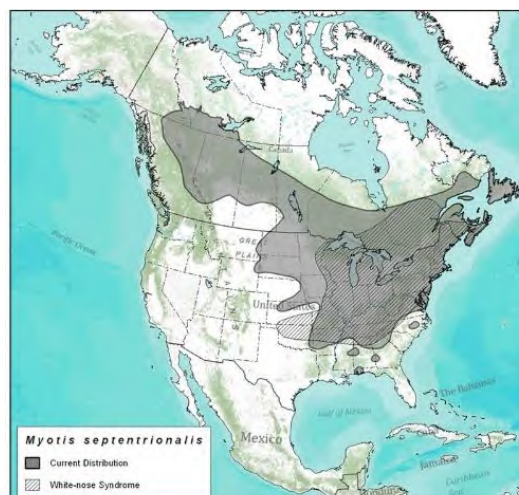
Northern Myotis

The northern myotis is a small bat species found across North America, including across Canada south of the treeline (COSEWIC 2013a). The species is considered a short-distance regional migrant between its summer and winter ranges, with the distance travelled dependent on the location of suitable overwintering hibernacula (COSEWIC 2013a).

Habitat for the northern myotis is composed of (1) overwintering hibernacula that are sufficiently cool and humid and (2) summering areas that provide foraging areas and suitable locations for roosting and maternity colonies (COSEWIC 2013a). Hibernacula and maternity sites are the main limiting habitat features for this species (COSEWIC 2013a). Hibernacula occur in parts of caves, mines, and buildings that have stable and specific temperature (0.6 to 14°C) and humidity (>80%) conditions (COSEWIC 2013a). Summer roosting trees are typically found in mature to old-growth forests, swamps, and riparian areas, although retained older trees and snags in younger forests may occasionally provide suitable roosting habitat (Environment and Climate Change Canada 2018). Females strongly prefer tall, large-diameter trees (both living and dead, typically deciduous) with early- to mid-decay for maternity sites (COSEWIC 2013a, Environment and Climate Change Canada 2018). Anthropogenic features (e.g., barns) may occasionally be used as maternity sites in fragmented landscapes with few potential roost trees (Environment and Climate Change Canada 2018). Maternity sites that maintain warm and relatively stable microclimate conditions are important to reproductive females and young as they allow more energy to be directed toward growth and development (Caceres and Barclay 2000, COSEWIC 2013a). Males are more versatile in their summer roosting requirements; they most frequently roost under exfoliating, raised bark but may also roost in the cavities and crevices of trees and snags with early- to mid-decay (Jung et al. 2004, COSEWIC 2013a).

The northern myotis is well adapted to flying in areas of dense or structurally complex vegetation where it catches flying insects on the wing or feeds by gleaning prey from foliage (Caceres and Barclay 2000, Henderson and Broders 2008). The species typically forages within the interior of mature to old-growth deciduous and mixedwood forests, but may also forage in forest gaps, along forest edges and riparian areas, and over rivers (Henderson and Broders 2008, COSEWIC 2013a).

The northern myotis is federally listed under Schedule 1 of SARA as Endangered (Government of Canada 2023) and is designated as an S3 species in Saskatchewan (i.e., Vulnerable) (Saskatchewan Conservation Data Centre 2023). The current size of the northern myotis population in Canada is unknown. Prior to the arrival of White-nose Syndrome in 2010, the population in Canada was estimated to be over one million individuals (COSEWIC 2013a, Environment and Climate Change Canada 2018). White-nose Syndrome has been identified as the main threat for northern myotis



Source: COSEWIC (2013a).

populations in Canada (COSEWIC 2013a). . Other threats to the northern myotis include habitat loss, colony eradication, chemical contamination, and wind turbines (COSEWIC 2013a)

Avian Species

Bank Swallow

The Bank Swallow is a small songbird that occurs on every continent (except Antarctica and Australia), breeds throughout Canada, and winters primarily in South America (COSEWIC 2013b). Nesting colonies are typically characterized by steep embankments with a sand, silt, or clay substrate that can be easily excavated for burrows (COSEWIC 2013b, Government of Canada 2019a). These steep sand, silt, or clay embankments are frequently subject to erosion or slumping (COSEWIC 2013b, Garrison and Turner 2020).

Nesting colonies are often adjacent to slow-moving or still waterbodies (e.g., low gradient rivers or lakes) and may occur in natural habitats or in anthropogenic features (e.g., quarries or road cuts) (COSEWIC 2013b, Government of Canada 2019a, Garrison and Turner 2020). Colony size can range from less than half a dozen burrows to hundreds or thousands of burrows (COSEWIC 2013b, Government of Canada 2019a). Individual burrows within colonies may be recolonized in subsequent years if the integrity of the colony remains intact (i.e., does not erode and collapse) (Garrison and Turner 2020). Bank Swallows are aerial insectivores that forage over a variety of open habitats such as lakes, ponds, rivers, wetlands, grasslands, and agricultural areas (COSEWIC 2013b, Garrison and Turner 2020).

The Bank Swallow is federally listed under Schedule 1 of SARA as Threatened (Government of Canada 2023) and is designated as an S4B, S5M species in Saskatchewan (i.e., Apparently Secure breeding population, Secure aggregating transient population [migrants]) (Saskatchewan Conservation Data Centre 2023). The most recent breeding population estimate for Canada is 2.4 million individuals (Environment and Climate Change Canada 2022b). Based on Breeding Bird Survey (BBS) data collected between 1970 and 2019, the Bank Swallow population in Canada has declined at a rate of 5.3% per year, for an overall decline of 98.0% (Environment and Climate Change Canada 2022b). The long-term population decline appears to be driven by several threats acting cumulatively, including loss of nesting and foraging habitats, incidental take during anthropogenic activities (e.g., aggregate extraction and erosion control), large-scale declines in aerial insect populations, and climate change (COSEWIC 2013b). Bank Swallows are also particularly vulnerable to collisions with vehicles partly due to the attraction of individuals to intraspecific carcasses; one swallow hit by a vehicle could attract several individuals to a road, potentially resulting in subsequent collisions and large mortality events (COSEWIC 2013b, Garrison and Turner 2020).

Although colonial nesting may provide advantages (e.g., predation protection and assistance with thermoregulation), it has been identified as a limiting factor for the Bank Swallow, potentially making



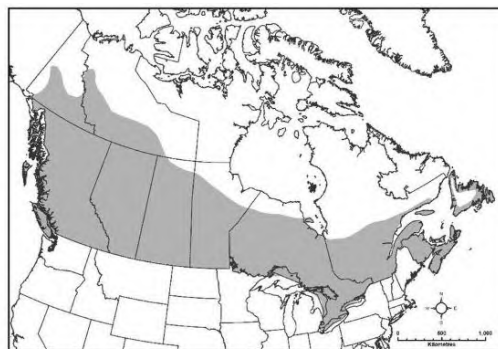
Source: COSEWIC (2013b).



them more vulnerable to natural events or anthropogenic activities, which may result in mass mortality events (Environment and Climate Change Canada 2022b).

Barn Swallow

The Barn Swallow is a medium-sized songbird that occurs on every continent (except Antarctica), breeds throughout Canada, and winters in the southern United States, Mexico, and southwards (COSEWIC 2021). Breeding habitat typically requires a suitable nesting site with a vertical or horizontal surface underneath a roof of some sort, open areas for foraging (e.g., grasslands, fields, wetlands, and shorelines), and a waterbody with mud for nest building (Government of Canada 2019b, Brown and Brown 2020, COSEWIC 2021). Historically, suitable nesting sites were likely provided by caves, cliff faces, rock ledges, tree branches, and hollow trees (Brown and Brown 2020, COSEWIC 2021). Today, nesting sites are usually located within agricultural and rural areas, and along roads and highways (Brown and Brown 2020, COSEWIC 2021). Anthropogenic features such as barns, houses, bridges, and culverts are commonly used for nesting sites (COSEWIC 2021). Barn Swallows nest in colonies or independently and typically return to the same nesting sites each year and may reuse old nests (Government of Canada 2019b, Brown and Brown 2020, COSEWIC 2021).



Source: COSEWIC (2021).

The Barn Swallow is federally listed under Schedule 1 of SARA as Threatened (Government of Canada 2023) and is designated as an S4B species in Saskatchewan (i.e., Apparently Secure breeding population) (Saskatchewan Conservation Data Centre 2023). An estimated 6.4 million individuals currently breed in Canada, with over 60% of the population breeding throughout the prairie provinces (COSEWIC 2021). Based on BBS data collected between 1970 and 2019, the Barn Swallow population in Canada has declined at a rate of 2.34% per year, for an overall decline of 68.6% (COSEWIC 2021). Intensification of agriculture, loss of nesting sites, large-scale declines in aerial insect populations, and climate change are cited as the most imminent threats for the Barn Swallow, and its dependence on aerial insects for prey and low post-fledging survival rates are cited as limiting factors for the species (COSEWIC 2021). The repeated use of anthropogenic features for nesting makes Barn Swallows vulnerable to incidental take, especially if the anthropogenic features require routine maintenance. In addition, their frequent use of anthropogenic features for nesting makes Barn Swallows vulnerable to entrapment (e.g., buildings, pipes, vents, other enclosed spaces) as they search for potential locations to build a nest (COSEWIC 2021).

Horned Grebe

The Horned Grebe is a small waterbird that occurs in North America and Eurasia (COSEWIC 2009b). Within North America, the species breeds across western Canada from BC and Yukon across to the Magdalen Islands in Quebec



and winters along the Pacific and Atlantic coasts (COSEWIC 2009b).

Breeding habitat for the Horned Grebe consists of small to medium-sized freshwater lakes, ponds, and marshes that are shallow with open water (at least 40%), emergent vegetation, anchorage for nests, and concealment for nests and young (COSEWIC 2009b, Stedman 2020).

Source: COSEWIC 2009b

Horned Grebes use a range of waterbody sizes for breeding, but typically prefer waterbodies between 0.3 and 2.0 ha in size (COSEWIC 2009b). Most pairs are solitary, but loose colonies of up to 20 pairs have been found on larger waterbodies with abundant food resources (COSEWIC 2009b, Stedman 2020). Nests are typically located in shallow water near shore on a floating or emerging mass of vegetation (COSEWIC 2009b). Horned Grebes are diving birds that feed on a variety of aquatic arthropods and fish (COSEWIC 2009b, Stedman 2020).

The Western population of the Horned Grebe is federally listed under Schedule 1 of SARA as Special Concern (Government of Canada 2023) and is designated as an S5B species in Saskatchewan (i.e., Secure breeding population) (Saskatchewan Conservation Data Centre 2023). An estimated 200,000 to 500,000 individuals occur in the Western population, with most breeding in southern Alberta and Saskatchewan (COSEWIC 2009b, Environment and Climate Change Canada 2022c). Based on BBS data collected between 1970 and 2019, the Western population of the Horned Grebe in Canada has declined at a rate of 1.7% per year, for an overall decline of 57.0% (Environment and Climate Change Canada 2022c). The reasons for this population decline are unknown. Probable threats include permanent habitat loss, temporary loss of habitat during droughts, eutrophication and degradation of habitat due to fertilizers, predator expansion on the prairies, Type E botulism in the Great Lakes, entanglement in commercial fishing gear, climate change and extreme weather, and oil spills on wintering grounds (COSEWIC 2009b).

Mitigation Measures

The Project will require the construction, operation, and decommissioning of several components (as described in Section 2 of the EIS). Expected interactions between these Project components and activities and the wildlife VCs and their associated KIs are summarized by Project phase and activity in Tables 9.3-6 and 9.4-5 of the EIS. Based on the timing and nature of interactions identified in Tables 9.3-6 and 9.4-5 of the EIS, the following adverse effects on the wildlife VCs, including SAR, are likely to occur during the lifetime of the Project:

- alteration and/or loss of habitat; and
- change in mortality.

These potential effects apply to Wildlife SAR as well. The potential effects are described in Sections 9.3.4.2 and 9.4.4.2 of the EIS for each Project phase as they may affect the wildlife VCs and associated KIs.

Mitigation in this EIS is defined as the elimination, reduction, or control of potential adverse effects of the Project on the environment throughout all Project phases. Project-specific mitigation measures include: Project design; implementation of best management practices; development of management plans; implementation of emergency response programs; and provision of training, education and awareness (Denison 2020). Mitigation measures for each potential effect are described in Sections 9.3.5 and 9.4.5 of the EIS. The following subsections summarize mitigation measures that will be implemented to avoid or minimize adverse effects on the Wildlife SAR.

Project Design Measures

Potential adverse effects on Raptors, Migratory Breeding Birds, and Bird SAR VCs will be avoided or minimized to the extent practical through Project design. All of the Project design measures listed here are consistent with those presented in Section 9 of the EIS (i.e., there are no new Project design measures proposed in this appendix):

- The Project Area (i.e., the area of maximum physical disturbance) has been reduced to the extent practicable resulting in reduced habitat disturbance and noise propagation.
- Much of the proposed footprint will be developed within previously disturbed areas, including roads currently used for exploration activities, thereby minimizing additional habitat disturbance.
- The powerline to the main substation at the site is relatively short (i.e., approximately 7 km) and will be constructed from the existing provincial power line adjacent to Highway 914.
- During Operation, progressive reclamation activities will be completed where possible, and the progress and success of these activities will be assessed annually.
- Cleared brush will be stockpiled when possible, to be used in progressive reclamation.
- Ongoing decommissioning of Project components will be completed when possible.
- Dust deposition on vegetation and waterbodies (including potential deposition of trace metals and radionuclides) will be reduced by:
 - directing processing plant exhaust from drying and packaging areas through a stack prior to release outside of the building;

- designing the stack height based on results of air dispersion modelling to be an appropriate height for optimal dispersion;
 - controlling access to the property with both a north and south security gate (the north gate is on a decommissioned road and the south gate is manned);
 - making a wash bay available to clean items, equipment and vehicles that may have been in contact with potentially contaminated materials. Contaminated water from the wash bay will be collected in a sump tank and routed to the water treatment plant for treatment and discharge;
 - conducting radiological clearance scanning as required for any items, equipment, and vehicles leaving the Project Area; and.
 - watering and traffic controls on roads.
- Battery-powered light vehicles and mobile equipment, and an AC powered dual rotary drill for ISR wellfield development instead of a traditional diesel-powered unit, will be employed, where practical, to reduce air emissions and noise levels and improve energy efficiency.
 - The main sources of noise will be related to transport of people and goods, drilling of holes for the freeze wall and wellfield, operation of the batch plant, operation of the processing plant, and operation of the pumphouses. The use of high-quality, low sound emission equipment and regular maintenance will reduce noise associated with Project activities.
 - Bulk storage tanks for processing chemicals such as sulphuric and/or hydrochloric acid, sodium hydroxide, and hydrogen peroxide will sit inside appropriately designed and sized secondary containment basins, physically separated from the containment basins for other chemical systems.
 - Surface pipelines will be designed to have secondary containment or catchment and have leak detection systems in place at key locations.
 - A freeze wall will be established around the uranium deposit to reduce groundwater disturbance.
 - Mining solution and process water will be reused throughout the mining process, reducing water use requirements to the extent feasible and reducing the volume of treated effluent requiring discharge. Make-up water will be preferentially sourced from site runoff where possible.
 - Double-walled, high-density polyethylene or equivalent piping will be used in the wellfields and will be freeze protected and secured to minimize pipe movement.
 - Contaminated wastes (e.g., mineralized drill cuttings, solid impurities removed from mining solution, dewatered reject solids) will be properly contained on a double lined waste pad with leak detection capabilities and an associated monitoring program. An adjacent pond will be used to collect runoff from the pad and water in the waste pond will be piped to the water treatment plant. Such waste will be disposed of either on site or off site at an approved facility.
 - The ISR wellfield and processing plant will be designed to re-use most of the solutions inside each circuit; any excess water will be released to a surface water body once acceptable water quality is achieved. All treated effluent released to surface water will meet federal and provincial regulatory discharge limits.

- All contaminated areas, such as waste ponds and pads, and the domestic landfill will be fenced to avoid contact with workers and wildlife. Fences will be monitored and maintained.

General Mitigation Measures for Wildlife Species at Risk

Mitigation measures specific to the Wildlife SAR, in accordance with the *Migratory Birds Convention Act* and tailored to Project features will be incorporated into various Project management and monitoring plans such as the erosion and sediment controls, soil and vegetation monitoring, wildlife monitoring, the Decommissioning Plan, air quality monitoring, Spill Response Plan, Radiation Protection Plan, surface water and effluent monitoring and Waste Management Plan.

The management plans within the Environmental Management System (EMS) will provide specific mitigation measures based on proven and accepted mitigation measures following standard industry guidelines and best management practices. The EMS will provide guidance to avoid or minimize potential adverse effects of the Project on avian species and their habitat, including monitoring and follow-up programs, as appropriate. It will be in place during all phases of the Project and will be subject to ongoing review and revision as required. If monitoring identifies a need for additional or revised mitigation measures, a process of adaptive management (as described in the plan) will be triggered. The Project management plans provide direction on monitoring and adaptive management so that responses are timely and effective.

The following subsections provides a description of the mitigation measures that will be applicable during all Project phases and expected to be effective immediately following implementation. Additional mitigation measures specific to the Wildlife SAR that were not included or that were revised from what was described in the draft EIS are provided in **bold text**.

Work Timing Windows and Habitat Disturbance

- Site clearing and other works that involve disturbance of vegetation and/or soil will be conducted outside of the nesting season, when practical. **The nesting season for many Wildlife SAR in Saskatchewan spans a period from March 15 to August 31; however, the dates differ for certain species. The Wildlife Management Plans within the EMS will provide details on nesting windows for avian species, as well as other sensitive time periods (e.g., caribou calving periods) occurring in the Terrestrial RSA based on the Saskatchewan Activity Restriction Guidelines for Sensitive Species (SARGSS), which were established to support the avoidance of sensitive species' habitats during sensitive periods (SK MOE 2017).**
- **Prior to commencing any site clearing (i.e., vegetation clearing and/or soil disturbance) during the nesting and breeding season, pre-disturbance wildlife clearance surveys will be conducted by a Qualified Professional (QP) at that location within the Project Area to identify sensitive species and habitat features (e.g., nests as well as roosts and hibernacula used by bat species).**
- **Active and/or suspected breeding and roosting locations identified during the pre-disturbance wildlife clearance surveys will be protected with a no-disturbance setback buffer consistent with regulatory guidelines (e.g., the 2017 SARGSS [SK MOE 2017]) in accordance with the level of the disturbance and species until the young have successfully fledged, the nest is confirmed as no longer active (e.g., abandoned or depredated), or the nesting window has passed (for suspected nest locations). If guidelines cannot be met, due to safety or operational concerns, SK MOE will be contacted for advice on the appropriate response to the situation.**

Wildlife Education and Awareness

- Employees and contractors will be provided with wildlife education and awareness training, including education about potential Wildlife SAR issues on site and training on the mitigation measures to avoid or minimize potential adverse Project effects on Wildlife SAR and their habitats.
- Employees and contractors will be educated on waste management policies that limit human-avian interactions.
- Designated employees will be trained in appropriate avian deterrent techniques to minimize avian interactions with the Project.
- **Employees and contractors will be requested to report avian observations on site, injured or dead birds (which will be reported to SK MOE). Avian encounters and outcomes will be monitored, and logbooks will be used to record observations. Logbooks and reports will be available to employees.**

Wildlife and Habitat Protection

- Personal firearms will be prohibited for employees and contractors within the Project Area to prevent hunting activities.
- If any individual were seeking access around the Project area to undertake Aboriginal and/or Treaty Rights, Denison staff would facilitate this, provided it were safe to do so given activities in the area.
- Policies will be implemented prohibiting employees and contractors from feeding, approaching, or harassing avian species within the Project Area.
- To support habitat regeneration, progressive reclamation and ecosystem-based revegetation will be conducted on disturbed areas as soon as practicable in accordance with the Reclamation and Closure Plan.

Wildlife Deterrence and Prevention of Wildlife Entrapment

- **Buildings and other Project infrastructure will be designed and maintained to exclude birds (e.g., barn swallows) and bats as much as possible. This would include installing solid barriers (e.g., corner slope panels, wooden panels) or flexible barriers (e.g., netting, tarps or geotextiles) under roof eaves or other exterior surfaces.**
- **Physical, visual, and/or auditory deterrents will be used to discourage bird and bat use of buildings and other Project infrastructure (e.g., water or waste treatment ponds) for refuge, shelter, breeding, and roosting, and to deter birds and bats from potentially becoming entrapped.**
- **Noise emitting Project activities will be managed to minimize sensory disturbance of wildlife SAR species, especially during sensitive time periods (i.e., breeding and nesting).**
- Low sound emission equipment, regular maintenance of equipment, and the use of silencers or mufflers (whenever practical) will be used to reduce noise associated with Project activities, to the extent practical.
- **Directed lighting or light shielding, rather than broad lighting, will be implemented to minimize sensory disturbance on the wildlife SAR, and lighting will be focused on work sites and not surrounding areas.**

- Dust generation and subsequent deposition on vegetation and in waterbodies (including potential deposition of trace metals and radionuclides) will be limited through dust suppression techniques such as road watering and traffic management.

Road and Traffic Management

- Traffic and access control measures will be implemented will include reducing traffic volume by scheduling truck convoys, using high-volume haul trucks, and restricting public access to the Project site and roads (e.g., private vehicles, snowmobiles, all-terrain vehicles, and foot traffic). It is important to note that if any individual were seeking access around the Project area to undertake Aboriginal and / or Treaty Rights, Denison staff would facilitate this, provided it were safe to do so given activities in the area.
- Appropriate road signage will be installed (e.g., speed limits) along Project roads to raise awareness and minimize the potential for wildlife SAR-vehicle collisions.
- Wildlife will have the right-of-way on Project roads, unless it is unsafe to stop (i.e., if a collision is imminent). Vehicles will not be used to encourage wildlife to move off Project roads.
- Processes will be implemented for employees and contractors to slow down and/or stop vehicles/equipment to allow animals to move away or off the road before resuming normal road speeds for the area.
- Employees and contractors will report and communicate the location and circumstances of any roadkill observed on or alongside Project roads. Large-bodied wildlife carcasses found will be reported to SK MOE and disposed of as directed to discourage avian scavengers.
- **Vegetation management, such as mowing and brush cutting, will be implemented along Project roads to reduce site attractiveness for wildlife SAR and maintain appropriate sightlines for drivers to minimize wildlife-vehicle collisions.**
- Alternative measures on Project roads for de-icing and winter traction (e.g., sand, gravel) or dust suppression (e.g., water) will be implemented, whenever practicable.
- Appropriately sized gaps in the roadside snowbanks during winter will be maintained to facilitate wildlife crossing and escape thereby reducing the risk of wildlife-vehicle collisions.
- New Project site and access roads will be designed to minimize sightlines for predators, whenever practicable, while still maintaining general road safety.
- Ditches and culverts along Project roads will be designed and maintained to minimize pooling of water. Roadside pools that form may attract wildlife.

Waste and Hazardous Materials Management

- A "no littering policy" for employees and contractors will be implemented within the Project Area.
- **Vegetation management will be incorporated in the vicinity of waste ponds to discourage wildlife SAR use of potentially affected vegetation.**
- Waste will be collected and temporarily stored in wildlife-proof containers to avoid attracting scavengers and with that increase the risk for human-wildlife interact.
- The wildlife-proof containers will be inspected regularly for evidence of avian presence (e.g., gull species) or access to waste disposal facilities. If evidence of avian presence or

access to waste disposal facilities is detected, modified systems will be implemented and/or off-site waste disposal frequencies will be increased.

- The use of hazardous materials will be limited as much as possible.
- Hazardous materials will be handled, stored, and disposed of appropriately and in accordance with a Waste Management Plan to avoid attracting avian scavengers (e.g., wildlife-proof containers, exclusion fencing).
- Physical deterrents (e.g., fencing) will be employed around contaminated areas (e.g., waste ponds and waste pads), the domestic landfill, or hazardous materials storage areas to discourage wildlife use.
- Appropriate hazardous materials management practices will be implemented in accordance with industry guidelines and a Waste Management Plan to minimize the risk of accidental spills or leakage.
- Appropriate spill response kits will be positioned adjacent to areas where hazardous materials are stored in accordance with the Spill Response Plan.
- A minimum 100 m distance from any waterbody will be maintained for fuel storage, refueling activities, or equipment servicing in accordance with the Spill Response Plan.
- Appropriate fuel, chemical, and materials management practices will be followed in accordance with the Spill Response Plan to minimize the risk of accidental spills or leakage of diesel fuel, other hydrocarbons, and other hazardous materials.
- Air emissions will be reduced to the extent practical through implementation of an air quality monitoring plan within the EMS.
- All vehicles and equipment will be equipped with industry-standard emission control systems; unnecessary idling of vehicles will be prohibited.
- Vehicles and equipment will be maintained in good working condition (e.g., no leaks) and furnished with industry-standard spill response kits.
- Mitigation measures to reduce the potential for dispersion of radiological contaminants of potential concern to vegetation will be implemented in accordance with the Radiation Protection Plan.
- Education on and enforcement of proper waste and hazardous materials management practices will be provided to employees and contractors.

Species-Specific Mitigation Measures for Wildlife Species at Risk

The following provides a summary of the species-specific mitigation measures that will be implemented during Project activities. Mitigation measures specific to the Wildlife SAR that were not included or that were revised from what was described in the draft EIS are provided in **bold text**. These will be added to the final EIS.

Arthropod Species

- Mitigation measures designed for the Soil and Organic Matter / Peat (Section 9.1.5) and Vegetation and Ecosystems (Section 9.2.5) VCs are expected to mitigate adverse effects on the arthropod species that are considered SAR (i.e., nine-spotted lady beetle, transverse lady beetle, and yellow-banded bumble bee) primarily related to limiting the loss and/or disruption of suitable habitat for these species. These include:

- The Project Area (i.e., the area of maximum physical disturbance) has been reduced to the extent safely practicable resulting in reduced habitat disturbance and noise propagation.
- Much of the proposed Project Footprint will be developed within previously disturbed areas, including roads currently used for exploration activities, thereby minimizing additional habitat disturbance.
- During Operation, progressive reclamation will be completed where possible, and the progress and success of these activities will be assessed annually.
- **Herbicide use as part of vegetation management will be limited to the immediate Project Footprint and applied by licensed professional applicators, when necessary, to limit the potential for adverse effects on arthropod species.**

Amphibian Species

- Mitigation measures designed for the Wetlands VC (Section 9.2.5) are expected to mitigate adverse effects on the northern leopard frog primarily related to limiting the loss and/or disruption of suitable habitat for these species. These include:
 - The Project Area (i.e., the area of maximum physical disturbance) has been reduced to the extent safely practicable resulting in reduced habitat disturbance and noise propagation.
 - Much of the proposed Project Footprint will be developed within previously disturbed areas, including roads currently used for exploration activities, thereby minimizing additional habitat disturbance.
 - During Operation, progressive reclamation will be completed where possible, and the progress and success of these activities will be assessed annually.
- **Pre- disturbance wildlife clearance surveys will be conducted to identify site-specific habitat features (e.g., amphibian breeding ponds) and implement the setbacks and/or timing windows (that will be defined in the Wildlife Management Plan).**
- **Locations of site-specific habitat features used by amphibians will be communicated to Project personnel and the requirement to limit disturbance in these areas will be implemented.**
- **Appropriate setback and buffer distances from wetland features where amphibians are known to occur will be implemented and maintained under the direction of a wildlife QP.**
- **Vehicle traffic and construction activities will be restricted to the approved access routes and work areas and will not cross or enter a watercourse or wetland.**

Bat Species

- Vegetation clearing activities will occur outside of roosting periods, when practical.
- **Pre- disturbance wildlife clearance surveys will be completed to identify site-specific habitat features such as maternal roosting sites and hibernacula used by bat species. If features are identified in the Project Footprint, appropriate setbacks and/or timing windows will be implemented in accordance with the SARGSS (SK MOE 2017 (that will also be defined in the Wildlife Management Plan)).**

- In the event a maternal roosting site is identified on the Project Footprint, exclusionary methods (e.g., installing a one-way bat exit) will be implemented following the summer maternity roost season. This installation would allow for bats to leave but not the ability to re-enter the roosting site.
- Locations of these site-specific habitat features used by bats will be communicated to the appropriate Project personnel and the requirement to limit disturbance in these areas will be implemented.
- Specific exclusion methods will be added as mitigation measures (Section 9.4.5 of the final EIS) to prevent access to buildings and other infrastructure.

Avian Species

- Site clearing and other works that involve disturbance of vegetation and/or soil will be conducted outside of the nesting season, when practical. The breeding and nesting season for most avian species in Saskatchewan typically spans a period from March 15 to August 31; however, the dates differ for certain species.
- In the event Project activities such as vegetation clearing and/or soil disturbance are required during the breeding and nesting season, pre-disturbance wildlife clearance surveys will be conducted by a QP at that location within the Project Area before activities commence to identify the presence of avian SAR and/or their nests.
- Active and/or suspected breeding and roosting locations identified during the pre-disturbance wildlife clearance surveys will be protected with a no-disturbance setback buffer consistent with regulatory guidelines (e.g., the 2017 SARGSS [SK MOE 2017]) for other grebe species (as there is currently no activity restriction guidelines for horned grebe in Saskatchewan) in accordance with the level of the disturbance and species until the young have successfully fledged, the nest is confirmed as no longer active (e.g., abandoned or depredated), or the nesting window has passed (for suspected nest locations).
- Locations of nesting sites used by bank swallows, barn swallows, and horned grebe will be communicated to appropriate Project personnel and the requirement to limit disturbance in these areas will be implemented.
- Deterrents designed to discourage or prevent barn swallows from using buildings and other Project infrastructure have been described in Section 3.2.4 of the EIS.
- Buildings and other Project infrastructure will be designed and maintained to exclude birds (e.g., barn swallows) and bats as much as practical. This would include installing solid barriers (e.g., corner slope panels, wooden panels) or flexible barriers (e.g., netting, tarps or geotextiles) under roof eaves or other exterior surfaces.

Residual and Cumulative Effects Summary

The approach to assessing residual Project effects on wildlife VCs followed the methodology outlined in Section 5.8 of the EIS, which included a habitat-based approach. For each VC and associated KI, each residual effect was assessed in the context of the Project activities that will occur within each Project phase. Each residual effect was then characterized based on the combined predicted residual effect for all phases. See Sections 9.3.6 and 9.4.6 of the EIS for specific details regarding the residual effects assessment for wildlife VCs (i.e., residual effect characterization and significance determination). A summary of the environmental assessment considerations and determination for predicted residual effects for Wildlife SAR is provided in Table 0.1. Mitigation measures specific to the Wildlife SAR that were not included or that were revised from what was described in the draft EIS are provided in bold text. These will be added to the final EIS.

The cumulative effects assessment (CEA) followed standard methodology as per provincial (e.g., Guidelines for an Environmental Assessment under the [Saskatchewan] *Environmental Assessment Act* 1980) and federal (e.g., Assessing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act 2012*) guidance, and is discussed in detail in Section 5.9 of the EIS. Similar to the residual effects assessment, the CEA included a habitat-based approach. See Sections 9.3.7 and 9.4.7 of the EIS for specific details regarding the CEA for wildlife VCs. A summary of the significance determination of the cumulative effects on Wildlife SAR is provided in Table 0.2.

Table 0.1 Summary of the Environmental Assessment Considerations and Determination for Predicted Residual Effects for Wildlife Species At Risk

| Component | Wildlife SAR | Measurable Parameters | Project Activities Resulting in Primary Interactions | Project Phase | Species-Specific Mitigation Measures ¹ | Predicted Residual Effect | Significance |
|--------------------------------|--|--|--|---------------|---|--|---|
| Terrestrial Environment | Nine-spotted lady beetle Transverse lady beetle Yellow-banded bumble bee | Amount of habitat that is altered or lost relative to its availability in the Terrestrial Regional Study Area (RSA). | <ul style="list-style-type: none"> Development of access roads and air strip. Site preparation and earthworks; clearing, levelling, and grading of the Project Area. Waste management (composting, domestic and industrial landfill operation, recycling). Water management (including treatment). Surface water withdrawal. On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | Construction | <ul style="list-style-type: none"> The proposed mitigation measures outlined in the EIS, particularly those designed for the Valued Components (VCs) Soil and Organic Matter / Peat (Section 9.1.5) and Vegetation and Ecosystems (Section 9.2.5), adequately and appropriately address potential for adverse effects on these species, primarily related to limiting the loss and/or disruption of suitable habitat. These include the following: <ul style="list-style-type: none"> The Project Area (i.e., the area of maximum physical disturbance) has been reduced to the extent safely practicable resulting in reduced habitat disturbance and noise propagation. Much of the proposed Project Footprint will be developed within | Alteration and/or loss of habitat: predicted to be low magnitude, local geographical extent, long-term duration, frequent, and fully reversible. | Not Significant: the predicted residual effect of alteration and/or loss of habitat is not expected to alter the integrity of the habitat for the arthropod SAR within the Terrestrial RSA to the point where it is not sustainable or available to contribute to ecological functions. |
| | | | <ul style="list-style-type: none"> Water withdrawal from groundwater or surface water body. Management of surface water (including seepage and site runoff). Water release to groundwater and/or surface water body. On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | Operation | | | |

¹ Mitigation measures specific to the Wildlife SAR that were not included or that were revised from what was described in the draft EIS are provided in bold text.

| Component | Wildlife SAR | Measurable Parameters | Project Activities Resulting in Primary Interactions | Project Phase | Species-Specific Mitigation Measures ¹ | Predicted Residual Effect | Significance |
|-----------|--------------|---|--|-----------------|--|---|--|
| | | Mortalities directly or indirectly attributable to the Project. | <ul style="list-style-type: none"> Site water management, treatment, and release Process water treatment and release. Demolition and disposal of non-salvageable surface infrastructure and materials. On-site and off-site operation of vehicles and transport of materials. Reclamation of disturbed areas. | Decommissioning | <p>previously disturbed areas, including roads currently used for exploration activities, thereby minimizing additional habitat disturbance.</p> <ul style="list-style-type: none"> - During Operation, progressive reclamation will be completed where possible, and the progress and success of these activities will be assessed annually. | | |
| | | | <ul style="list-style-type: none"> Development of access roads and air strip. Site preparation and earthworks; clearing, levelling, and grading of the Project Area. On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | Construction | <ul style="list-style-type: none"> • Herbicide use as part of vegetation management will be limited to the immediate Project Footprint applied by licensed professional applicators when necessary to limit the potential for adverse effects on arthropod species. | Change in mortality: predicted to be low magnitude, local in geographical extent, long-term duration, infrequent, and fully reversible. | The predicted residual effect of change in mortality is not expected to alter the integrity of the regional populations of the arthropod SAR to the point where they are not sustainable or available to contribute to ecological functions. |
| | | | <ul style="list-style-type: none"> On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | Operation | | | |
| | | | <ul style="list-style-type: none"> Demolition and disposal of non-salvageable surface infrastructure and materials. On-site and off-site operation of vehicles and transport of materials. Reclamation of disturbed areas. | Decommissioning | | | |

| Component | Wildlife SAR | Measurable Parameters | Project Activities Resulting in Primary Interactions | Project Phase | Species-Specific Mitigation Measures ¹ | Predicted Residual Effect | Significance |
|-------------------------|-----------------------|--|--|-----------------|--|--|---|
| Terrestrial Environment | Northern leopard frog | Amount of habitat that is altered or lost relative to its availability in the Terrestrial RSA. | <ul style="list-style-type: none"> Development of access roads and air strip. Site preparation and earthworks; clearing, leveling and grading of the Project Area. Water management (including treatment and site runoff). Surface water withdrawal. On-site and off-site operation of vehicles and transport of materials. | Construction | <ul style="list-style-type: none"> The proposed mitigation measures outlined in the EIS, particularly those designed for the Wetlands VC (Section 9.2.5), adequately and appropriately address potential adverse effects on northern leopard frogs, primarily related to limiting the loss and/or disruption of suitable habitat for this species. These include the following: <ul style="list-style-type: none"> The Project Area (i.e., the area of maximum physical disturbance) has been reduced to the extent safely practicable resulting in reduced habitat disturbance and noise propagation. Much of the proposed Project Footprint will be developed within previously disturbed areas, including roads currently used for exploration activities, thereby minimizing | Alteration and/or loss of habitat: predicted to be low magnitude, local geographical extent, long-term duration, frequent, fully reversible. | Not Significant: the predicted residual effect of alteration and/or loss of habitat is not expected to alter the integrity of the habitat for northern leopard frog within the Terrestrial RSA to the point where it is not sustainable or available to contribute to ecological functions. |
| | | | <ul style="list-style-type: none"> Water withdrawal from groundwater or surface water body. Management of surface water (including seepage and site runoff). Water release to surface water body. On-site and off-site operation of vehicles and transport of materials. | Operation | | | |
| | | | <ul style="list-style-type: none"> Site water management, treatment, and release. Process water treatment and release. Demolition and disposal of non-salvageable surface infrastructure and materials. On-site and off-site operation of vehicles and transport of materials. Reclamation of disturbed areas. | Decommissioning | | | |

| Component | Wildlife SAR | Measurable Parameters | Project Activities Resulting in Primary Interactions | Project Phase | Species-Specific Mitigation Measures ¹ | Predicted Residual Effect | Significance |
|-----------|--------------|---|--|-----------------|---|---|---|
| | | Mortalities directly or indirectly attributable to the Project. | <ul style="list-style-type: none"> Development of access roads and air strip. Site preparation and earthworks; clearing, leveling and grading of the Project Area. On-site and off-site operation of vehicles and transport of materials. | Construction | <p>additional habitat disturbance.</p> <ul style="list-style-type: none"> - During Operation, progressive reclamation will be completed where possible, and the progress and success of these activities will be assessed annually. | Change in mortality: predicted to be low magnitude, local in geographical extent, long-term duration, infrequent, and fully reversible. | The predicted residual effect of change in mortality is not expected to alter the integrity of the regional populations of northern leopard frog to the point where they are not sustainable or available to contribute to ecological functions |
| | | | <ul style="list-style-type: none"> Water withdrawal from groundwater or surface water body. Management of surface water (including seepage and site runoff). Water release to surface water body. On-site and off-site operation of vehicles and transport of materials | Operation | <ul style="list-style-type: none"> • Pre- disturbance wildlife clearance surveys will be conducted to identify site-specific habitat features (e.g., amphibian breeding ponds) and implement the setbacks and/or timing windows (that will be defined in the Wildlife Management Plan). | | |
| | | | <ul style="list-style-type: none"> Site water management, treatment, and release. Demolition and disposal of non-salvageable surface infrastructure and materials. Reclamation of disturbed areas). On-site and off-site operation of vehicles and transport of materials. | Decommissioning | <ul style="list-style-type: none"> • Locations of site-specific habitat features used by amphibians will be communicated to Project personnel and the requirement to limit disturbance in these areas will be implemented. • Appropriate setback and buffer distances from wetland features where | | |

| Component | Wildlife SAR | Measurable Parameters | Project Activities Resulting in Primary Interactions | Project Phase | Species-Specific Mitigation Measures ¹ | Predicted Residual Effect | Significance |
|-------------------------|--|--|---|-----------------|--|--|---|
| | | | | | <p>amphibians are known to occur will be implemented and maintained under the direction of a wildlife QP.</p> <ul style="list-style-type: none"> Vehicle traffic and construction activities will be restricted to the approved access routes and work areas and will not cross or enter a watercourse or wetland. | | |
| Terrestrial Environment | Little brown myotis Northern myotis | Amount of habitat that is altered or lost relative to its availability in the Terrestrial RSA. | <ul style="list-style-type: none"> Development of access roads and air strip. Site preparation and earthworks; clearing, leveling and grading of the Project Area. On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | Construction | <ul style="list-style-type: none"> Vegetation clearing activities will occur outside of roosting periods, when practical. Pre- disturbance wildlife clearance surveys will be completed to identify site-specific habitat features such as maternal rooting sites and hibernacula used by bat species. If features are identified in the Project Footprint, appropriate setbacks and/or timing windows will be implemented in accordance with the SARGSS (SK MOE 2017 (that will also be defined in the Wildlife Management Plan). | Alteration and/or loss of habitat: predicted to be low magnitude, local geographical extent, long-term duration, frequent, fully reversible. | Not Significant: the predicted residual effect of alteration and/or loss of habitat is not expected to alter the integrity of the habitat for bat species within the Terrestrial RSA to the point where it is not sustainable or available to contribute to ecological functions. |
| | | | <ul style="list-style-type: none"> On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | Operation | | | |
| | | | <ul style="list-style-type: none"> Demolition and disposal of non-salvageable surface infrastructure and materials. On-site and off-site operation of vehicles and transport of materials. Reclamation of disturbed areas. | Decommissioning | | | |

| Component | Wildlife SAR | Measurable Parameters | Project Activities Resulting in Primary Interactions | Project Phase | Species-Specific Mitigation Measures ¹ | Predicted Residual Effect | Significance |
|--------------------------------|--------------|---|---|-----------------|---|---|---|
| | | Mortalities directly or indirectly attributable to the Project. | <ul style="list-style-type: none"> Development of access roads and air strip. Site preparation and earthworks; clearing, leveling and grading of the Project Area. On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | Construction | <ul style="list-style-type: none"> In the event a maternal roosting site is identified on the Project Footprint, exclusionary methods (e.g., installing a one-way bat exit) will be implemented following the summer maternity roost season. This installation would allow for bats to leave but not the ability to re-enter the roosting site. Locations of these site-specific habitat features used by bats will be communicated to appropriate Project personnel and the requirement to limit disturbance in these areas will be implemented. Specific exclusion methods will be added as mitigation measures (Section 9.4.5 of the final EIS) to prevent access to buildings and other infrastructure. | Change in mortality: predicted to be low magnitude, local in geographical extent, long-term duration, infrequent, and fully reversible. | The predicted residual effect of change in mortality is not expected to alter the integrity of the regional populations of the bat species to the point where they are not sustainable or available to contribute to ecological functions |
| | | | <ul style="list-style-type: none"> On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | Operation | | | |
| | | | <ul style="list-style-type: none"> Demolition and disposal of non-salvageable surface infrastructure and materials. On-site and off-site operation of vehicles and transport of materials. Reclamation of disturbed areas. | Decommissioning | | | |
| Terrestrial Environment | Bank Swallow | Amount of habitat that is altered or | <ul style="list-style-type: none"> Development of access roads and air strip. | Construction | <ul style="list-style-type: none"> Site clearing and other works that involve disturbance of | Alteration and/or loss of habitat: | Not Significant: the predicted residual |

| Component | Wildlife SAR | Measurable Parameters | Project Activities Resulting in Primary Interactions | Project Phase | Species-Specific Mitigation Measures ¹ | Predicted Residual Effect | Significance |
|-----------|---|---|--|-----------------|--|---|---|
| | Barn Swallow Common Nighthawk Horned Grebe Olive-sided Flycatcher Rusty Blackbird Short-eared Owl Yellow Rail | lost relative to its availability in the Terrestrial RSA. | <ul style="list-style-type: none"> Site preparation an earthworks; clearing, leveling and grading of the Project Area. Water management (including treatment and site runoff). Surface water withdrawal. On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | | vegetation and/or soil will be conducted outside of the nesting season, when practical. The breeding and nesting season for most avian species in Saskatchewan typically spans a period from March 15 to August 31; however, the dates differ for certain species. | predicted to be low magnitude, local geographical extent, long-term duration, frequent, fully reversible. | effect of alteration and/or loss of habitat is not expected to alter the integrity of the habitat for the avian SAR within the Terrestrial RSA to the point where it is not sustainable or available to contribute to ecological functions. |
| | | | <ul style="list-style-type: none"> Management of surface water (including seepage and site runoff). Water release to surface water body. On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | Operation | <ul style="list-style-type: none"> In the event Project activities such as vegetation clearing and/or soil disturbance are required during the breeding and nesting season, pre-disturbance wildlife clearance surveys will be conducted a by a QP at that location within the Project Area before activities commence to identify the presence of avian SAR and/or their nests. | | |
| | | | <ul style="list-style-type: none"> Site water management, treatment, and release. Process water treatment and release. Demolition and disposal of non-salvageable surface infrastructure and materials. On-site and off-site operation of vehicles and transport of materials. Reclamation of disturbed areas. | Decommissioning | <ul style="list-style-type: none"> Active and/or suspected breeding and roosting locations identified during the pre- disturbance wildlife clearance surveys will be protected with a no- | | |
| | | Mortalities directly or indirectly | <ul style="list-style-type: none"> Development of access roads and air strip. | Construction | | Change in mortality: | The predicted residual effect of |

| Component | Wildlife SAR | Measurable Parameters | Project Activities Resulting in Primary Interactions | Project Phase | Species-Specific Mitigation Measures ¹ | Predicted Residual Effect | Significance |
|-----------|--------------|------------------------------|--|-----------------|---|---|---|
| | | attributable to the Project. | <ul style="list-style-type: none"> Site preparation an earthworks; clearing, leveling and grading of the Project Area. On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | | <p>disturbance setback buffer consistent with regulatory guidelines (e.g., the 2017 SARGSS [SK MOE 2017]) for other grebe species (as there is currently no activity restriction guidelines for horned grebe in Saskatchewan) in accordance with the level of the disturbance and species until the young have successfully fledged, the nest is confirmed as no longer active (e.g., abandoned or depredated), or the nesting window has passed (for suspected nest locations).</p> <ul style="list-style-type: none"> Locations of nesting sites used by bank swallows, barn swallows, and horned grebe will be communicated to appropriate Project personnel and the requirement to limit disturbance in these areas will be implemented. Deterrents designed to discourage or prevent barn swallows from using | predicted to be low magnitude, regional in geographical extent, long-term duration, infrequent, and fully reversible. | change in mortality is not expected to alter the integrity of the regional populations of the avian SAR to the point where they are not sustainable or available to contribute to ecological functions. |
| | | | <ul style="list-style-type: none"> On-site and off-site operation of vehicles and transport of materials. Air transportation for workers. | Operation | | | |
| | | | <ul style="list-style-type: none"> Demolition and disposal of non-salvageable surface infrastructure and materials. On-site and off-site operation of vehicles and transport of materials. Reclamation of disturbed areas. | Decommissioning | | | |

| Component | Wildlife SAR | Measurable Parameters | Project Activities Resulting in Primary Interactions | Project Phase | Species-Specific Mitigation Measures ¹ | Predicted Residual Effect | Significance |
|-----------|--------------|-----------------------|--|---------------|--|---------------------------|--------------|
| | | | | | <p>buildings and other Project infrastructure have been previously described in Section 3.2.4 of the EIS.</p> <ul style="list-style-type: none">• Buildings and other Project infrastructure will be designed and maintained to exclude birds (e.g., barn swallows) and bats as much as practical. This would include installing solid barriers (e.g., corner slope panels, wooden panels) or flexible barriers (e.g., netting, tarps or geotextiles) under roof eaves or other exterior surfaces• Minimize height of salvaged soil stockpiles and avoid vertical slopes to deter bank swallows from creating nesting cavities. | | |

Table 0.2 Summary of Significance of the Cumulative Effects on Wildlife Species At Risk

| Component | Valued Component | Key Indicator | Cumulative Effects | Summary of Significance of the Cumulative Effects |
|-------------------------|--------------------------|--|------------------------------------|---|
| Terrestrial Environment | Wildlife Species at Risk | <ul style="list-style-type: none">Nine-spotted lady beetleTransverse lady beetleYellow-banded bumble beeNorthern leopard frogLittle brown myotisNorthern myotisBank SwallowBarn Swallow | Alteration and/or loss of habitat. | Not significant: The cumulative effect of alteration and/or loss of habitat is not expected to alter the integrity of the Wildlife Species at Risk habitat within the Terrestrial RSA to the point where it is not sustainable or available to contribute to ecological functions. |
| | | <ul style="list-style-type: none">Common NighthawkHorned GrebeOlive-sided FlycatcherRusty BlackbirdShort-eared OwlYellow Rail | Change in mortality. | Not significant: The cumulative effect of change in mortality is not expected to alter the integrity of the regional populations to the point where they are not sustainable or available to contribute to ecological functions. |

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Related information: Round 2 response – new EIS Appendix 9-F, Figure 2.9

Species At Risk – *Myotis* Species

The following information is intended to provide additional context to the responses provided in the IR tracking sheet for IR-174.

Acoustic bat surveys were completed between July 22 and 23, 2019 with 61 survey points sampled across five ecosite types. The location of the survey points, species detected, and frequency of detections are included in Figure 0-1.

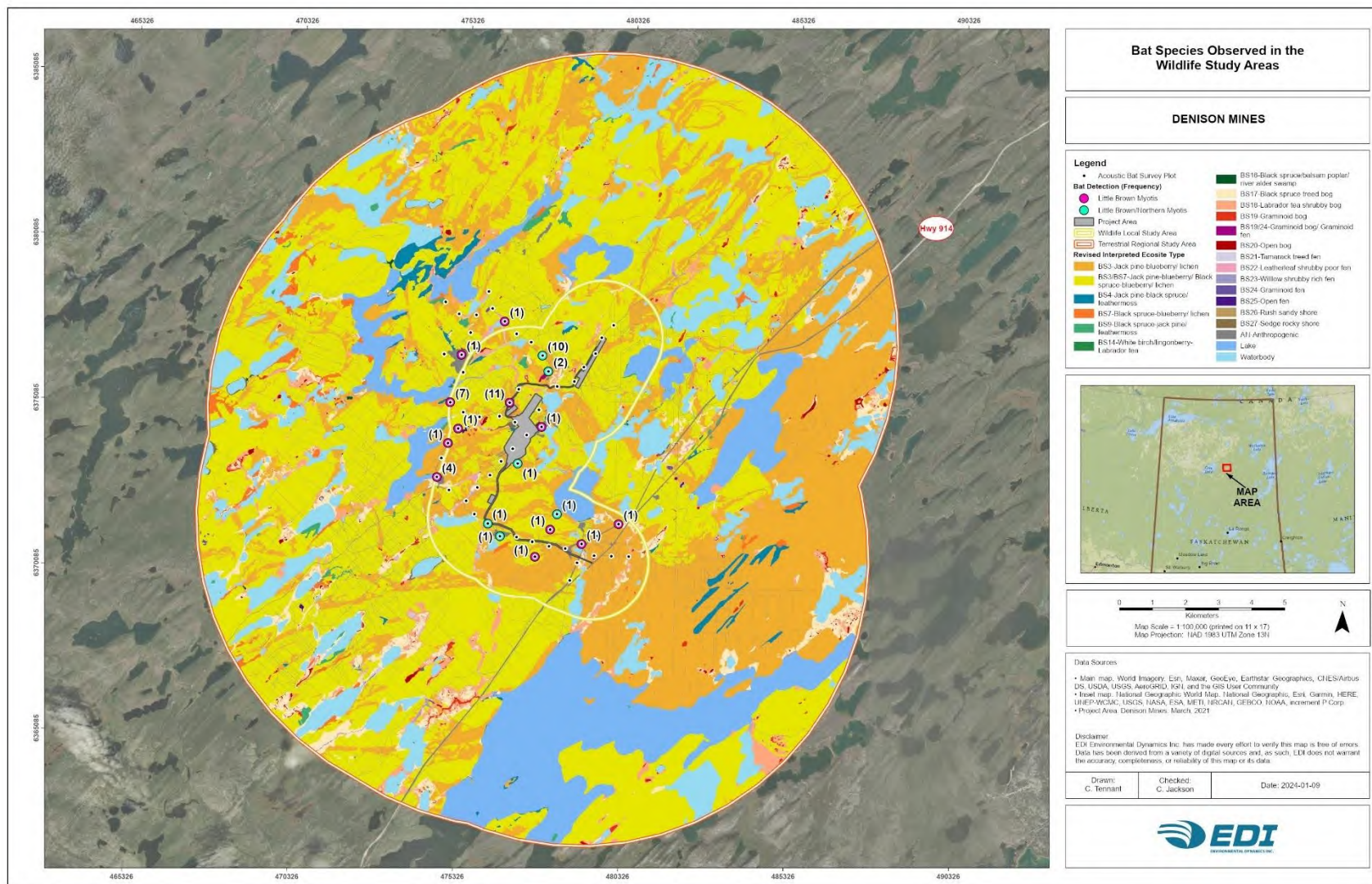


Figure 0-1: Bat Species Observed within the Wildlife Study Areas

IR-174, Round 3 Attachment:

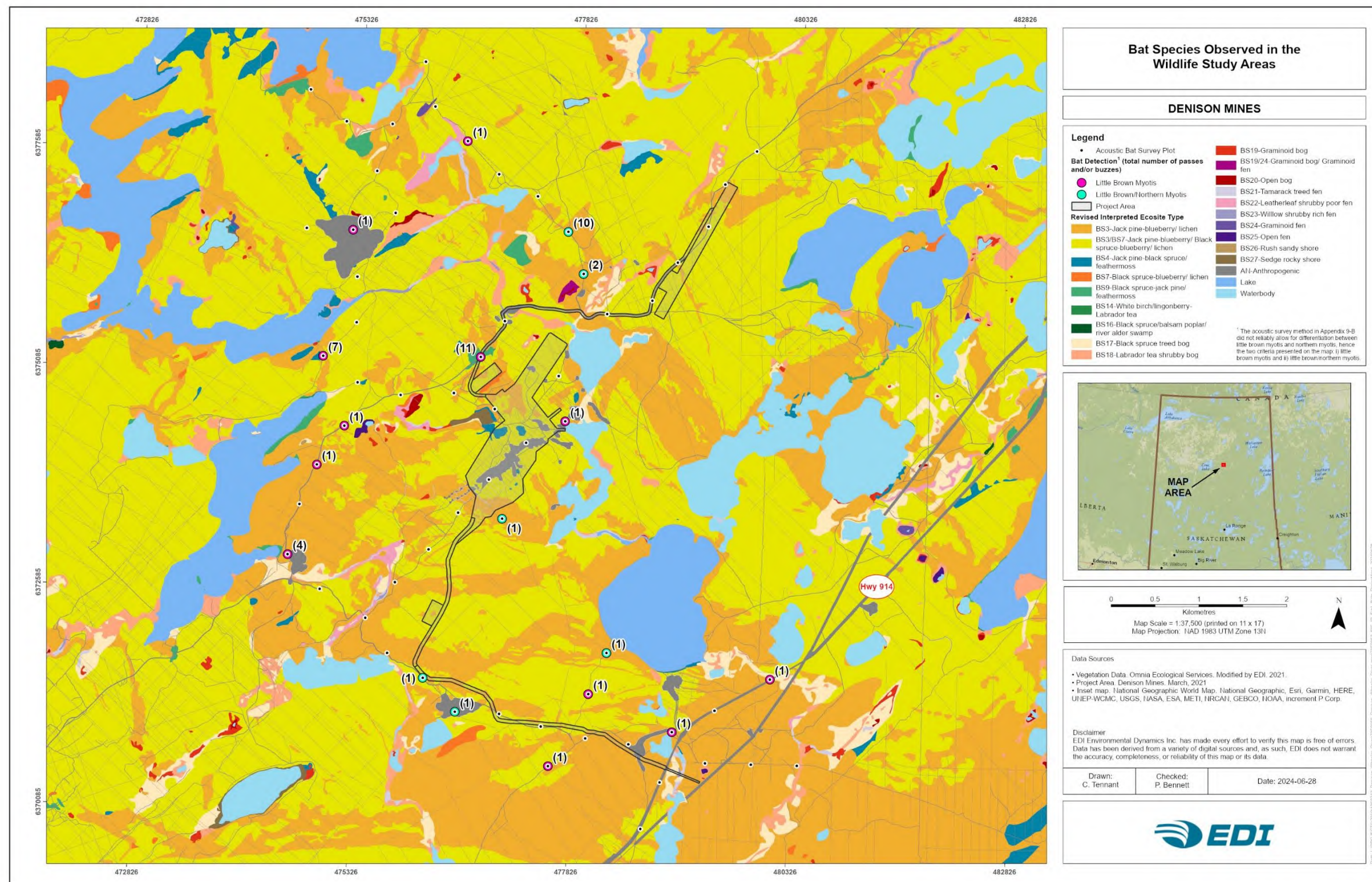


Figure IR-174 Round 3-1: Bat Species Observed within the Wildlife Study Areas

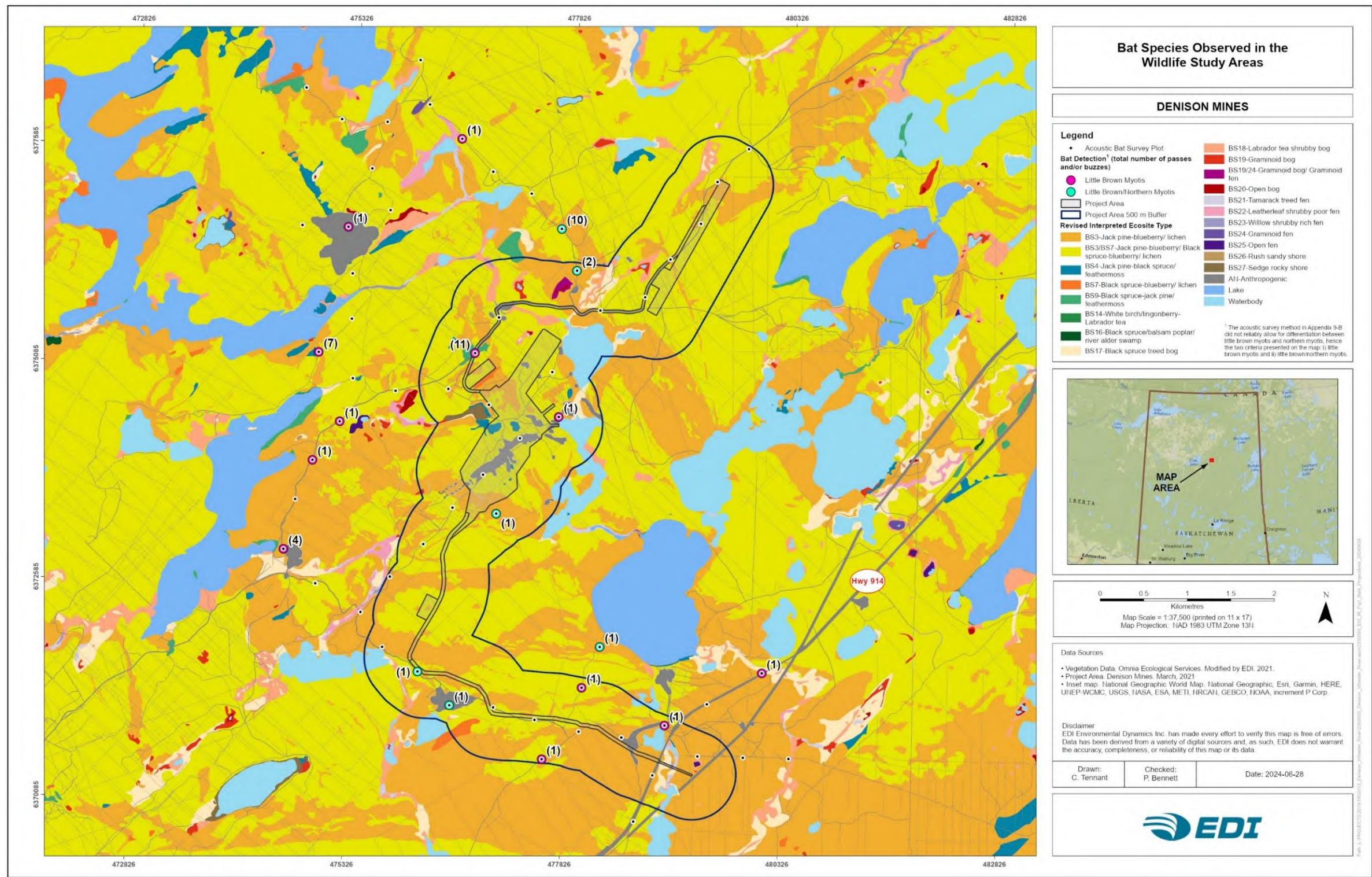


Figure IR-174 Round 3-2: Bat Species Observed within the Wildlife Study Areas (with 500m disturbance buffer shown)

Note: the above figure is provided as Figure 2-9 in Appendix 9-F of the final EIS

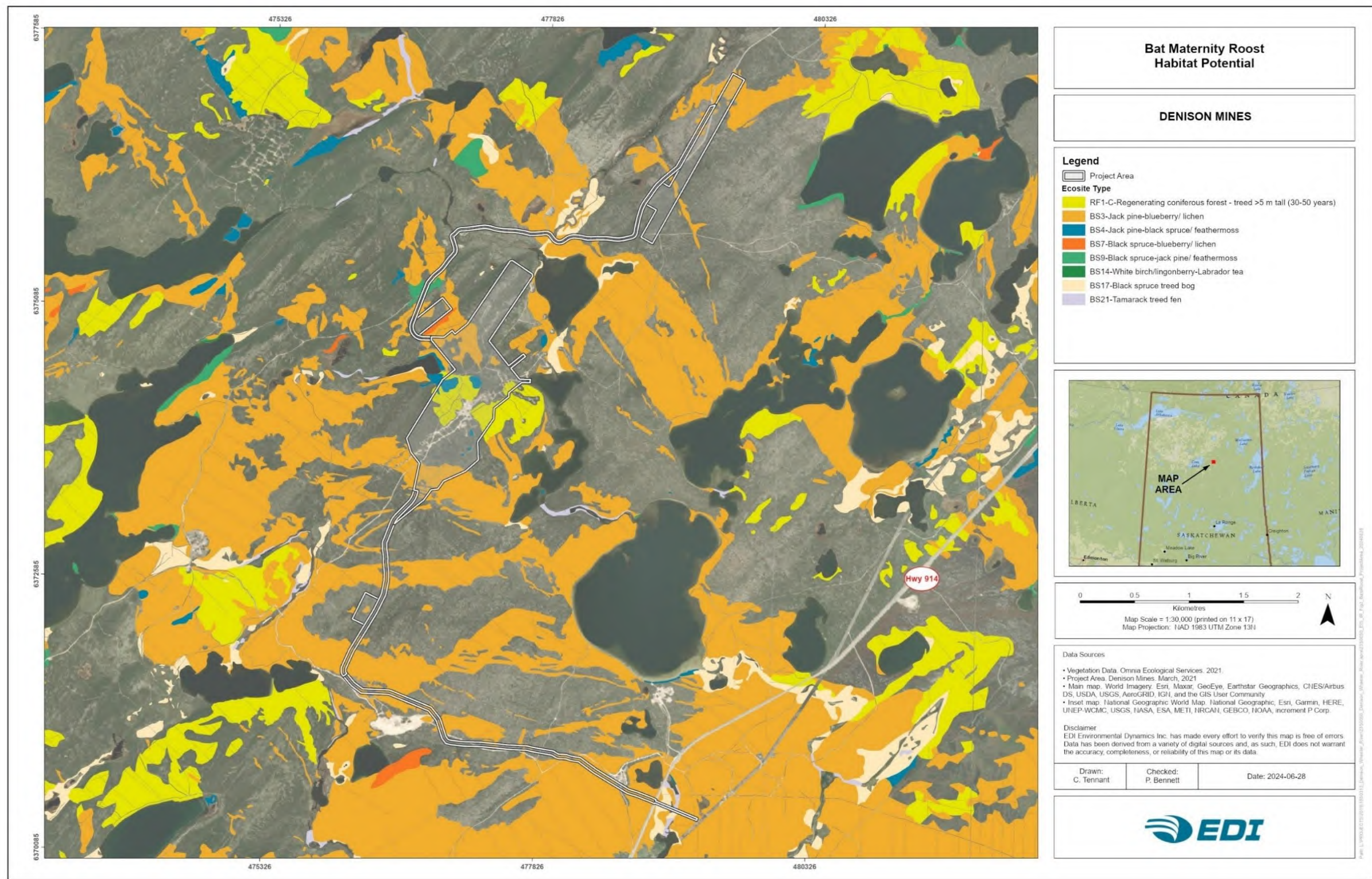


Figure IR-174 Round 3-3: Bat Maternity Roost Habitat Potential

Note: the above figure is provided as Figure 2-10 in Appendix 9-F of the final EIS

Table 8.2-13: Maximum Concentration of Surface Water Constituents of Potential Concern in Surface Water

| Constituent | Unit | Kratchkowsky Lake (LA-7) | Whitefish Lake North (LA-6) | Whitefish Lake Middle (LA-5 North) | Whitefish Lake South (LA-5 South) | McGowan Lake (LA-1) | Icelander River | Russell Lake Inlet | Screening Criteria | Source of Screening Concentration | Notes |
|---------------------------|------|--------------------------|-----------------------------|------------------------------------|-----------------------------------|---------------------|-----------------|--------------------|---------------------|-----------------------------------|-------|
| Alkalinity ⁽¹⁾ | mg/L | NE | NE | 12.4 | 12.4 | NE | NE | NE | -- | -- | |
| Aluminum | mg/L | 0.01766 | 0.01616 | 0.01835 | 0.02226 | 0.01500 | 0.01499 | 0.01614 | | MDMER Sched 5 | (5) |
| Ammonia (as N) | mg/L | 0.01463 | 0.01463 | 0.05232 | 0.05215 | 0.03978 | 0.0395 | 0.03368 | 5.74 | SEQG/CCME | (4) |
| Un-ionized Ammonia | mg/L | 0.01770 | 0.01770 | 0.06331 | 0.06310 | 0.04813 | 0.04780 | 0.04075 | 6.98 | SEQG/CCME | (4) |
| Arsenic | mg/L | 0.00012 | 0.00011 | 0.00015 | 0.00015 | 0.00013 | 0.00013 | 0.00012 | 0.005 | SEQG/CCME | |
| Cadmium | mg/L | 0.000024 | 0.000023 | 0.00004 | 0.000039 | 0.000033 | 0.000033 | 0.00003 | 0.0003 | SEQG/CCME* | |
| Chloride | mg/L | 0.32 | 0.32 | 6.14 | 6.11 | 4.2 | 4.16 | 3.26 | 120 | SEQG/CCME | (6) |
| Chromium | mg/L | 0.00053 | 0.0005 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0006 | 0.001 | SEQG/CCME | |
| Cobalt | mg/L | 0.000101 | 0.000101 | 0.000129 | 0.000128 | 0.000119 | 0.000119 | 0.000114 | 0.0003 | FEQG | (10) |
| Copper | mg/L | 0.00062 | 0.00062 | 0.00082 | 0.00082 | 0.00075 | 0.00075 | 0.00072 | 0.004 | SEQG/CCME* | |
| Iron | mg/L | 0.0467 | 0.0424 | 0.0470 | 0.0567 | 0.0400 | 0.0400 | 0.0425 | | MDMER Sched 5 | |
| Lead | mg/L | 0.000124 | 0.000114 | 0.000118 | 0.00013 | 0.000114 | 0.000114 | 0.000116 | 0.005 | CCME | (8) |
| Lead-210 | Bq/L | 0.0062 | 0.0057 | 0.0084 | 0.0083 | 0.0067 | 0.0067 | 0.0064 | 0.2 | HC | |
| Manganese | mg/L | 0.001674 | 0.001524 | 0.001722 | 0.001867 | 0.001593 | 0.001590 | 0.001593 | 0.64 | SEQG/CCME | (3) |
| Mercury | mg/L | 0.0000053 | 0.0000053 | 0.0000053 | 0.0000053 | 0.0000053 | 0.0000053 | 0.0000053 | 0.000026 | CCME | |
| Molybdenum | mg/L | 0.0001 | 0.0001 | 0.0243 | 0.024 | 0.0158 | 0.0156 | 0.0118 | 0.07 | WHO | (16) |
| Nickel | mg/L | 0.00039 | 0.00038 | 0.00051 | 0.0005 | 0.00046 | 0.00046 | 0.00044 | 0.07 | WHO | (16) |
| Nitrate ⁽¹⁾ | mg/L | NE | NE | 0.249 | 0.249 | NE | NE | NE | 3 | SEQG | |
| Phosphorus ⁽¹⁾ | mg/L | <0.01 | <0.01 | 0.01 | 0.01 | 0.01 | <0.01 | <0.01 | 0.02 - 0.035 | CCME | (17) |
| Polonium-210 | Bq/L | 0.0063 | 0.0058 | 0.0067 | 0.0072 | 0.0062 | 0.0062 | 0.0062 | 0.1 | HC | |
| Radium-226 | Bq/L | 0.0057 | 0.0056 | 0.0069 | 0.0067 | 0.0063 | 0.0063 | 0.0061 | 0.11 | SEQG | |
| Selenium | mg/L | 0.000034 | 0.00003 | 0.00043 | 0.00041 | 0.00026 | 0.00026 | 0.0002 | 0.001 | SEQG/CCME | |
| Sulphate | mg/L | 0.69 | 0.69 | 38.66 | 38.49 | 26.03 | 25.75 | 19.88 | 128 | BC MOE | (12) |
| Thallium | mg/L | 9.97E-05 | 9.96E-05 | 1.04E-04 | 1.04E-04 | 1.03E-04 | 1.03E-04 | 1.02E-04 | 0.0008 | SEQG/CCME | |
| Thorium-230 | Bq/L | 0.01014 | 0.01012 | 0.01868 | 0.01854 | 0.01569 | 0.01563 | 0.0143 | 0.6 | HC | |
| TSS | mg/L | 1.60 | 1.60 | 1.65 | 1.65 | 1.63 | 1.63 | 1.63 | background + 5 mg/L | CCME | |
| Un-ionized Ammonia | mg/L | 0.0000086 | 0.0000086 | 0.0000309 | 0.0000308 | 0.0000235 | 0.0000233 | 0.0000199 | 1 | MDMER Sched 4 | |
| Uranium | mg/L | 0.00003 | 0.00003 | 0.00057 | 0.00055 | 0.00034 | 0.00033 | 0.00025 | 0.02 | SEQG/CCME | |
| Vanadium | mg/L | 0.00017 | 0.00015 | 0.00067 | 0.00056 | 0.00033 | 0.00033 | 0.00027 | 0.12 | FEQG | (13) |
| Zinc | mg/L | 0.0007 | 0.00069 | 0.00106 | 0.00103 | 0.0009 | 0.0009 | 0.00084 | 0.007 | FEQG | (9) |

Notes

Notes

Estimates of mercury concentration are based on 50% of the detection limit in both background and effluent.

(1) Estimated from near-field model

NE = No estimate for this lake for this parameter

Saskatchewan Water Quality Objectives, SEQG on-line (<https://envrbrportal.crmf.saskatchewan.ca/seqg-search/>), SEQG for the protection of aquatic life were selected, based on total concentrations, a temperature of 15°C and a pH of 7.0.

Hardness dependent WQOs are for very soft water (hardness <25 mg CaCO₃/L). Site-specific hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6).

(4) Total ammonia-N calculated from the total ammonia guideline for a temperature of 15°C and a pH of 7.0, Un-ionized Ammonia from Table 1 of temperature and pH Canadian Water Quality Guidelines for the Protection of Aquatic Life - Ammonia (<https://ccme.ca/en/res/ammonia-en-canadian-water-quality-guidelines-for-the-protection-of-aquatic-life.pdf>)

(5) Based on a pH of >6.5.

(6) Based on water hardness >0 to <17 mg/L.

(7) Based on water hardness >0 to <82 mg/L.

(8) Based on water hardness >0 to ≤60 mg/L equation used at hardness of 5.26. At hardness >180 mg/L, the CWQG is 7 µg/L

(9) Guideline is based on dissolved zinc.

(10) Environment Canada 2017. Federal Environmental Quality Guidelines, Cobalt, May. Based on equation and site-specific baseline hardness of 15 mg/L.

(11) ECCC 2020. Federal Environmental Quality Guidelines Strontium. July.

(12) BC MECCS 2021. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture. https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf

(13) Environment Canada 2016. Federal Environmental Quality Guidelines, Vanadium. May.

(14) Health Canada 2020. Guidelines for Canadian Drinking Water Quality Summary Table. September. https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/water-eau/sum_guide-res_recom/summary-table-EN-2020-02-11.pdf

(15) BC MECCS 2020. Source Drinking Water Quality Guidelines, Guideline Summary Ministry of Environment & Climate Change Strategy Water Protection & Sustainability Branch .

(16) WHO 2017. Guidelines for Drinking Water Quality. Fourth Edition Incorporating The First Addendum.

(17) Framework - guideline for meso-eutrophic waterbody 20-35 µg/L

Attachment IR-114 (Round 3 submission)

Updated tables as requested by ECCC for the following:

- Table 8.2-8;
- Table 8.2-10;
- Table 8.2-13; and,
- Table 8.2-14.

Table Error! No text of specified style in document.-1: Summary of Background Water Quality Screening Criteria

| Parameter | Units | Short-term Screening Criteria (background hardness) | Short-term Screening Criteria (Hardness induced [>250 mg/L]) | Source | Note | Long-term Screening Criteria (background hardness) | Long-term Screening Criteria (Hardness induced [>250 mg/L]) | Source | Note |
|---|----------|---|--|------------------|----------|--|---|-----------|----------|
| General Chemistry, Nutrients and Anions | | | | | | | | | |
| Alkalinity | mg/L | -- | -- | -- | -- | -- | -- | -- | |
| Ammonia (as N) | mg/L | -- | -- | -- | -- | 5.74 | 5.74 | SEQG/CCME | (2) |
| Un-Ionized Ammonia | mg/L | -- | -- | -- | -- | 0.019 | 0.019 | SEQG/CCME | |
| Hardness | mg/L | -- | -- | -- | -- | -- | -- | -- | -- |
| Conductivity | µS/cm | -- | -- | -- | -- | -- | -- | -- | -- |
| Nitrate | mg/L | 550 | 550 | CCME | | 3 | 3 | SEQG | -- |
| pH | pH units | -- | -- | -- | -- | 6.5-9.0 | 6.5-9.0 | SEQG/CCME | -- |
| Phosphorus | mg/L | -- | -- | -- | -- | 0.004-0.01 | 0.004-0.01 | CCME | (10) |
| Sulphate | mg/L | -- | -- | -- | -- | 128 | 429 | BC MOE | |
| TDS | mg/L | -- | -- | -- | -- | 500 | 500 | SEQG | -- |
| Temperature | °C | -- | -- | -- | -- | ambient temp | ambient temp | -- | -- |
| TSS | mg/L | 15 | 15 | MDMER Schedule 4 | (11) | background + 5 mg/L | background + 5 mg/L | CCME | -- |
| Chloride | mg/L | 640 | 640 | SEQG/CCME | (4) | 120 | 120 | SEQG/CCME | |
| Metals | | | | | | | | | |
| Aluminum | mg/L | -- | -- | -- | -- | 0.1 | 0.1 | SEQG/CCME | (1) |
| Arsenic | mg/L | 0.1 | 0.1 | MDMER Schedule 4 | | 0.005 | 0.005 | SEQG/CCME | -- |
| Cadmium | mg/L | 0.00011 | 0.0053 | SEQG/CCME | (3) | 0.00004 | 0.00034 | SEQG/CCME | -- |
| Chromium | mg/L | -- | -- | -- | -- | 0.001 | 0.001 | SEQG/CCME | (5) |
| Cobalt | mg/L | -- | -- | -- | -- | 0.00078 | 0.00149 | FEQG | (15)(16) |
| Copper | mg/L | 0.0009 | 0.00004 | SEQG | (6) | 0.002 | 0.004 | CCME | (7) |
| Cyanide | mg/L | -- | -- | -- | -- | -- | -- | -- | -- |
| Iron | mg/L | -- | -- | -- | -- | 0.3 | 0.3 | SEQG/CCME | -- |
| Lead | mg/L | -- | -- | -- | -- | 0.001 | 0.007 | SEQG/CCME | |
| Manganese | mg/L | 0.501 | 15 | CCME | (8) | 0.21 | 0.64 | SEQG/CCME | (9) |
| Mercury | mg/L | -- | -- | -- | -- | 0.000026 | 0.000026 | CCME | -- |
| Molybdenum | mg/L | -- | -- | -- | -- | 0.073 | 0.073 | CCME | |
| Nickel | mg/L | -- | -- | -- | -- | 0.025 | 0.025 | CCME | |
| Selenium | mg/L | -- | -- | -- | -- | 0.001 | 0.001 | CCME | -- |
| Strontium | mg/L | -- | -- | -- | -- | 2.5 | 2.5 | FEQG | |
| Thallium | mg/L | -- | -- | -- | -- | 0.0008 | 0.0008 | SEQG/CCME | -- |
| Uranium | mg/L | 0.033 | 0.033 | CCME | | 0.015 | 0.015 | SEQG/CCME | -- |
| Vanadium | mg/L | -- | -- | -- | -- | 0.12 | 0.12 | FEQG | |
| Zinc | mg/L | 0.008 | 0.204 | CCME | (12)(13) | 0.013 | 0.058 | CCME | (14) |
| Radiological | | | | | | | | | |
| Lead-210 | Bq/L | -- | -- | -- | -- | 0.2 | 0.2 | HC | -- |
| Polonium-210 | Bq/L | -- | -- | -- | -- | 0.1 | 0.1 | HC | -- |
| Radium-226 | Bq/L | -- | -- | -- | -- | 0.11 | 0.11 | SEQG | -- |
| Thorium-230 | Bq/L | -- | -- | -- | -- | 0.6 | 0.6 | HC | -- |
| Uranium-238 | Bq/L | -- | -- | -- | -- | 3 | 3 | HC | -- |
| Uranium-234 | Bq/L | -- | -- | -- | -- | 3 | 3 | HC | -- |

Notes:

All parameters listed as total concentrations unless otherwise specified

Saskatchewan Water Quality Objectives, SEQG on-line (<https://envrbrportal.crm.p.saskatchewan.ca/seqg-search/>), SEQG for the protection of aquatic life were selected, based on total concentrations

Bold numbers indicate exceedance of long-term criteria

Bold and italicized indicate exceedance of short-term criteria and long-term criteria.

SEQG – Saskatchewan Environmental Quality Guidelines – Water Quality Guidelines for Freshwater Aquatic Life.

CWQG – Canadian Council of Ministers of the Environment – Canadian Water Quality Guidelines for the Protection of Aquatic Life.

SSWQO – Saskatchewan Surface Water Quality Objectives.

DOC – Dissolved organic carbon.

TDS – Total dissolved solids.

TKN – Total Kjeldahl Nitrogen.

TOC – Total organic carbon.

TSS – Total suspended solids.

Narrative – Temperature - Maximum Weekly Average Temperature: Thermal additions to receiving waters should be such that the maximum weekly average temperature is not exceeded. Short-term Exposure to Extreme Temperature: Thermal additions to receiving waters should be such that the short-term exposures to maximum temperatures are not exceeded. Exposures should not be so lengthy or frequent as to adversely affect the important species.

- * A pH of 7 and a temperature of 15°C were assumed to convert total ammonia to un-ionized ammonia in accordance with CCME (2002).
- (1) Long-term criterion for aluminum based on CCME/SEQG of 0.1 mg/L for dissolved aluminum when pH is greater than 6.5.

(2) Total ammonia-N calculated from the total ammonia guideline for an average annual temperature of 15°C and a pH of 7.0, Un-ionized Ammonia from Table 1 of temperature and pH, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Ammonia (<https://ccme.ca/en/res/ammonia-en-canadian-water-quality-guidelines-for-the-protection-of-aquatic-life.pdf>).

(3) Based on water hardness of >0 to <5.3 mg/L (Site-specific background hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6).

(4) Based on water hardness >0 to <17 mg/L.

(5) Guideline specific to Chromium VI for conservative comparison to baseline water quality

(6) Based on hardness of 5.26 mg/L (Short-term equation is (e^{(0.979123[ln(hardness)]-8.64497)})*1000 (SEQQ via AEP 1996b)

(7) Federal Water Quality Guideline for Copper Biotic Ligand Model (BLM) Tool and User Manual, (Site-specific background hardness is 5.26 mg/L, DOC is 2.24 mg/L, pH is 6.61 (95th percentile of LA-5 and LA-6)

(8) Short Term Guideline is based on dissolved manganese. Benchmark = exp(0.878[ln(hardness)] + 4.76) where the benchmark is expressed in dissolved manganese concentration (µg/L), and hardness is measured as CaCO3 equivalents in mg/L. (Site-specific hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6).

(9) Long-term guideline for manganese based on Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life - Manganese, Appendix B - Canadian Water Quality Guidelines Calculator (pH = 6.61, hardness = 5.26 mg/L.

(10) Framework provides Trigger Ranges for Total Phosphorus (µg/L) - guideline for oligotrophic waterbody 4 - 10 µg/L

(11) MDMER Schedule 4 - maximum authorized monthly mean concentration

(12) Guideline is based on dissolved zinc.

(13) Short term guideline is based on Benchmark = exp(0.833[ln(hardness mg·L-1)] + 0.240[ln(DOC mg·L-1)] + 0.526). (Site-specific background hardness is 5.26 mg/L, DOC is 2.24 mg/L, pH is 6.61 (95th percentile of LA-5 and LA-6). Note – extrapolated for value outside the hardness range.

(14) Long term guideline is based on CWQG = exp(0.947[ln(hardness mg·L-1)] - 0.815[pH] + 0.398[ln(DOC mg·L-1)] + 4.625). (Site-specific background hardness is 5.26 mg/L, DOC is 2.24 mg/L, pH is 6.61 (95th percentile of LA-5 and LA-6). Note – extrapolated for value outside the hardness range.

(15) Environment Canada 2017. Federal Environmental Quality Guidelines, Cobalt, May. Based on equation and lowest hardness for equation of 52 mg/L

(16) Environment Canada 2017. Federal Environmental Quality Guidelines, Cobalt. Based on equation and hardness of 250 mg/L for equation of FWQG = $\exp\{(0.414[\ln(\text{hardness})] - 1.887)\}$.

Table 8.2-10: Near-field Receiving Water Quality Results

| Parameter | Units | Short-term Screening Criteria (background hardness) | Short-term Screening Criteria (Hardness induced [>250 mg/L]) | Source | Note | Long-term Screening Criteria (background hardness) | Long-term Screening Criteria (Hardness induced [>250 mg/L]) | Source | Note | Discharge Concentration (max predicted) | LA-5 Well Mixed (7Q10) | LA-5 Well Mixed (Monthly Low) | LA-5 Well Mixed (Average) |
|---|----------|---|--|------------------|----------|--|---|-----------|----------|---|------------------------|-------------------------------|---------------------------|
| General Chemistry, Nutrients and Anions | | | | | | | | | | | | | |
| Alkalinity | mg/L | -- | -- | -- | -- | -- | -- | -- | | 12.4 | 12.4 | 12.4 | 12.4 |
| Ammonia (as N) | mg/L | -- | -- | -- | -- | 5.74 | 5.74 | SEQG/CCME | (2) | 3.9 | 0.13 | 0.11 | 0.1 |
| Un-Ionized Ammonia | mg/L | -- | -- | -- | -- | 0.019 | 0.019 | SEQG/CCME | | 0.0129 | 0.0004 | 0.0003 | 0.0003 |
| Hardness | mg/L | -- | -- | -- | -- | -- | -- | -- | -- | 250 | 9 | 8 | 7 |
| Conductivity | µS/cm | -- | -- | -- | -- | -- | -- | -- | -- | 21.7 | 21.7 | 21.7 | 21.7 |
| Nitrate | mg/L | 550 | 550 | CCME | | 3 | 3 | SEQG | -- | 0.249 | 0.249 | 0.249 | 0.249 |
| pH | pH units | -- | -- | -- | -- | 6.5-9.0 | 6.5-9.0 | SEQG/CCME | -- | 7 | 7 | 7 | 7 |
| Phosphorus | mg/L | -- | -- | -- | -- | 0.004-0.01 | 0.004-0.01 | CCME | (10) | 0.01 | 0.005 | 0.005 | 0.005 |
| Sulphate | mg/L | -- | -- | -- | -- | 128 | 429 | BC MOE | | 2600 | 43 | 26 | 19 |
| TDS | mg/L | -- | -- | -- | -- | 500 | 500 | SEQG | -- | 6420 | 131 | 90 | 74 |
| Temperature | °C | -- | -- | -- | -- | ambient temp | ambient temp | -- | -- | 16.5 | 15 | 15 | 15 |
| TSS | mg/L | 15 | 15 | MDMER Schedule 4 | (11) | background + 5 mg/L | background + 5 mg/L | CCME | -- | 6 | 4 | 4 | 4 |
| Chloride | mg/L | 640 | 640 | SEQG/CCME | (4) | 120 | 120 | SEQG/CCME | | 600 | 10 | 6 | 5 |
| Metals | | | | | | | | | | | | | |
| Aluminum | mg/L | -- | -- | -- | -- | 0.1 | 0.1 | SEQG/CCME | (1) | 0.051 | 0.01 | 0.01 | 0.01 |
| Arsenic | mg/L | 0.1 | 0.1 | MDMER Schedule 4 | | 0.005 | 0.005 | SEQG/CCME | -- | 0.006 | 0.0002 | 0.0002 | 0.0001 |
| Cadmium | mg/L | 0.00011 | 0.0053 | SEQG/CCME | (3) | 0.00004 | 0.00034 | SEQG/CCME | -- | 0.0018 | 0.00005 | 0.00004 | 0.00003 |
| Chromium | mg/L | -- | -- | -- | -- | 0.001 | 0.001 | SEQG/CCME | (5) | 0.025 | 0.001 | 0.001 | 0.001 |
| Cobalt | mg/L | -- | -- | -- | -- | 0.00078 | 0.00149 | FEQG | (15)(16) | 0.0027 | 0.000142 | 0.000125 | 0.000119 |
| Copper | mg/L | 0.0009 | 0.00004 | SEQG | (6) | 0.002 | 0.004 | CCME | (7) | 0.02 | 0.001 | 0.0004 | 0.0004 |
| Cyanide | mg/L | -- | -- | -- | -- | -- | -- | -- | -- | N/A | -- | -- | -- |
| Iron | mg/L | -- | -- | -- | -- | 0.3 | 0.3 | SEQG/CCME | -- | 0.0039 | 0.178 | 0.179 | 0.180 |
| Lead | mg/L | -- | -- | -- | -- | 0.001 | 0.007 | SEQG/CCME | | 0.0003 | 0.000 | 0.000 | 0.000 |
| Manganese | mg/L | 0.501 | 15 | CCME | (8) | 0.21 | 0.64 | SEQG/CCME | (9) | 0.03 | 0.020 | 0.020 | 0.020 |
| Mercury | mg/L | -- | -- | -- | -- | 0.000026 | 0.000026 | CCME | -- | 0.00001 | 0.000010 | 0.000010 | 0.000010 |
| Molybdenum | mg/L | -- | -- | -- | -- | 0.073 | 0.073 | CCME | | 2.5 | 0.04 | 0.02 | 0.02 |
| Nickel | mg/L | -- | -- | -- | -- | 0.025 | 0.025 | CCME | | 0.0138 | 0.0003 | 0.0002 | 0.0002 |
| Selenium | mg/L | -- | -- | -- | -- | 0.001 | 0.001 | CCME | -- | 0.042 | 0.001 | 0.001 | 0.000 |
| Strontium | mg/L | -- | -- | -- | -- | 2.5 | 2.5 | FEQG | | 1.68 | 0.04 | 0.03 | 0.03 |
| Thallium | mg/L | -- | -- | -- | -- | 0.0008 | 0.0008 | SEQG/CCME | -- | 0.0006 | 0.0002 | 0.0002 | 0.0002 |
| Uranium | mg/L | 0.033 | 0.033 | CCME | | 0.015 | 0.015 | SEQG/CCME | -- | 0.057 | 0.001 | 0.001 | 0.001 |
| Vanadium | mg/L | -- | -- | -- | -- | 0.12 | 0.12 | FEQG | | 0.059 | 0.0011 | 0.0007 | 0.00 |
| Zinc | mg/L | 0.008 | 0.204 | CCME | (12)(13) | 0.013 | 0.058 | CCME | (14) | 0.042 | 0.002 | 0.001 | 0.001 |
| Radiological | | | | | | | | | | | | | |
| Lead-210 | Bq/L | -- | -- | -- | -- | 0.2 | 0.2 | HC | -- | 0.42 | 0.026 | 0.024 | 0.023 |
| Polonium-210 | Bq/L | -- | -- | -- | -- | 0.1 | 0.1 | HC | -- | 0.15 | 0.007 | 0.006 | 0.006 |
| Radium-226 | Bq/L | -- | -- | -- | -- | 0.11 | 0.11 | SEQG | -- | 0.15 | 0.008 | 0.007 | 0.007 |
| Thorium-230 | Bq/L | -- | -- | -- | -- | 0.6 | 0.6 | HC | -- | 0.9 | 0.024 | 0.019 | 0.016 |
| Uranium-238 | Bq/L | -- | -- | -- | -- | 3 | 3 | HC | -- | 0.7 | 0.013 | 0.008 | 0.006 |
| Uranium-234 | Bq/L | -- | -- | -- | -- | 3 | 3 | HC | -- | 0.7 | 0.013 | 0.008 | 0.006 |

Notes:

All parameters listed as total concentrations unless otherwise specified

Saskatchewan Water Quality Objectives, SEQG on-line (<https://envrbrportal.crm.p.saskatchewan.ca/seqg-search/>), SEQG for the protection of aquatic life were selected, based on total concentrations

Bold numbers indicate exceedance of long-term criteria

Bold and italicized indicate exceedance of short-term criteria and long-term criteria.

SEQG – Saskatchewan Environmental Quality Guidelines – Water Quality Guidelines for Freshwater Aquatic Life.

CWQG – Canadian Council of Ministers of the Environment – Canadian Water Quality Guidelines for the Protection of Aquatic Life.

SSWQO – Saskatchewan Surface Water Quality Objectives.

DOC – Dissolved organic carbon.

TDS – Total dissolved solids.

TKN – Total Kjeldahl Nitrogen.

TOC – Total organic carbon.

TSS – Total suspended solids.

Narrative – Temperature - Maximum Weekly Average Temperature: Thermal additions to receiving waters should be such that the maximum weekly average temperature is not exceeded. Short-term Exposure to Extreme Temperature: Thermal additions to receiving waters should be such that the short-term exposures to maximum temperatures are not exceeded. Exposures should not be so lengthy or frequent as to adversely affect the important species.

* A pH of 7 and a temperature of 15°C were assumed to convert total ammonia to un-ionized ammonia in accordance with CCME (2002).

(1) Long-term criterion for aluminum based on CCME/SEQG of 0.1 mg/L for dissolved aluminum when pH is greater than 6.5.

(2) Total ammonia-N calculated from the total ammonia guideline for an average annual temperature of 15°C and a pH of 7.0, Un-ionized Ammonia from Table 1 of temperature and pH, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Ammonia (<https://ccme.ca/en/res/ammonia-en-canadian-water-quality-guidelines-for-the-protection-of-aquatic-life.pdf>).

(3) Based on water hardness of >0 to <5.3 mg/L (Site-specific background hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6).

(4) Based on water hardness >0 to <17 mg/L.

(5) Guideline specific to Chromium VI for conservative comparison to baseline water quality

(6) Based on hardness of 5.26 mg/L (Short-term equation is (e^{[0.979123[ln(hardness)]]-8.64497]})*1000 (SEGQ via AEP 1996b)

(7) Federal Water Quality Guideline for Copper Biotic Ligand Model (BLM) Tool and User Manual, (Site-specific background hardness is 5.26 mg/L, DOC is 2.24 mg/L, pH is 6.61 (95th percentile of LA-5 and LA-6)

(8) Short Term Guideline is based on dissolved manganese. Benchmark = exp(0.878[ln(hardness)] + 4.76) where the benchmark is expressed in dissolved manganese concentration (µg/L), and hardness is measured as CaCO3 equivalents in mg/L. (Site-specific hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6).

(9) Long-term guideline for manganese based on Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life - Manganese, Appendix B - Canadian Water Quality Guidelines Calculator (pH = 6.61, hardness = 5.26 mg/L.

(10) Framework provides Trigger Ranges for Total Phosphorus (µg/L) - guideline for oligotrophic waterbody 4 - 10 µg/L

(11) MDMER Schedule 4 - maximum authorized monthly mean concentration

(12) Guideline is based on dissolved zinc.

- (13) Short term guideline is based on Benchmark = $\exp(0.833[\ln(\text{hardness mg}\cdot\text{L}^{-1})] + 0.240[\ln(\text{DOC mg}\cdot\text{L}^{-1})] + 0.526)$. (Site-specific background hardness is 5.26 mg/L, DOC is 2.24 mg/L, pH is 6.61 (95th percentile of LA-5 and LA-6). Note – extrapolated for value outside the hardness range.
- (14) Long term guideline is based on CWQG = $\exp(0.947[\ln(\text{hardness mg}\cdot\text{L}^{-1})] - 0.815[\text{pH}] + 0.398[\ln(\text{DOC mg}\cdot\text{L}^{-1})] + 4.625)$. (Site-specific background hardness is 5.26 mg/L, DOC is 2.24 mg/L, pH is 6.61 (95th percentile of LA-5 and LA-6). Note – extrapolated for value outside the hardness range.
- (15) Environment Canada 2017. Federal Environmental Quality Guidelines, Cobalt, May. Based on equation and lowest hardness for equation of 52 mg/L
- (16) Environment Canada 2017. Federal Environmental Quality Guidelines, Cobalt. Based on equation and hardness of 250 mg/L for equation of FWQG = $\exp\{(0.414[\ln(\text{hardness})] - 1.887)\}$.

Table Error! No text of specified style in document.-2: Maximum Concentration of Surface Water Constituents of Potential Concern in Surface Water

| Constituent | Unit | Kratchkowsky Lake (LA-7) | Whitefish Lake North (LA-6) | Whitefish Lake Middle (LA-5 North) | Whitefish Lake South (LA-5 South) | McGowan Lake (LA-1) | Icelander River | Russell Lake Inlet | Short-term Benchmark | | | Long-term Benchmark | | |
|--------------------|------|--------------------------|-----------------------------|------------------------------------|-----------------------------------|---------------------|-----------------|--------------------|----------------------|------------------|----------|---------------------|-----------|-------|
| | | | | | | | | | Value | Reference | Notes | Value | Reference | Notes |
| Alkalinity | mg/L | NE | NE | 12.4 | 12.4 | NE | NE | NE | | | | | | |
| Aluminum | mg/L | 0.01766 | 0.01616 | 0.01835 | 0.02226 | 0.01500 | 0.01499 | 0.01614 | | | | 0.1 | SEQG/CCME | (1) |
| Ammonia (as N) | mg/L | 0.01463 | 0.01463 | 0.05232 | 0.05215 | 0.03978 | 0.0395 | 0.03368 | | | | 5.74 | SEQG/CCME | (2) |
| Un-ionized Ammonia | mg/L | 0.0000086 | 0.0000086 | 0.0000309 | 0.0000308 | 0.0000235 | 0.0000233 | 0.0000199 | | | | 0.019 | SEQG/CCME | |
| Arsenic | mg/L | 0.00012 | 0.00011 | 0.00015 | 0.00015 | 0.00013 | 0.00013 | 0.00012 | 0.1 | MDMER Schedule 4 | (11) | 0.005 | SEQG/CCME | |
| Cadmium | mg/L | 0.000024 | 0.000023 | 0.00004 | 0.000039 | 0.000033 | 0.000033 | 0.00003 | 29 | CCME | | 1.5 | SEQG/CCME | |
| Chloride | mg/L | 0.32 | 0.32 | 6.14 | 6.11 | 4.2 | 4.16 | 3.26 | 640 | SEQG/CCME | (3) | 0.00004 | SEQG/CCME | |
| Chromium | mg/L | 0.00053 | 0.0005 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0006 | | | | 0.001 | SEQG/CCME | (5) |
| Cobalt | mg/L | 0.000101 | 0.000101 | 0.000129 | 0.000128 | 0.000119 | 0.000119 | 0.000114 | | | | 0.00078 | FEQG | (15) |
| Copper | mg/L | 0.00062 | 0.00062 | 0.00082 | 0.00082 | 0.00075 | 0.00075 | 0.00072 | 0.0009 | SEQG | (6) | 0.002 | CCME | |
| Iron | mg/L | 0.0467 | 0.0424 | 0.0470 | 0.0567 | 0.0400 | 0.0400 | 0.0425 | | | | | | |
| Lead | mg/L | 0.000124 | 0.000114 | 0.000118 | 0.00013 | 0.000114 | 0.000114 | 0.000116 | | | | 0.001 | SEQG/CCME | |
| Lead-210 | Bq/L | 0.0062 | 0.0057 | 0.0084 | 0.0083 | 0.0067 | 0.0067 | 0.0064 | | | | | | |
| Manganese | mg/L | 0.001674 | 0.001524 | 0.001722 | 0.001867 | 0.001593 | 0.001590 | 0.001593 | 0.501 | CCME | (8) | 0.21 | SEQG/CCME | (9) |
| Mercury | mg/L | 0.0000053 | 0.0000053 | 0.0000053 | 0.0000053 | 0.0000053 | 0.0000053 | 0.0000053 | | | | 0.000026 | CCME | |
| Molybdenum | mg/L | 0.0001 | 0.0001 | 0.0243 | 0.024 | 0.0158 | 0.0156 | 0.0118 | | | | 0.07 | CCME | |
| Nickel | mg/L | 0.00039 | 0.00038 | 0.00051 | 0.0005 | 0.00046 | 0.00046 | 0.00044 | | | | 0.025 | CCME | |
| Nitrate | mg/L | NE | NE | 0.249 | 0.249 | NE | NE | NE | 550 | CCME | | 3 | SEQG | |
| Phosphorus | mg/L | <0.01 | <0.01 | 0.01 | 0.01 | 0.01 | <0.01 | <0.01 | | | | 0.004 - 0.01 | CCME | (10) |
| Polonium-210 | Bq/L | 0.0063 | 0.0058 | 0.0067 | 0.0072 | 0.0062 | 0.0062 | 0.0062 | | | | 0.1 | HC | |
| Radium-226 | Bq/L | 0.0057 | 0.0056 | 0.0069 | 0.0067 | 0.0063 | 0.0063 | 0.0061 | | | | 0.11 | SEQG | |
| Selenium | mg/L | 0.000034 | 0.00003 | 0.00043 | 0.00041 | 0.00026 | 0.00026 | 0.0002 | | | | 0.001 | CCME | |
| Sulphate | mg/L | 0.69 | 0.69 | 38.66 | 38.49 | 26.03 | 25.75 | 19.88 | | | | 128 | BC MOE | |
| Thallium | mg/L | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | | | | 0.0008 | SEQG/CCME | |
| Thorium-230 | Bq/L | 0.01014 | 0.01012 | 0.01868 | 0.01854 | 0.01569 | 0.01563 | 0.0143 | | | | 0.6 | HC | |
| TSS | mg/L | 1.60 | 1.60 | 1.65 | 1.65 | 1.63 | 1.63 | 1.63 | 15 | MDMER Schedule 4 | (11) | background +5 mg/L | CCME | |
| Uranium | mg/L | 0.00003 | 0.00003 | 0.00057 | 0.00055 | 0.00034 | 0.00033 | 0.00025 | 0.033 | CCME | | 0.015 | SEQG/CCME | |
| Uranium-234 | Bq/L | 0.000385 | 0.000377 | 0.00705 | 0.00672 | 0.00415 | 4.11E-03 | 3.09E-03 | | | | | | |
| Uranium-238 | Bq/L | 0.000385 | 0.000377 | 0.00705 | 0.00672 | 0.00415 | 4.11E-03 | 3.09E-03 | | | | | | |
| Vanadium | mg/L | 0.00017 | 0.00015 | 0.00067 | 0.00056 | 0.00033 | 0.00033 | 0.00027 | | | | 0.12 | FEQG | |
| Zinc | mg/L | 0.0007 | 0.00069 | 0.00106 | 0.00103 | 0.0009 | 0.0009 | 0.00084 | 0.008 | CCME | (12)(13) | 0.013 | CCME | (14) |

Notes:
All parameters listed as total concentrations unless otherwise specified
Saskatchewan Water Quality Objectives, SEQG on-line (<https://envrbrportal.crm.p.saskatchewan.ca/seqg-search/>), SEQG for the protection of aquatic life were selected, based on total concentrations
Bold numbers indicate exceedance of long-term criteria
Bold and italicized indicate exceedance of short-term criteria and long-term criteria.
SEQG – Saskatchewan Environmental Quality Guidelines – Water Quality Guidelines for Freshwater Aquatic Life.
CWQG – Canadian Council of Ministers of the Environment – Canadian Water Quality Guidelines for the Protection of Aquatic Life.
SSWQO – Saskatchewan Surface Water Quality Objectives.
DOC – Dissolved organic carbon.
TDS – Total dissolved solids.
TKN – Total Kjeldahl Nitrogen.
TOC – Total organic carbon.
TSS – Total suspended solids.
Narrative – Temperature - Maximum Weekly Average Temperature: Thermal additions to receiving waters should be such that the maximum weekly average temperature is not exceeded. Short-term Exposure to Extreme Temperature: Thermal additions to receiving waters should be such that the short-term exposures to maximum temperatures are not exceeded. Exposures should not be so lengthy or frequent as to adversely affect the important species.
* A pH of 7 and a temperature of 15°C were assumed to convert total ammonia to un-ionized ammonia in accordance with CCME (2002).
(1) Long-term criterion for aluminum based on CCME/SEQG of 0.1 mg/L for dissolved aluminum when pH is greater than 6.5.
(2) Total ammonia-N calculated from the total ammonia guideline for an average annual temperature of 15°C and a pH of 7.0, Un-ionized Ammonia from Table 1 of temperature and pH, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Ammonia (<https://ccme.ca/en/res/ammonia-en-canadian-water-quality-guidelines-for-the-protection-of-aquatic-life.pdf>).
(3) Based on water hardness of >0 to <5.3 mg/L (Site-specific background hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6).
(4) Based on water hardness >0 to <17 mg/L.
(5) Guideline specific to Chromium VI for conservative comparison to baseline water quality
(6) Based on hardness of 5.26 mg/L (Short-term equation is (e^{[0.979123[ln(hardness)]-8.64497]})*1000 (SEQG via AEP 1996b)
(7) Federal Water Quality Guideline for Copper Biotic Ligand Model (BLM) Tool and User Manual, (Site-specific background hardness is 5.26 mg/L, DOC is 2.24 mg/L, pH is 6.61 (95th percentile of LA-5 and LA-6)
(8) Short Term Guideline is based on dissolved manganese. Benchmark = exp(0.878[ln(hardness)] + 4.76) where the benchmark is expressed in dissolved manganese concentration (µg/L), and hardness is measured as CaCO3 equivalents in mg/L. (Site-specific hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6).
(9) Long-term guideline for manganese based on Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life - Manganese, Appendix B - Canadian Water Quality Guidelines Calculator (pH = 6.61, hardness = 5.26 mg/L.
(10) Framework provides Trigger Ranges for Total Phosphorus (µg/L) - guideline for oligotrophic waterbody 4 - 10 µg/L
(11) MDMER Schedule 4 - maximum authorized monthly mean concentration
(12) Guideline is based on dissolved zinc.
(13) Short term guideline is based on Benchmark = exp(0.833[ln(hardness mg·L-1)] + 0.240[ln(DOC mg·L-1)] + 0.526). (Site-specific background hardness is 5.26 mg/L, DOC is 2.24 mg/L, pH is 6.61 (95th percentile of LA-5 and LA-6). Note – extrapolated for value outside the hardness range.
(14) Long term guideline is based on CWQG = exp(0.947[ln(hardness mg·L-1)] - 0.815[pH] + 0.398[ln(DOC mg·L-1)] + 4.625). (Site-specific background hardness is 5.26 mg/L, DOC is 2.24 mg/L, pH is 6.61 (95th percentile of LA-5 and LA-6). Note – extrapolated for value outside the hardness range.
(15) Environment Canada 2017. Federal Environmental Quality Guidelines, Cobalt, May. Based on equation and lowest hardness for equation of 52 mg/L.

Table Error! No text of specified style in document.-3: Maximum Concentration of Surface Water Constituents of Potential Concern in Surface Water During Future Centuries

| Constituent | Unit | Kratchkowsky Lake (LA-7) | Whitefish Lake North (LA-6) | Whitefish Lake Middle (LA-5 North) | Whitefish Lake South (LA-5 South) | McGowan Lake (LA-1) | Icelander River | Russell Lake Inlet | Long-term Screening Concentration | Source of Screening Concentration | Notes |
|--------------------|------|--------------------------|-----------------------------|------------------------------------|-----------------------------------|---------------------|-----------------|--------------------|-----------------------------------|-----------------------------------|-------|
| Aluminum | mg/L | 0.01358 | 0.01358 | 0.01388 | 0.01373 | 0.0136 | 0.0136 | 0.01359 | 0.1 | SEQG/CCME | (1) |
| Ammonia (as N) | mg/L | 0.01463 | 0.01463 | 0.01463 | 0.01463 | 0.01463 | 0.01463 | 0.01463 | 5.74 | SEQG/CCME | (2) |
| Un-ionized Ammonia | mg/L | 0.000035 | 0.000035 | 0.000035 | 0.000035 | 0.000035 | 0.000035 | 0.000035 | 0.019 | CCME | |
| Arsenic | mg/L | 0.000103 | 0.000103 | 0.000107 | 0.000107 | 0.000105 | 0.000105 | 0.000104 | 0.005 | SEQG/CCME | |
| Cadmium | mg/L | 0.0000232 | 0.0000232 | 0.0000233 | 0.0000233 | 0.0000233 | 0.0000233 | 0.0000232 | 0.00004 | SEQG/CCME* | |
| Chloride | mg/L | 0.32 | 0.32 | 0.41 | 0.41 | 0.39 | 0.39 | 0.38 | 120 | SEQG/CCME | |
| Chromium | mg/L | 0.00052 | 0.00052 | 0.00053 | 0.00053 | 0.00052 | 0.00052 | 0.00052 | 0.001 | SEQG/CCME | |
| Cobalt | mg/L | 0.0001 | 0.0001 | 0.00011 | 0.00011 | 0.00011 | 0.0001 | 0.0001 | 0.00078 | FEQG | (15) |
| Copper | mg/L | 0.00062 | 0.00062 | 0.00063 | 0.00063 | 0.00062 | 0.00062 | 0.00062 | 0.002 | CCME | |
| Iron | mg/L | 0.12126 | 0.12126 | 0.12756 | 0.12672 | 0.12408 | 0.12405 | 0.12308 | 0.3 | SEQG/CCME | |
| Lead | mg/L | 0.00011 | 0.00011 | 0.00011 | 0.00011 | 0.00011 | 0.00011 | 0.00011 | 0.001 | SEQG/CCME | |
| Lead-210 | Bq/L | 0.00527 | 0.00527 | 0.00605 | 0.00592 | 0.00557 | 0.00556 | 0.00545 | 0.2 | HC | |
| Manganese | mg/L | 0.01206 | 0.01206 | 0.01419 | 0.01413 | 0.01355 | 0.01353 | 0.01317 | 0.21 | SEQG/CCME | (9) |
| Mercury | mg/L | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | 0.000026 | CCME | |
| Molybdenum | mg/L | 0.00011 | 0.00011 | 0.00012 | 0.00012 | 0.00011 | 0.00011 | 0.00011 | 0.07 | CCME | |
| Nickel | mg/L | 0.00038 | 0.00038 | 0.00041 | 0.00041 | 0.0004 | 0.0004 | 0.00039 | 0.025 | CCME | |
| Phosphorus | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.004 - 0.01 | CCME | |
| Polonium-210 | Bq/L | 0.00536 | 0.00536 | 0.00615 | 0.00602 | 0.00566 | 0.00564 | 0.00553 | 0.1 | HC | |
| Radium-226 | Bq/L | 0.00557 | 0.00557 | 0.00639 | 0.00637 | 0.00615 | 0.00614 | 0.006 | 0.11 | SEQG | |
| Selenium | mg/L | 0.00003 | 0.00003 | 0.00004 | 0.00004 | 0.00004 | 0.00004 | 0.00004 | 0.001 | SEQG/CCME | |
| Sulphate | mg/L | 0.69 | 0.69 | 0.72 | 0.72 | 0.71 | 0.71 | 0.71 | 128 | BC MOE | |
| Thallium | mg/L | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.0008 | SEQG/CCME | |
| Thorium-230 | Bq/L | 0.0101 | 0.0101 | 0.01036 | 0.01036 | 0.0103 | 0.0103 | 0.01025 | 0.6 | HC | |
| TSS | mg/L | 3.0 | 2.0 | 2.6 | 2.6 | 2.5 | 2.2 | 4.0 | background +5 mg/L | CCME | |
| Uranium | mg/L | 0.00003 | 0.00003 | 0.00004 | 0.00004 | 0.00003 | 0.00003 | 0.00003 | 0.02 | SEQG/CCME | |
| Vanadium | mg/L | 0.00015 | 0.00015 | 0.00015 | 0.00015 | 0.00015 | 0.00015 | 0.00015 | 0.12 | FEQG | |
| Zinc | mg/L | 0.00068 | 0.00068 | 0.00074 | 0.00074 | 0.00072 | 0.00072 | 0.00071 | 0.013 | CCME | (14) |

Notes:

All parameters listed as total concentrations unless otherwise specified

Saskatchewan Water Quality Objectives, SEQG on-line (<https://envrbrportal.crmp.saskatchewan.ca/seqg-search/>), SEQG for the protection of aquatic life were selected, based on total concentrations

Bold numbers indicate exceedance of long-term criteria

Bold and italicized indicate exceedance of short-term criteria and long-term criteria.

SEQG – Saskatchewan Environmental Quality Guidelines – Water Quality Guidelines for Freshwater Aquatic Life.

CWQG – Canadian Council of Ministers of the Environment – Canadian Water Quality Guidelines for the Protection of Aquatic Life.

SSWQO – Saskatchewan Surface Water Quality Objectives.

DOC – Dissolved organic carbon.

TDS – Total dissolved solids.

TKN – Total Kjeldahl Nitrogen.

TOC – Total organic carbon.

TSS – Total suspended solids.

Narrative – Temperature - Maximum Weekly Average Temperature: Thermal additions to receiving waters should be such that the maximum weekly average temperature is not exceeded. Short-term Exposure to Extreme Temperature: Thermal additions to receiving waters should be such that the short-term exposures to maximum temperatures are not exceeded. Exposures should not be so lengthy or frequent as to adversely affect the important species.

* A pH of 7 and a temperature of 15°C were assumed to convert total ammonia to un-ionized ammonia in accordance with CCME (2002).

(1) Long-term criterion for aluminum based on CCME/SEQG of 0.1 mg/L for dissolved aluminum when pH is greater than 6.5.

(2) Total ammonia-N calculated from the total ammonia guideline for an average annual temperature of 15°C and a pH of 7.0, Un-ionized Ammonia from Table 1 of temperature and pH, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Ammonia (<https://ccme.ca/en/res/ammonia-en-canadian-water-quality-guidelines-for-the-protection-of-aquatic-life.pdf>).

(3) Based on water hardness of >0 to <5.3 mg/L (Site-specific background hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6).

(4) Based on water hardness >0 to <17 mg/L.

(5) Guideline specific to Chromium VI for conservative comparison to baseline water quality

(6) Based on hardness of 5.26 mg/L (Short-term equation is (e^{(0.979123[ln(hardness)]-8.64497)})*1000 (SEGQ via AEP 1996b)

(7) Federal Water Quality Guideline for Copper Biotic Ligand Model (BLM) Tool and User Manual, (Site-specific background hardness is 5.26 mg/L, DOC is 2.24 mg/L, pH is 6.61 (95th percentile of LA-5 and LA-6)

(8) Short Term Guideline is based on dissolved manganese. Benchmark = exp(0.878[ln(hardness)] + 4.76) where the benchmark is expressed in dissolved manganese concentration (µg/L), and hardness is measured as CaCO3 equivalents in mg/L. (Site-specific hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6).

(9) Long-term guideline for manganese based on Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life - Manganese, Appendix B - Canadian Water Quality Guidelines Calculator (pH = 6.61, hardness = 5.26 mg/L.

(10) Framework provides Trigger Ranges for Total Phosphorus (µg/L) - guideline for oligotrophic waterbody 4 - 10 µg/L

(11) MDMER Schedule 4 - maximum authorized monthly mean concentration

(12) Guideline is based on dissolved zinc.

(13) Short term guideline is based on Benchmark = exp(0.833[ln(hardness mg-L-1)] + 0.240[ln(DOC mg-L-1)] + 0.526). (Site-specific background hardness is 5.26 mg/L, DOC is 2.24 mg/L, pH is 6.61 (95th percentile of LA-5 and LA-6). Note – extrapolated for value outside the hardness range.

(14) Long term guideline is based on CWQG = exp(0.947[ln(hardness mg-L-1)] - 0.815[pH] + 0.398[ln(DOC mg-L-1)] + 4.625). (Site-specific background hardness is 5.26 mg/L, DOC is 2.24 mg/L, pH is 6.61 (95th percentile of LA-5 and LA-6). Note – extrapolated for value outside the hardness range.

(15) Environment Canada 2017. Federal Environmental Quality Guidelines, Cobalt, May. Based on equation and lowest hardness for equation of 52 mg/L.

- Department: HC
- Project Effects Link: Change to an environmental component due to hazardous contaminants
- Reference to EIS, appendices, or supporting documentation: Appendix 10-A (ERA), Table 3-8 (p. 3.31) and Table 3-9 (p. 3.36), Appendix 6, Table 5 (p. 16)

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, July 4, 2024) |
|--------------|----------------|--|---|---|---|---|--|---|
| IR-190 | - | <p>NO2 criteria is not being consistently compared.</p> <p>Context: Provincial and federal air quality criteria/screening values for NO2 have been used inconsistently.</p> <p>Table 3-9 in Appendix 10-A (ERA) uses the 2015 Saskatchewan Ambient Air Quality Standards (SAAQS) value of 300 µg/m3 to compare the maximum concentrations of NO2 at receptor locations for the 1-hour average period, while Table 5 of Appendix 6 uses the 2025 Canadian Ambient Air Quality Standards (CAAQS) of 79µg/m3 for the same average period time.</p> <p>Rationale: By utilizing the SAAQS screening value for NO2, the maximum concentrations at receptor locations exceed the 1-hour threshold solely during the decommissioning stage (Table 3-9). However, if the 2025 CAAQS are applied, the screening values would be exceeded at receptor locations for all project phases. It is best practice to use the more protective air quality standards to evaluate potential human health risks associated with project activities.</p> | <p>1. Compare the predicted maximum concentrations to the most protective applicable air quality standards available. Alternatively, provide a rationale as to why the SAAQS for NO2 were used rather than the more protective 2025 CAAQS to determine potential exceedances and screen for the need for additional mitigation measures.</p> <p>Suggestions for mitigation and follow-up measures: Health Canada recommends use of the standards from the 2025 CAAQS for NO2 in future mitigation and follow-up plans.</p> | <p>The CAAQCs are applicable to measured ambient air concentrations over a three-year period and are not applicable to modelled results from a single facility. In technical meetings between Denison and ENV, the province agreed to the approach of utilizing 1-year of site-specific meteorological data. Use of the CAAQCs would require a three-year site specific data set. Denison agrees to using the 2025 CAAQCs for NO2 in future mitigation and follow-up plans.</p> | <p>This response has not been accepted, as the rationale for not applying the CAAQS in the assessment is not accurate. Health Canada acknowledges the commitment to use the 2025 CAAQS for NO2 in future mitigation and follow-up plans. However, the response to IR-190 did not compare the predicted maximum concentrations to the most protective applicable air quality standards available (i.e., CAAQS), and included the following rationale: The CAAQS are applicable to measured ambient air concentrations over a three-year period and are not applicable to modelled results from a single facility; and, Use of the CAAQCs would require a three-year site specific data set. The statement is incorrect. The CAAQS are national air quality standards, but they are not restricted to applications within the context of the Air Quality Management System (AQMS). The comparison with CAAQS may be considered in determining the nature and severity of the Project’s impact on air quality levels and the resulting mitigation measures that may be required to maintain good air quality levels or to prevent an exceedance of the CAAQS. The CAAQS are generally calculated for specific multi-year averages and for a particular statistical form so that extreme and unpredictable events do not drive risk management. However, if the data is not available for comparison to a full CAAQS timeframe, Health Canada suggests using model results for at least one calendar year to allow for a basic comparison with the CAAQS statistical form. The modelling results should be able to indicate the frequency of CAAQS exceedances, which can be used in the discussion as to whether any anticipated human health impacts are anticipated. Please see the Advice to the Proponent table for further discussion on the use of CAAQS (AD-69), which also notes that, while being more conservative than the NAAQO, Saskatchewan & Alberta’s screening value do not reflect the most recent science, which indicates that there is no apparent threshold for NO2, meaning that health effects may occur at any level of exposure. See also follow-up IR 190-R1.</p> | <p>1. Air quality monitoring for NO₂ is proposed as monthly collection using passive samplers, during all Project phases. The objective of the program is to demonstrate compliance with provincial and federal ambient air quality standards including the CAAQSSs. Monitoring data will also be compared against the modelled data provided in the EIS. Passive samplers will allow for direct comparison against the annual 2025 CAAQSSs. To compare against the 1-hour CAAQSSs Denison will use a commonly utilized averaging equation (such as the Ontario MECP averaging equation Air Dispersion Modelling Guideline for Ontario) to allow for conversion from the monitoring period to a 1-hour averaging period. Denison acknowledges that short-term peaks may not be captured through the passive</p> <p>2. See response to #1. Denison intends to use passive samplers for NO₂ monitoring.</p> <p>References:</p> <p>Ontario MECP. 2017. AIR DISPERSION MODELLING GUIDELINE FOR ONTARIO [GUIDELINE A-11] Version 3.0. Air Dispersion Modelling Guideline for Ontario.</p> | <p>The response to IR-190 acknowledges the predicted exceedances of the CAAQS for NO₂. However, the revised information does not appear to have been carried through to all the health risk assessment documents.</p> <p>HC notes that the new CAAQS for NO₂ also recognizes that there is no population health threshold for human health effects; therefore, any increase in exposure will result in an incremental population risk (Environment Canada and Health Canada, 2012; CCME, 2000). In other words, NO₂ is considered a non-threshold substance, meaning that health effects may occur at any level of exposure. Therefore, guideline values should not be construed as limits to which polluting up to is allowed.</p> <p>Please provide the following information:</p> <ol style="list-style-type: none">1. Present modelled concentrations at the nearest human receptor site (i.e., Risk 2 - seasonal resident at McGowan Lake) in Tables 3-9, 3-10 and 3-11).2. Correct/update Section 3.2.1.3.1: <i>Nitrogen Dioxide</i>, of Revised DRAFT EIS Appendix 10-A (February 2024), as follows:<ol style="list-style-type: none">a. Remove references to the 1970’s National Ambient Air Quality Objectives (NAAQOs) for NO₂. These objectives are no longer relevant and do not support the exclusion of NO₂ from further consideration as a COPC (Ref. AD-67);b. Acknowledge that modelled results exceed the 1-h NO₂ CAAQSSs at the <i>camp workers location</i> and <i>fence line</i> during all project phases; and,c. Consider NO₂ a COPC for further quantitative assessment and characterize the potential health risk related to 1-h exposure to NO₂.3. Characterize potential health risks from 1-h exposure to NO₂ using HC’s guidance. Alternatively, use the updated 2021 WHO Global Air Quality Guidelines for annual and 24-h NO₂ exposures when calculating hazard quotients.4. Discuss how the proposed mitigation measures to minimize residual effects of the Project on air quality, as identified in Section 16.1.1 of the Revised DRAFT EIS (January 2024), address the health risks identified in Chapter 10. Also specify whether any additional air quality monitoring and/or mitigation measures are proposed specifically to address human health risks. <p>Editorial Revisions</p> <ol style="list-style-type: none">1. Corrections are required for Table 3-11: <i>Summary of Air Quality Constituents that Exceed a Screening Value</i>, for NO₂ so that it remains consistent with the results presented in Tables 3-9 and Table 3-10 (i.e., 1-h exceedance at the <i>camp worker location</i> and <i>fence line</i> for all phases).2. Include the updated human risk receptor site names for Risk 2 and Risk 4 for consistency throughout the DRAFT EIS.<ol style="list-style-type: none">a. “Risk 2 - trapper” is now “Risk 2 - seasonal resident at McGowan Lake.”b. “Risk 4 - seasonal resident” is now “Risk 4 - seasonal resident at Russell Lake.” <p>World Health Organization (WHO), 2021. WHO global air quality guidelines. Particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. 273 p. Available online at: https://apps.who.int/iris/handle/10665/345329</p> | <p>1. See Attachment IR-190 below for the updated text in the ERA (Appendix 10-A) which includes the modelled concentrations at the nearest receptor locations and hazard quotients. There are no exceedances of the annual NO₂ CAAQS at any receptor location during any Project phase. There are exceedances of the 1-hr short term CAAQS at the on-site locations, but no exceedances at off-site human receptor locations.</p> <p>2.<ol style="list-style-type: none">a. The 1970’s National Ambient Air Quality Objectives (NAAQOs) for NO₂ has been removed from the ERA.b. Table 3-11 of the ERA (Appendix 10-A) has been updated to acknowledge exceedances of the 1-hr CAAQS at the camp worker and fenceline locations.c. NO2 has been considered further in a qualitative discussion in Section 3.2.1.3.1 of the ERA (Appendix 10-A). Additional text on conservative assumptions, planning measures, and monitoring requirements have been added. As well, a quantitative assessment using Hazard Quotients has been added. Denison and its SME are of the opinion that the manner by which NO₂ has been addressed in the revised ERA/EIS is the most appropriate path forward. The revision addresses the concern that has been raised by the FIRT comment and acknowledges the potential risk. The overall conclusions are unchanged in the ERA and EIS.</p> <p>3. Potential health risks from 1-hr NO2 have been considered in terms of hazard quotients in and updated Section 3.2.1.3.1 of the ERA (Appendix 10-A), which is reproduced below in Attachment IR-190. While the WHO guidelines have been reviewed, the guidelines are not considered applicable here as those guidelines are only available for 24 hour and annual averaging periods. There are no exceedances for the 24 hour and annual averaging periods using the existing air quality screening values.</p> <p>4. Text has been incorporated into Section 3.2.1.2.1 that discusses proposed mitigation measures, as it concerns NO2 emissions (see Attachment IR-190). As identified in IR-190-R1 NO₂ and reiterated in Section 3.2.1.2.1 (see Attachment IR-190), monitoring is planned during all Phases of the Project. Monitoring will include monthly collection using passive samplers and will follow an adaptive management process to identify if (and when) more frequent monitoring is needed. Further development of the details of the monitoring program is part of the site preparation and construction licensing documentation.</p> <p>Editorial Revisions</p> <ol style="list-style-type: none">1. Table 3-11 is updated as suggested, see Attachment IR-190 with the updates in track changes.2. The ERA identifies Risk 2 as the recreational fisher/hunter at McGown Lake, and Risk 4 as the seasonal resident at Russell Lake. Chapter 6 of the EIS (Table 6.2-3 identifies Risk 2 as the same location as the recreational fisher/hunter and Risk 4 in the same way. No change required. |
| IR-190 | IR-190-R1 | <p>Limitations with the proposed use of passive NO₂ monitoring would not allow comparison of measurement results to the 2025 CAAQS for 1-hour NO₂.</p> <p>Context: In response to IR-190, there was agreement to using the 2025 CAAQS for NO₂ in future mitigation and follow-up plans, which Health Canada supports. However, the proposed air quality monitoring and follow-up plans (Chapter 6.1.8) anticipate continued use passive NO₂ samplers, which do not measure hourly (1-hour) concentrations.</p> <p>Section 6.1.3.2.2 indicates that the assessment makes use of passive samplers to measure NO₂ at two sampling locations. The results from those samplers are presented in tables 6.1-8 and 6.1-9, for a</p> | n/a | n/a | <p>1. Provide additional details on proposed air quality monitoring for NO2 that will allow for comparisons to both the 1-hour and annual 2025 CAAQS and how that will be used to support mitigation and follow-up plans. Distinguish between comparisons with measured and modelled monitoring data, as well as use of passive and active samplers.</p> <p>2. If multiple approaches will be used to monitor NO2 (e.g., use of passive and/or active samplers, modifications due to differences between project phases, etc.), describe their intended contribution to the monitoring objectives and outcomes (e.g.,</p> | <p>1. Air quality monitoring for NO₂ is proposed as monthly collection using passive samplers, during all Project phases. The objective of the program is to demonstrate compliance with provincial and federal ambient air quality standards including the CAAQSSs. Monitoring data will also be compared against the modelled data provided in the EIS. Passive samplers will allow for direct comparison against the annual 2025 CAAQSSs. To compare against the 1-hour CAAQSSs Denison will use a commonly utilized averaging equation (such as the Ontario MECP averaging equation Air Dispersion Modelling Guideline for Ontario) to allow for conversion from the monitoring period to a 1-hour averaging period. Denison acknowledges that short-term peaks may not be captured through the passive</p> | <p><i>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> <p>Please provide the following information:</p> <ol style="list-style-type: none">1. Clarify the conditions under which a switch from passive to continuous monitoring would be warranted (e.g., if the 30-d measured NO₂ concentration, after conversion to a 1-h concentration, approaches or exceeds the 1-h CAAQS value). | <p>Monitoring will include monthly collection using passive samplers and will follow an adaptive management process to identify if (and when) more frequent monitoring is needed. Further development of the details of the monitoring program is part of the site preparation and construction licensing documentation.</p> |

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, July 4, 2024) |
|--------------|----------------|--|--------------------------|---|---|---|----------------------------|--|
| | | <p>~30-day sampling period (i.e., a total concentrations for NO₂ in ambient air over ~30 days).</p> <p>While passive samplers provide measurement data for comparison to the annual 2025 CAAQS for NO₂, measurement data for the 1-hour NO₂ standard commonly requires use of an active sampler.</p> <p>Rationale: Health Canada encourages the monitoring of air contaminants when exceedances or near-exceedances of air quality criteria, standards and/or guidance values are predicted or reported, to:</p> <ul style="list-style-type: none">• determine the accuracy of predictions;• help verify whether standards are being met; and,• assist with implementing or modifying mitigation measures. | | | <p>determine the accuracy of predictions; assist with implementing or modifying mitigation measures).</p> | <p>sampling approach; however, Denison plans to first utilize passive sampling during site preparation and will consider based on an adaptive management process whether there is a need to switch to continuous monitoring.</p> <p>2. See response to #1. Denison intends to use passive samplers for NO₂ monitoring.</p> <p>References:</p> <p>Ontario MECP. 2017. AIR DISPERSION MODELLING GUIDELINE FOR ONTARIO [GUIDELINE A-11] Version 3.0. Air Dispersion Modelling Guideline for Ontario.</p> | | |

Attachment IR-190 (Round 3)

The text below is the updated text in the ERA in Appendix 10-A. The text is provided in “Track Change” for ease of review.

Section 3.2.1.3 Secondary Screening of Air Quality Constituents

Air quality constituents that exceeded a screening value were nitrogen dioxide, particulate matter (TSP, PM₁₀), and uranium (Table Error! No text of specified style in document.-1). These constituents were further evaluated to determine if they require additional quantitative assessment in the ERA.

Table Error! No text of specified style in document.-13-11: Summary of Air Quality Constituents that Exceed a Screening Value

| Constituent | Screening Criteria Exceeded | | Predicted Exceedances at Human/Ecological Locations | Hours/Days Exceeding at Human/Ecological Locations | Frequency of Exceedance at Human/Ecological Locations |
|-------------------------|-----------------------------|---------------|--|---|--|
| | Short-Term | Long-Term | | | |
| Nitrogen dioxide | 1-hour | none exceeded | <u>Construction:</u> exceedance of 1-hour screening value at the camp worker location and fenceline; no 24-hour or annual exceedances no exceedances <u>Operation:</u> exceedance of 1-hour screening value at the camp worker location and fenceline; no 24-hour or annual exceedances no exceedances <u>Decommissioning:</u> exceedance of 1-hour screening value at the camp worker location and fenceline; no 24-hour or annual exceedances | <u>Construction:</u> 1-hr: 296 hours (Camp) 28 hours (fenceline) n/a <u>Operation:</u> 1-hr: 402 hours (Camp) 28 hours (fenceline) n/a <u>Decommissioning:</u> 1-hr: 494 hours (Camp) 254 hours (fenceline) | <u>Construction:</u> 1-hr: 3.4% (Camp) 0.3% (fenceline) n/a <u>Operation:</u> n/a 1-hr: 4.6% (Camp) 0.3% (fenceline) <u>Decommissioning:</u> 1-hr: 5.6% (Camp) 0.2% (fenceline) |
| Particulate Matter: TSP | 24-hour | none exceeded | <u>Construction:</u> exceedance of 24-hour screening value at camp worker location and fenceline; no annual exceedances <u>Operation:</u> exceedance of 24-hour screening value at camp worker location and fenceline; no annual exceedances <u>Decommissioning:</u> exceedance of 24-hour screening value | <u>Construction:</u> 24-hr: 108 days (Camp), 104 days (fenceline) <u>Operation:</u> 24-hr: 8 days (Camp), 80 days (fenceline) <u>Decommissioning:</u> 24-hr: 6 days (Camp), 2 days (fenceline) | <u>Construction:</u> 24-hr: 30% (Camp), 29% (fenceline) <u>Operation:</u> 24-hr: 2.2% (Camp), 22% (fenceline) <u>Decommissioning:</u> 24-hr: 1.6% (Camp), 0.5% (fenceline) |

| Constituent | Screening Criteria Exceeded | | Predicted Exceedances at Human/Ecological Locations | Hours/Days Exceeding at Human/Ecological Locations | Frequency of Exceedance at Human/Ecological Locations |
|--------------------------------------|-----------------------------|-----------|---|--|--|
| | Short-Term | Long-Term | | | |
| | | | at camp worker location and fenceline; no annual exceedances | | |
| Particulate Matter: PM ₁₀ | 24-hour | n/a | <u>Construction:</u> exceedance of 24-hour screening value at camp worker location and fenceline <u>Operation:</u> exceedance of 24-hour screening value at camp worker location and fenceline <u>Decommissioning:</u> exceedance of 24-hour screening value at camp worker location | <u>Construction:</u> 24-hr: 78 days (Camp), 61 days (fenceline) <u>Operation:</u> 24-hr: 4 days (Camp), 42 days (fenceline) <u>Decommissioning:</u> 24-hr: 6 days | <u>Construction:</u> 24-hr: 21% (Camp), 17% (fenceline) <u>Operation:</u> 24-hr: 1.1% (Camp), 12% (fenceline) <u>Decommissioning:</u> 24-hr: 1.6% |
| Uranium | 24-hour | Annual | <u>Construction:</u> no exceedances <u>Operation:</u> exceedance of 24-hour screening value at the on-site ecological receptor location and camp worker location, also fenceline; annual exceedance at the on-site ecological location <u>Decommissioning:</u> no exceedances | <u>Construction:</u> n/a <u>Operation:</u> 24-hr: 8 days (Camp), 3 days (fenceline) <u>Decommissioning:</u> 24-hr: 5% | <u>Construction:</u> n/a <u>Operation:</u> 24-hr: 5% (Camp), 0.8% (fenceline) <u>Decommissioning:</u> n/a |

Section 3.2.1.3.1 Nitrogen Dioxide

Screening values were available for 1-hour, 24-hour, and annual averaging periods for nitrogen dioxide. The exceedances are summarized below, followed by a discussion of the critical effects upon which the screening values were based and an overall conclusion related to whether nitrogen dioxide was ultimately retained for further evaluation in the ERA.

Summary of Exceedances at Human/Ecological Locations

1-hour: Exceedances during all project phases; however, the maximum 1-hour NO₂ concentration is during the decommissioning phase. The camp worker location (Risk3) had a predicted max 1-hour NO₂ concentration during decommissioning of 355 µg/m³, which exceeds its screening value from the CAAQS of 79 µg/m³. Exceedances at the camp worker location were noted for a maximum of 5.60-2% of the year (decommissioning), which corresponds to 49421 hours out of 8,760 hours in a year. Exceedances were also noted for 1-hour NO₂ at the fenceline for 0.3% of the year (for approximately 28 hours per year during decommissioning), although concentrations here at the fenceline were lower than at the camp worker location.

There were no exceedances of the 24-hour or annual screening values at any human or ecological locations for any Project phase.

Health/Environmental Effect(s) for Short-term and Long-term Exposures

Long-term (annual): As noted, there are no predicted exceedances of annual screening values at any receptor location during all Project phases; therefore, no long-term effects are expected.

Short-term (1-hour, 24-hour): Health Canada published a national one-hour maximum acceptable level of 400 µg/m³ for NO₂ in ambient air using a risk assessment approach (Health Canada, 2016b). This value considers sensitive human populations. The screening value used in this assessment was 300 µg/m³ from Alberta, which is also based upon health effects. There are no predicted exceedances of 24-hr screening values at any receptor location during all Project phases; however, there are infrequent predicted exceedances of 1-hr NO₂ at the camp worker location and the fenceline. There are no exceedances at other receptor locations.

To put the exceedances of NO₂ into context, hazard quotients (HQ) for all receptors have been calculated using the 1-hr and annual CAAQs as the toxicity reference values (see Table Error! No text of specified style in document.-2). HQs above 1 require further discussion. As shown in Table Error! No text of specified style in document.-2, HQs are below 1 for long-term NO₂ exposure at all receptor locations, and HQs exceed 1 for short-term 1-hr NO₂ exposure only for the on-site receptors (camp worker, on-site ecological location), and the fenceline receptor.

Potential ~~Ad~~verse health effects that are attributed to short-term exposures to ambient nitrogen dioxide include asthma exacerbations and possibly increased risk of cardiopulmonary effects, and to a lesser extent cardiovascular and respiratory mortality (Health Canada, 2016b). Individuals with certain pre-existing diseases such as asthma appear to be sensitive to exposure to ambient NO₂. Although it has been suggested that there may not be a threshold for the health effects of NO₂ even considering short-term (1-hour) exposures (CCME, 2020), at least some reviews (e.g. (Hesterberg TW et al., 2009) do not support this assertion and rather support a 1-hour threshold ~~of 400 µg/m³.~~ Hesterberg et al. (2009) completed a critical review of over 50 human clinical studies in which human volunteers (including sensitive sub-populations: the elderly, children, and asthmatics) were exposed to NO₂ at concentrations ranging from 0.1 to 3.5 ppm (equivalent to 188 to 6,580 µg/m³ [1 ppm = 1880 µg/m³] for periods of 30 minutes to 6 hours, often combined with exercise and co-pollutants. Their findings indicated that there is evidence of no-effect at low concentrations, and that a threshold of approximately 0.2 ppm (or 376 µg/m³) is supported. The maximum predicted concentration of 1-hour NO₂ was 355 µg/m³, which is slightly greater than Alberta's 1-hour screening value of 300 µg/m³ but is less than the concentration that may be associated with measurable health effects in sensitive populations (approximately 400 µg/m³) protective for short-term exposures in asthmatics per Hesterberg et al. (2009). If sensitive individuals are present at the camp worker location or the fenceline during periods when ambient NO₂ concentrations exceed the screening value, it is possible that they could experience minor irritation of the respiratory system. These effects would be reversible and would subside after exposure.

Additionally, as reported in Health Canada (2016b), both the WHO and US EPA concluded ~~Note as well~~ that healthy individuals do not experience any adverse effects at concentrations up to 1 ppm (or 1,880 µg/m³), and as such would not be affected by short-term exposures to NO₂ at the concentrations predicted for the Project.

~~Discussion and~~ Conclusion

Overall, the predicted exceedances of the 1-hour short-term screening value for nitrogen dioxide at the camp worker location (Risk3) and the fenceline would be limited to a small percentage of the time, and any health effects would be reversible and would subside after exposure. The elevated predicted NO₂ concentrations are based on the conservative assumption that backup diesel generators will be used continuously to supply power to support site activities; however, it is anticipated that power will be obtained from the provincial grid during the Project phases. The

~~backup diesel generators make up more than 85% of the NO₂ emission sources, with the remaining coming from vehicle/equipment combustion, propane heaters, and the ISR Plant stacks.~~

Other strategies to reduce NO₂ emissions will include planning vehicle and equipment routes to minimize travel distances and limit idling, and employing standard operating procedures for equipment and machinery use, completing regular inspections of equipment machinery to make sure it is in good working order.

Denison has committed to NO₂ monitoring during all Project phases. Monitoring will include monthly collection using passive samplers, and will follow an adaptive management process to identify if ~~(and when) more frequent monitoring would be needed.~~

~~Considering the above discussion, The maximum predicted concentration of NO₂ during decommissioning was expected to be 355 µg/m³, which is lower than the 400 µg/m³ associated with short-term health effects for sensitive subpopulations (asthmatic children). Therefore, NO₂ was not considered for further assessment in the ERA.~~

Table Error! No text of specified style in document.-2: Predicated 1-hr and Annual NO2 Concentrations at Receptor Locations during all Project Phases and Associated Hazard Quotients

| - | - | NO2 1 hr Air Concentration (µg/m3) | | | NO2 annual Air Concentration (µg/m3) | | |
|---|-------|------------------------------------|-----------|-----------------|--------------------------------------|-----------|-----------------|
| Location | Name | Construction | Operation | Decommissioning | Construction | Operation | Decommissioning |
| On-Site Ecological Location | Risk1 | 124.3 | 116.3 | 120.9 | 8.3 | 4.4 | 7.1 |
| Recreational Fisher/Trapper (LA1) - McGowan Lake | Risk2 | 43.0 | 40.2 | 41.6 | 4.7 | 4.0 | 4.6 |
| Camp Worker | Risk3 | 181.0 | 274.8 | 355.1 | 17.1 | 11.3 | 16.4 |
| Seasonal Resident (Russell Lake) | Risk4 | 22.9 | 24.0 | 22.7 | 4.0 | 3.8 | 4.0 |
| Reference Receptor (LA-7) | Risk5 | 40.2 | 43.2 | 39.0 | 4.2 | 3.9 | 4.2 |
| Fenceline | - | 176.5 | 177.7 | 177.7 | 6.8 | 4.4 | 6.6 |
| - | CAAQS | 79.0 | 79.0 | 79.0 | 23.0 | 23.0 | 23.0 |
| - | - | NO2 1 hr Hazard Quotient | | | NO2 annual Hazard Quotient | | |
| Location | Name | Construction | Operation | Decommissioning | Construction | Operation | Decommissioning |
| On-Site Ecological Location | Risk1 | 1.6 | 1.5 | 1.5 | 0.4 | 0.2 | 0.3 |
| Recreational Fisher/Trapper (LA1) - McGowan Lake | Risk2 | 0.5 | 0.5 | 0.5 | 0.2 | 0.2 | 0.2 |
| Camp Worker | Risk3 | 2.3 | 3.5 | 4.5 | 0.7 | 0.5 | 0.7 |
| Seasonal Resident (Russell Lake) | Risk4 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 |
| Reference Receptor (LA-7) | Risk5 | 0.5 | 0.5 | 0.5 | 0.2 | 0.2 | 0.2 |
| Fenceline | - | 2.2 | 2.2 | 2.2 | 0.3 | 0.2 | 0.3 |

Notes:

Bold and shaded values indicate exceedance of the CAAQS. Hazard quotients greater than 1 are bold and shaded.

Air concentrations are obtained from EIS Section 6, Appendix 6-A.

- Department: ECCC
- Project Effects Link: Change to an environmental component due to hazardous contaminants
- Reference to EIS, appendices, or supporting documentation: Appendix 10-A (ERA), Section 3.1.1.2, Section 8.2.4.2.3

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (Round 3, June 28, 2024) |
|--------------|----------------|--|---|--|---|---|---|---|
| IR-193 | - | <p>Context: Appendix 10-A (ERA) Table 3-1 ‘Screening of Effluent Quality against Surface Water Quality Guidelines for the Wheeler River ERA’ does not include acute water quality thresholds for all COPCs compared against predicted effluent quality. For example, it is stated that the final effluent quality discharge target for uranium is 0.057 mg/L. However, the CCME water short term (acute) water quality guidelines for the protection of aquatic life is 0.033 mg/L. The proposed effluent discharge target for uranium exceeds the acute water quality guidelines, indicating effluent may pose the risk of being acutely lethal to aquatic biota at end-of-pipe.</p> <p>All water quality thresholds should be derived from receiving environment parameters, and there are discrepancies between the values used in Appendix 10-A (ERA) Table 3-1 and the values presented in Tables 8.2-8 and 8.2-10 in Section 8.2.4.2.3 of the draft EIS. No selected screening value for TSS has been calculated from baseline conditions. Un-ionized ammonia, which is a regulated Schedule 4 substance under the MDMER, has not been included.</p> <p>Rationale: A review of all modelling results for all COPCs under the MDMER will assist ECCC in understanding the potential risks to the receiving environment.</p> | <p>1. Provide acute and chronic water quality thresholds for all required COPCs with monitoring required under the MDMER.</p> <p>2. Ensure all water quality thresholds are derived from receiving environment baseline parameters and that these thresholds are consistently applied throughout the draft EIS.</p> | <p>1. The application of acute water quality thresholds will be added to Section 8.2.4.2.3 and will be used to refine the effluent quality during the licensing phase (see the response to IR 114 for the updated mixing zone model results). The effluent presented in Table 8.2-9 is based on maximum effluent concentrations; however, Denison is committed to ensuring all effluent released will be below MDMER limits as well as short-term CCME guidelines for protection of aquatic life.</p> <p>2. Water quality thresholds have been applied appropriately in the draft EIS and fit for purpose. Water quality thresholds in Section 3.1.1.2 of the ERA (Appendix 10-A) were based on site-specific hardness of 5.26 mg/L (95th percentile of LA-5 and LA-6). This was to provide a conservative screening for COPCs to be carried forward for further quantitative assessment in the ERA. Water quality thresholds in Section 8.2.4.2.3 are based on Project induced hardness which is assumed to be 250 mg/L. This results in known discrepancies for some water quality parameters that are hardness induced such as cadmium, copper, zinc, and sulphate.</p> | <p>This response has not been accepted, as the Proponent has not included un-ionized ammonia, mercury and phosphorous in Table 3-1 in Appendix 10-A or provided acute and chronic water quality thresholds for all COPCs, including those with monitoring required under the MDMER, in Table 3-1 in Appendix 10-A (ERA). Water quality thresholds derived from receiving environment baseline parameters have not been consistently applied throughout the draft EIS. It is unclear from the current information provided if predicted effluent concentrations exceed acute water quality guidelines, indicating effluent may pose the risk of being acutely lethal to aquatic biota at end of pipe.</p> <p>The Proponent should:</p> <p>1. Update Table 3-1 in Appendix 10-A to include un-ionized ammonia, mercury and phosphorous. Update the risk assessment to incorporate these parameters as needed.</p> <p>2. Update Table 3-1 in Appendix 10-A and Tables 8.2-8 and 8.2-10 in Section 8.2.4.2.3 of the draft EIS to include both acute and chronic water quality thresholds derived from receiving environment baseline parameters and in accordance with IR- 114.</p> | <p>1.) The ERA in Appendix 10-A is focused on chronic long-term exposure due to routine effluent release during the Project Phases. As such the screening criteria used were chronic criteria. It is acknowledged that effluent quality will not be allowed to exceed acute guidelines. Acute guidelines are now provided in the updated Table 8.2-10 as presented in Attachment IR-114 and in the Final Draft EIS. This table (Table 8.2-10) also includes guidelines for unionized ammonia, phosphorous and mercury. Phosphorus will be present in the effluent at low levels and the near-field water quality model indicates that levels will remain well below criteria protective of aquatic life in the Whitefish Lake environment. Mercury is not identified as present in the effluent (see response to IR-100). No updates to Table 3-1 in Appendix 10-A are needed.</p> <p>2.) Tables 8.2-8 and 8.2-10 have been updated as requested. Please refer to Attachment IR-114 and Attachment IR-115 and Section 8.2.4.2.3 of the updated EIS. No updates to Table 3-1 in Appendix 10-A are needed. The guidelines were derived using baseline environmental conditions such as baseline hardness, DOC, pH, etc.</p> | <p>The previous round’s IR has not been fully met. When responding to item one, the Proponent did not update Table 3-1 in Appendix 10-A. And the rationale provided relates to Table 8.2-10, which is not part of the request. The Proponent should update Table 3-1 in Appendix 10-A to include un-ionized ammonia, mercury and phosphorous and should incorporate these parameters into the risk assessment as needed. The Proponent should also correct the following inconsistencies in Table 3-1 in Appendix 10-A:</p> <ul style="list-style-type: none">• Table footnote #11 refers to the strontium guideline; strontium is not included in the table and the footnote is also not referenced in the table,• Please refer to IR108 for comments on derivation of aluminum, chromium, copper, nickel, manganese and cobalt thresholds. <p>The Proponent responded to item two by modifying Tables 8.2-8 and 8.2-10 to include both acute and chronic water quality thresholds. The Proponent should update Table 3-1 in Appendix 10-A with the corrections flagged in comments IR-108 and IR-114 then update the risk assessment to incorporate these parameters and values as needed.</p> | <p>The ERA is focused on chronic effects, consistent with N288.6 Clause 7.4.3.4. “BVs for contaminants that are continually released should generally be defined based on chronic (long- term) exposure studies. However, there can be acute (short-term) situations of interest, such as boiler blowdown over a period of a few hours. For these situations, acute exposure BVs should be used. The risk assessor should justify the BVs selected, considering relevant exposure scenarios and timeframes.”</p> <p>The ERA in the final EIS will include a statement stating that “While the ERA focuses on chronic effects, it is acknowledged that Denison will not be allowed to release effluent above acute guidelines.” These acute guidelines are provided in Table 8.2-10 which is the appropriate place.</p> <ul style="list-style-type: none">• Footnote #11 for strontium will be removed.• Cobalt water quality guideline will be changed to 0.78 ug/L for lowest hardness of 52 mg/L• Chromium, nickel, and manganese are appropriate guidelines.• Un-ionized ammonia, mercury and phosphorous will be added to Table 3-1 <p>The updated Table 3-1 (with track changes shown) is provided below and will be included in the final EIS. Based on the changes made, there are no additional COPCs for the ERA.</p> |

Table Error! No text of specified style in document.-1: Screening of Effluent Quality against Surface Water Quality Guidelines for the Wheeler River ERA

| Constituent | Unit | Reasonable Upper Bound Effluent Quality | CCME Protection of Aquatic Life | | Federal Environmental Quality Guideline | | Saskatchewan Environmental Quality Guidelines (SEQG Online) (1) | | Other | | Drinking Water Guidelines | | | Selected Screening Value | Source | Is Effluent Quality Greater than Screening Value? |
|------------------------------------|------|---|---------------------------------|-------|---|-------|---|------|------------|-------|---------------------------|--------------|-------|--------------------------|---|---|
| | | | Long Term | Note | Long Term | Note | Long Term | Note | Long Term | Note | Health Canada (154) | Other Source | Note | | | |
| Total suspended solids | mg/L | 6.00E+00 | background + 5 mg/L | | | | | | | | | | | | | N/A |
| Aluminum | mg/L | 5.10E-02 | 1.00E-01 | (56) | | | 1.00E-01 | | | | 1.00E-01 | | | 1.00E-01 | SEQG/CCME | No |
| Arsenic | mg/L | 6.00E-03 | 5.00E-03 | | | | 5.00E-03 | | | | 1.00E-02 | | | 5.00E-03 | SEQG/CCME | Yes |
| Cadmium | mg/L | 1.80E-03 | 4.00E-05 | | | | 4.00E-05 | | | | 7.00E-03 | | | 4.00E-05 | SEQG/CCME | Yes |
| Chromium | mg/L | 2.50E-02 | 1.00E-03 | | | | 1.00E-03 | | | | 5.00E-02 | | | 1.00E-03 | SEQG/CCME | Yes |
| Cobalt | mg/L | 2.70E-03 | | | 0.00037.80E-04 | (110) | | | | | | 1.00E-03 | (165) | 7.802.95E-04 | FEQG | Yes |
| Copper | mg/L | 2.22E-02 | 2.00E-03 | (78) | 2.00E-04 | (12) | 2.00E-03 | (2) | | | 2.00E+00 | | | 2.00E-03 | SEQG/CCME (FEQG not selected as higher than background) | Yes |
| Iron | mg/L | 3.90E-03 | 3.00E-01 | | | | | | | | 3.00E-01 | | | 3.00E-01 | CCME | No |
| Lead | mg/L | 3.00E-04 | 1.00E-03 | (98) | | | 1.00E-03 | (2) | | | 5.00E-03 | | | 1.00E-03 | SEQG/CCME | No |
| Manganese | mg/L | 3.00E-02 | 2.60E-01 | (3) | | | | | | | 1.20E-01 | | | 1.20E-01 | Health Canada | No |
| Mercury | mg/L | 1.00E-05 | 2.60E-05 | - | - | - | 2.60E-05 | - | - | - | 1.00E-03 | - | - | 2.60E-05 | SEQG/CCME | No |
| Molybdenum | mg/L | 2.50E+00 | 7.30E-02 | - | - | - | 3.10E+01 | - | - | - | - | 7.00E-02 | (176) | 7.00E-02 3.10E+01 | WHO (drinking water) SEQG (eco) | Yes (human health) No (eco health) |
| Nickel | mg/L | 1.38E-02 | 2.50E-02 | (98) | - | - | 2.50E-02 | (2) | - | - | - | 7.00E-02 | (176) | 2.50E-02 | SEQG/CCME | No |
| Phosphorous | mg/L | 1.00E-02 | = | = | = | = | = | = | 0.004-0.01 | (18) | = | 1.00E-02 | (16) | 0.004-0.01 | Ontario PWQO | No |
| Selenium | mg/L | 4.19E-02 | 1.00E-03 | | | | 1.00E-03 | | | | 5.00E-02 | | | 1.00E-03 | SEQG/CCME | Yes |
| Thallium | mg/L | 6.00E-04 | 0.0008 | - | - | - | - | - | - | - | - | - | - | 0.0008 | CCME | No |
| Uranium | mg/L | 5.70E-02 | 1.50E-02 | - | - | - | 1.50E-02 | - | - | - | 2.00E-02 | - | - | 1.50E-02 | SEQG/CCME | Yes |
| Vanadium | mg/L | 5.90E-02 | - | - | 1.20E-01 | (143) | - | - | - | - | - | - | - | 1.20E-01 | FEQG | No |
| Zinc | mg/L | 4.20E-02 | 7.00E-03 | (109) | - | - | 3.00E-02 | - | - | - | 5.00E+00 | - | - | 7.00E-03 | CCME | Yes |
| Total Ammonia as nitrogen | mg/L | 3.90E+00 | 5.74E+00 | (4) | - | - | 5.74E+00 | (4) | - | - | none required | - | - | 5.74E+00 | SEQG/CCME | No |
| Un-ionized ammonia as nitrogen (5) | mg/L | 1.06E-02 | 1.56E-02 | = | = | = | 1.56E-02 | = | = | = | none required | = | = | 1.56E-02 | SEQG/CCME | No |
| Chloride | mg/L | 6.00E+02 | 1.20E+02 | (67) | - | - | 1.20E+02 | - | - | - | none required | - | - | 1.20E+02 | SEQG/CCME | Yes |
| Total dissolved solids | mg/L | 6.42E+03 | - | - | - | - | 5.00E+02 | - | - | - | 5.00E+02 | - | - | 5.00E+02 | SEQG | Yes (addressed in Section 10.2 of EIS) |
| Sulphate | mg/L | 3.92E+03 | - | - | - | - | - | - | 1.28E+02 | (132) | 5.00E+02 | - | - | 1.28E+02 | BC MOE | Yes |
| Radium-226 | Bq/L | 1.50E-01 | - | - | - | - | 0.11 | - | - | - | - | - | - | 0.11 | SEQG | Yes |
| Thorium-230 | Bq/L | 9.00E-01 | - | - | - | - | - | - | - | - | - | - | - | N/A | - | N/A |
| Lead-210 | Bq/L | 4.19E-01 | - | - | - | - | - | - | - | - | - | - | - | N/A | - | N/A |
| Polonium-210 | Bq/L | 1.50E-01 | - | - | - | - | - | - | - | - | - | - | - | N/A | - | N/A |
| Uranium-238 | Bq/L | 7.04E-01 | - | - | - | - | - | - | - | - | - | - | - | N/A | - | N/A |
| Uranium-234 | Bq/L | 7.04E-01 | - | - | - | - | - | - | - | - | - | - | - | N/A | - | N/A |

Notes:

(1) Saskatchewan Water Quality Objectives, SEQG on-line (<https://envbrportal.crmpp.saskatchewan.ca/seqg-search/>), SEQG for the protection of aquatic life were selected, based on total concentrations, a temperature of 15°C and a pH of 7.0.

(2) Hardness dependent WQOs are for very soft water (hardness <25 mg CaCO₃/L). Site-specific hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6).

(3) Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life - Manganese, Appendix B - Canadian Water Quality Guidelines Calculator (pH = 7.5, hardness = 15 mg/L). Guideline is based on dissolved manganese.

(4) Total ammonia-N calculated from the total ammonia guideline for a temperature of 15°C and a pH of 7.0.

(5) A pH of 7 and a temperature of 15°C were assumed to convert total ammonia to un-ionized ammonia in accordance with CCME (2002)

(56) Based on a pH of >6.5.

(67) Based on water hardness >0 to <17 mg/L.

(78) Based on water hardness >0 to <82 mg/L.

(89) Based on water hardness >0 to ≤60 mg/L.

(910) Guideline is based on dissolved zinc.

(+911) Environment Canada 2017. Federal Environmental Quality Guidelines, Cobalt, May. Based on equation and lowest site-specific baseline hardness for equation of ‡52 mg/L.

(12) The Biotic Ligand Model was used. The calculated HCS is below 0.2 µg/L, however, 0.2 µg/L is considered to be the lowest concentration routinely measured and therefore replaces the calculated HC5 value for this water chemistry.

(+14) ECCC 2020: Federal Environmental Quality Guidelines Strontium. July:

(+1213) BC MECCS 2021. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture. https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf

(+1314) Environment Canada 2016. Federal Environmental Quality Guidelines, Vanadium. May.

(+1415) Health Canada 2020. Guidelines for Canadian Drinking Water Quality Summary Table. September. https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/water-eau/sum_guide-res_recom/summary-table-EN-2020-02-11.pdf

(+1516) BC MECCS 2020. Source Drinking Water Quality Guidelines, Guideline Summary Ministry of Environment & Climate Change Strategy Water Protection & Sustainability Branch.

(+1617) WHO 2017. Guidelines for Drinking Water Quality. Fourth Edition Incorporating The First Addendum.

(18) Ontario Ministry of Environment and Energy: Water management: policies, guidelines, provincial water quality objectives (1994).

- Department: ECCC
- Project Effects Link: Aquatic species
- Reference to EIS, appendices, or supporting documentation : Appendix 10-A (ERA), Section 3.1.1.2 and Section 3.1.2.3

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, July 4, 2024) |
|--------------|----------------|---|---|--|--|--|--|--|
| IR-194 | - | <p>Context: In the ERA, COPCs should be selected for further assessment based upon the following factors:</p> <ol style="list-style-type: none">1. COPC concentrations in effluent that exceed selected water quality guidelines for the protection of aquatic biota, and2. Baseline COPC concentrations in the LSA that exceed selected surface water and sediment quality guidelines for the protection of aquatic biota. <p>However, only COPCs that had concentrations in effluent that exceeded guidelines were assessed further. Baseline concentrations of COPCs in sediment were not considered. In addition to this, not all COPCs that require monitoring under the MDMER had predicted effluent concentrations. From Section 8.2.3.3 Table 8.2-2 of the Aquatic Environment Report, it appears Aluminum in McGowan Lake and Whitefish Lake South and North, and pH in Whitefish Lake North exceed water quality guidelines. Predicted effluent concentrations or near-field surface water concentrations for Aluminum and pH are not provided.</p> <p>Rationale: It is not possible to determine if there is risk from effluent to the receiving environment and aquatic receptors based on the current information provided.</p> | <ol style="list-style-type: none">1. As noted in IR-114, provide the information on predicted effluent quality for COPCs with required monitoring under the MDMER.2. Provide the information on predicted maximum receiving environment surface water concentrations for COPCs with required monitoring under the MDMER in IR-114.3. Update the ERA to assess the risk of any additional MDMER COPC concentrations in effluent that exceed water quality guidelines.4. Update the ERA to assess the risk of COPCs that had elevated baseline water and sediment quality concentrations in the receiving environment. | <ol style="list-style-type: none">1. See response to IR-114 (Attachment IR-114 below). No revisions to Appendix 10-A, ERA are needed based on the response.2. See response to IR-114 for the predicted maximum receiving environment surface water concentrations for constituents regulated under Schedule 4 of MDMER. As indicated in Section 3.1.1 of the ERA in Appendix 10-A a long list of constituents was initially identified for consideration in the ERA based on they are known to be present in treated effluent, have existing water quality guidelines or were identified in MDMER (with the exception of cyanide). The focus of the MDMER constituents were those regulated under Schedule 4. Denison will monitor for all MDMER constituents with required monitoring in the environment. This will be included as part of Denison's Effluent and Emissions Plan to support licensing.3. As indicated in Section 3.1.1.1 of the ERA in Appendix 10-A the long list of constituents was reduced further based on potential for exceedance of a water quality guideline (for both protection of human health and aquatic life). Any MDMER constituent that was identified as exceeding a water quality guideline was considered a COPC and assessed further in the ERA (see Table 3-1 in the ERA). For example, effluent quality for arsenic, copper, and zinc which are all Schedule 4 constituent were identified as COPCs in the ERA based on exceeding a water quality guideline.4. The ERA followed the guidance in CSA N288.6-22 which does not require COPCs with elevated baseline concentrations to be considered COPCs for further quantitative assessment in the ERA. Clause 6.2.5.9 indicates that constituents with naturally elevated concentrations should be excluded from further consideration as a COPC. As indicated in Section 8.2.3.3 of the EIS constituents in baseline water quality that exceeded water quality guidelines included aluminum, and occasional exceedances for cadmium, iron, and lead. All of these constituents were considered in the ERA screening; however, were not identified for further assessment (other than cadmium) since based on a conservative screening of effluent quality water quality guidelines would not be exceeded. Section 8.4.3.2.3 of the EIS did not identify any constituents where baseline sediment quality exceeded sediment quality guidelines. Section 3.1.2.3 of the ERA in Appendix 10-A provides the predicted maximum sediment quality in Whitefish Lake for a list of constituents. These concentrations included background concentrations and are screened against sediment quality guidelines. The only constituents that exceed sediment quality guidelines are molybdenum and selenium; however, other COPCs are assessed further in the ERA (see Table 3-14 in the ERA in Appendix 10-A) even though sediment quality guidelines are not anticipated to be exceeded. | <p>This response has not been accepted, as the Proponent has not updated the ERA to assess elevated baseline concentrations to delineate potential Project effects from background conditions.</p> <p>The Proponent's response states: "The ERA followed the guidance in CSA N288.6-22 which does not require COPCs with elevated baseline concentrations to be considered COPCs for further quantitative assessment in the ERA. Clause 6.2.5.9 indicates that constituents with naturally elevated concentrations should be excluded from further consideration as a COPC."</p> <p>Section 6.2.5.9 of N288.6-22 is specific to the Human Health Risk Assessment, and this statement does not apply to the Ecological Risk Assessment (EcoRA). Section 7 of N288.6-22 is specific to the development of the EcoRA methodology, and in Section 7.2.5.2.6 of N288.6-22 it states: "In addition to screening of effluent and emissions data, concentrations measured in environmental media should be considered, as determined in the EMPs. Maximum concentrations measured in soil, receiving water, or sediment should be compared to screening criteria." Therefore, COPCs that had elevated baseline water and sediment quality concentrations in the receiving environment should be assessed in the ERA.</p> <p>Additionally, in Section 7.2.5.4.2 of N288.6-22 it is stated: "If COPCs exceed the screening level for one medium, they should be carried forward into the EcoRA for all media that are likely to contribute to exposure. For example, for a given COPC, if a water screening benchmark is exceeded, the same COPC should be carried forward for sediment if its concentration was above the detection limit." Therefore, if baseline exceedances occur in one media types, they should be carried forward for all media types in the ERA.</p> <p>It is not possible to determine if there is risk from effluent to the receiving environment and aquatic receptors based on the current information provided. Negative effects to biota from naturally elevated background concentrations of COPCs can be exacerbated by additional input of COPCs from Project effluent into the receiving environment. It is important to characterize and assess those potential effects and delineate potential Project effects from background conditions.</p> <p>Please:</p> <ol style="list-style-type: none">1. Update Table 3-1 in Appendix 10-A to include un-ionized ammonia, mercury and phosphorous. Update the risk assessment to incorporate these parameters as needed.2. Update the ERA to assess the risk of COPCs that had elevated baseline water quality concentrations in the receiving environment: aluminum, iron, and lead. | <ol style="list-style-type: none">1. See response to IR-114. Additional information has been provided for COPCs with requirement for monitoring under Schedule 5 of MDMER. Note that predicted effluent quality for all Schedule 5 parameters, with the exception of mercury, nitrate, and phosphorous were provided in Table 3-1 of the ERA in Appendix 10-A (these constituents were not identified as COPCs in the ERA).2. Information on predicted maximum receiving environment surface water concentrations for COPCs with required monitoring under the MDMER is in the updated EIS (Tables 8.2-10 and 8.2-13 and Appendix 8E. Please refer to Attachment IR-115.3. This is not applicable. No additional COPCs need to be carried forward in the ERA as the concentrations of COPCs in effluent do not exceed water quality guidelines (see Table 3-1 in the ERA in Appendix 10-A). All constituents identified in Schedule 4 and Schedule 5 were considered in the ERA screening with the exception of cyanide and mercury which are not identified as present in the effluent (see IR-100 regarding mercury). Phosphorus and nitrate will be present in the effluent at low levels and estimates of these constituents via the near-field water quality model indicate that levels will remain well below criteria protective of aquatic life in the Whitefish Lake environment (see Tables 8.2-10 and 8.2-13 of Section 8).4. The CSA guidance referenced by the reviewer in this IR (Section 7.2.5.2.6 of N288.6-22) is for exposure situations and not for baseline. The text in Section 7.2.5.2.6 of N288.6-22 is saying that measured concentrations in environmental media should be screened in addition to effluent and emissions data. This is referring to measured concentrations in the environment since they will reflect the impact from releases from the facility. This is not referring to baseline concentrations without influence from effluent. Section 7.2.5.3.1 and 7.2.5.3.2 of N288.6-22 recommend that the most restrictive of applicable federal or provincial guidelines be used as the screening criteria, and screening criteria should not be below a reasonable upper end of background. <p>Additionally, the reviewer points to Section 7.2.5.4.2 to indicate that if a COPC exceeds screening criterion in one medium it should be assessed for all media that are likely to contribute to exposure. This guidance was followed in the ERA – all COPCs identified in water were also assessed in sediment and vice versa, as well as additional food chain pathways. Again, the intent of this clause is for exposure situations and not specific to baseline conditions.</p> <p>The ERA did consider in the screening assessment constituents that had elevated baseline that were also present in the effluent. Aluminum, cadmium, iron, and lead exceeded water quality guidelines in baseline and were considered in the ERA screening; however, only cadmium was identified for further assessment since its concentration in the effluent exceeded its water quality guideline.</p> <p>Table 8.2-4 in the EIS provides a summary of baseline water quality exceedances. Note that the only iron exceedance was in SA-1 which is downstream of McGowan Lake (see Figure 8.2-4) and outside of the direct influence on the Project. Section 8.4.3.2.3 of the EIS did not identify any constituents where baseline sediment quality exceeded sediment quality guidelines.</p> <p>The screening followed the process identified in Figure 3-1 of the ERA (Appendix 10-A) as well as N288.6-22 guidance. No changes to the ERA or EIS are warranted to address Part 4 of this IR.</p> | <p>Note to Denison: There are multiple elements of this IR outstanding. This IR is being conditionally accepted for the purposes of the EA process, but these issues will need to be resolved during the licensing process. It is expected that a fully revised ERA that both incorporates revisions following closure of EA related IRs and addresses outstanding issues that will be further assessed during the licensing review. This commitment should be captured in the Commitments Register, and relates to various IRs in this table.</p> <p>This IR has been accepted for the purposes of the current EA process, and the outstanding issues below will be further assessed as part of licensing technical reviews, prior to the granting of a license.</p> <p>Item one of the IR has been met. However additional information is required for items two, three, and four. Similar to ECCC's rationale provided for IR-124, "the ERA primarily relies on modelling results to identify the maximum predicted levels of COPCs in the receiving environment." However, due to the upper bound discharge rates being the only model input evaluated, it is unclear whether the model considered scenarios where maximum COPCs might occur as the exclusion of other environmental variables may have resulted in inaccurate maximum environmental concentrations of the COPCs.</p> <p>The Proponent's responses regarding baseline exceedances of COPC thresholds in the receiving waterbodies requires additional information. The modeling of surface water and sediment COPC's described in Appendix 10-A, Figures 6-1 and 6-2 respectively, show results for the receiving waterbodies. However, it is unclear if these modeled values are based on the worst-case scenarios that account for environmental variables such as seasonal changes in hydrology and chemistry, or if they have only accounted for changes in operational effluent discharge scenarios to consider the upper bound discharge rates. Including the upper bounds of operational effluent discharges regardless of the variability of the receiving environmental conditions is important factor for determining whether the baseline data and risk assessment fully considered the effects of the operations of the proposed mine, including environmental concentrations of the COPCs, on water quality.</p> <p>The Proponent should provide baseline data and a risk assessment that includes consideration of maximum COPC scenarios for the receiving water bodies, including seasonal variability and sediment depositional areas. The Proponent should provide supplemental information to identify if the environmental model has considered environmental variability such as seasonal changes in water levels, flows and sedimentation. The Proponent should also demonstrate that the model has considered a reasonable expected worst case scenario, such as a 100 year return.</p> | <p>Please see Round 3 response to IR-124. The ERA is a living document and commits to reviewing and updating the ERA according to the periodic review requirements in Clauses 5.4 and 11 of CSA N288.6:22.</p> |

ATTACHMENT IR-114 (included in Round 1 submission)

Response:

1) Please see updated Tables 8.2-9 and 8.2-10 from the draft EIS below. Water quality predictions for the well mixed portion of LA-5 for each of the three flow scenarios (described in Section 8.2.4.2.3 and Table 8.2-7 of the draft EIS) are provided in the updated Table 8.2-10 below. Predicted site discharge concentrations that exceed respective receiver WQOs are bolded. Chloride, sulphate, TDS, arsenic, cadmium, chromium, cobalt, copper, selenium, and uranium, thorium-230, radium-226, lead-210, and polonium-210 predicted discharge concentrations are above receiver WQOs. However, under all three flow scenarios, the predicted water quality for all constituents is below respective WQOs within the well mixed portion of LA-5, indicating that sufficient dilution is present within LA-5 to meet objectives. Updated Table 8.2-13 is provided below. Water quality predictions have been added for MDMER constituents listed under Schedule 4 and Schedule 5. There are no predicted exceedances of water quality guidelines for any of the COPCs during Construction, Operation, or Decommissioning

2) The predictive water quality analysis considered the effects of toxicity modifying factors, such as hardness, on water quality. Specifically, the analysis considered induced hardness - that is hardness that is derived from or includes contributions from on site sources and in this case discharge from the IWWTP. It is reasonable in this case to utilize induced hardness since the water quality assessment directly considers the potential effect of IWWTP discharge on the receiving environment. The hardness added to the receiver from the discharge represents a constant source during periods of discharge. The effluent hardness value used in the analysis was derived from bench scale testing and is considered to be a reasonable estimate of expected hardness in effluent. With that in mind, the predictive water quality analysis reflects the water quality conditions that are anticipated to prevail in the receiver and therefore presents an appropriate platform on which to base the effects assessment.

3) The table below (IR-114 Table 1) shows a summary of baseline concentrations of total mercury in surface water within the LSA. Sediment was not analyzed for mercury during previous baseline surveys. Baseline water quality in the LSA and RSA showed no indication of total mercury present above detectable limits and as such, the potential for methyl-mercury to be detected was unlikely. Generally, 60 to 95% of total mercury concentrations in fish muscle tissues are present in the form of methylmercury. Table 8.5-2 of Section 8.5 of the EIS provides a full summary of tissue constituent concentrations for key species from the Icelander River and Russell Lake. A conservative approach of assuming 95% of mercury in the tissues is present in the methylated form could be used for comparative purposes. These data supplemented with more current baseline data for water, sediment and fish tissues specific to total and methyl-mercury prior to the onset of site development will provide a robust database for comparative purposes during the subsequent development and operation on site.

4) Consistent with CSA N288.1-20, Clause 5.1.5, atmospheric depositions to large water bodies such as lakes, are considered negligible; therefore, the air to surface water pathway has been excluded for the ecological risk assessment. The rationale for exclusion of atmospheric deposition to lakes and rivers is explained in detail in Section G9, Appendix G of the COG DRL Guidance Document (Hart, 2019). Typical transfer parameters from source to air and source to water are on a similar magnitude to each other. The transfer parameter from air to water is orders of magnitude lower indicating that atmospheric deposition to the lake would have a negligible effect. Rationale on the exclusion of the air to water pathway can be included in the ERA in Appendix 10-A. The following statement will be added to Section 2.2 in Appendix A to Appendix 10-A "Atmospheric deposition to Whitefish Lake is considered negligible. This is consistent with the COG DRL guidance (COG, 2019) which shows (assuming a modest flow rate for a lake of 0.1 m/s and an assumed water depth of 10 m) that the transfer of constituents from the atmosphere to large bodies of water (including lakes and rivers) is considered negligible." As baseline surface water did not identify measurable concentrations of total mercury in the LSA or RSA (See IR-114 Table 1 below) and deposition to large water bodies such as lakes is not likely to contribute to the methyl mercury concentration in the Wheeler River receiving waters, it is most reasonable to conclude that changes in total and methyl mercury can be adequately monitored in relation to sulphate inputs. Denison will undertake monitoring of total and methyl mercury as it relates to the discharge of sulphate to Whitefish Lake.

References:

Hart, D. 2019. Derived Release Limits Guidance. COG-06-3090R4-I

Table 8.2-9: Predicted Effluent Water Quality (Updated to include MDMER Constituents)

| Constituent | Unit | Discharge Concentration (max predicted) |
|---------------------|------|--|
| Chloride | mg/L | 600 |
| Sulphate (Hardness) | mg/L | 3915 |
| Sulphate | mg/L | 3915 |
| TDS | mg/L | 6420 |
| TSS | mg/L | 6 |
| Arsenic | mg/L | 0.006 |
| Cadmium | mg/L | 0.0018 |
| Chromium | mg/L | 0.025 |
| Cobalt | mg/L | 0.0030 |
| Copper | mg/L | 0.022 |
| Lead | mg/L | 0.0003 |
| Molybdenum | mg/L | 2.5 |
| Nickel | mg/L | 0.014 |
| Selenium | mg/L | 0.042 |
| Uranium | mg/L | 0.057 |
| Vanadium | mg/L | 0.059 |
| Zinc | mg/L | 0.042 |
| Mercury | mg/L | 0.000001 |
| Ammonia (as N) | mg/L | 3.9 |
| Un-ionized Ammonia* | mg/L | 0.0078 |
| Phosphorus | mg/L | N/A |
| Thorium-230 | Bq/L | 0.9 |
| Radium-226 | Bq/L | 0.15 |
| Lead-210 | Bq/L | 0.419 |
| Polonium-210 | Bq/L | 0.15 |

Note:

* - Calculated value

Table 8.2-10: Near-field Receiving Water Quality Results (Updated to include MDMER Constituents)

| Constituent | Unit | Screening Concentration | Source of Screening Concentration | Predicted Site Discharge Concentration | LA-5 Well Mixed (7Q10) | LA-5 Well Mixed (Monthly Low) | LA-5 Well Mixed (Average) |
|---------------------|------|-------------------------|-----------------------------------|--|------------------------|-------------------------------|---------------------------|
| Chloride | mg/L | 120 | SEQG/CCME | 600 | 10.06 | 6.18 | 4.69 |
| Sulphate (Hardness) | mg/L | 429 | BC MOE* | 3915 | 63.83 | 38.51 | 28.76 |
| Sulphate | mg/L | 128 | BC MOE | 3915 | 63.83 | 38.51 | 28.76 |
| TDS | mg/L | 500 | SEQG | 6420 | 131.41 | 90.06 | 74.13 |
| TSS | mg/L | 15 | Schd 4 - MDMER | 6 | 3.9 | 3.9 | 3.9 |
| Arsenic | mg/L | 0.01 | SEQG/CCME | 0.006 | 0.00020 | 0.00016 | 0.00014 |
| Cadmium | mg/L | 0.0003 | SEQG/CCME* | 0.0018 | 0.00005 | 0.00004 | 0.00003 |
| Chromium | mg/L | 0.001 | SEQG/CCME | 0.025 | 0.00090 | 0.001 | 0.00068 |
| Cobalt | mg/L | 0.0003 | FEQG | 0.0030 | 0.00015 | 0.00013 | 0.00012 |
| Copper | mg/L | 0.004 | SEQG/CCME* | 0.022 | 0.00055 | 0.00041 | 0.00036 |
| Lead | mg/L | 0.005 | CCME | 0.0003 | 0.0001 | 0.0001 | 0.0001 |
| Molybdenum | mg/L | 0.07 | WHO | 2.5 | 0.040 | 0.024 | 0.018 |
| Nickel | mg/L | 0.07 | WHO | 0.014 | 0.0003 | 0.0002 | 0.0002 |
| Selenium | mg/L | 0.001 | SEQG/CCME | 0.042 | 0.0008 | 0.001 | 0.0004 |
| Uranium | mg/L | 0.02 | SEQG/CCME | 0.057 | 0.0010 | 0.0006 | 0.0005 |
| Vanadium | mg/L | 0.12 | FEQG | 0.059 | 0.0011 | 0.0007 | 0.0005 |
| Zinc | mg/L | 0.1 | FEQG** | 0.042 | 0.0018 | 0.0015 | 0.0014 |
| Mercury | mg/L | 0.000026 | SEQG/CCME | 0.000001 | 0.00001 | 0.00001 | 0.00001 |
| Ammonia (as N) | mg/L | 5.74 | SEQG/CCME | 3.9 | 0.13 | 0.11 | 0.10 |
| Un-ionized Ammonia | mg/L | 1.00 | MDMER Sched 4 | 0.0078 | 0.00008 | 0.00006 | 0.00006 |
| Phosphorus | mg/L | 0.015 | BC MOE | N/A | 0.01 | 0.01 | 0.01 |
| Thorium-230 | Bq/L | 0.6 | HC | 0.9 | 0.024 | 0.019 | 0.016 |
| Radium-226 | Bq/L | 0.11 | SEQG | 0.15 | 0.008 | 0.007 | 0.007 |
| Lead-210 | Bq/L | 0.2 | HC | 0.419 | 0.026 | 0.024 | 0.023 |
| Polonium-210 | Bq/L | 0.1 | HC | 0.15 | 0.007 | 0.006 | 0.006 |
| Notes | | | | | | | |

| Constituent | Unit | Screening Concentration | Source of Screening Concentration | Predicted Site Discharge Concentration | LA-5 Well Mixed | LA-5 Well Mixed | LA-5 Well Mixed |
|--|------|-------------------------|-----------------------------------|--|-----------------|-----------------|-----------------|
| | | | | | (7Q10) | (Monthly Low) | (Average) |
| (1) Bolded values are those that exceed the screening concentrations Un-ionized ammonia calculated value * Hardness induced guideline, assuming hardness >250 mg/L ** Hardness induced guideline, assuming hardness >250 mg/L, pH=7.0, DOC = 5.26 mg/L | | | | | | | |

Table 8.2-13: Maximum Concentration of Surface Water Constituents of Potential Concern in Surface Water (Updated to include available MDMER Constituents)

| Constituent | Unit | Kratchkowsky Lake (LA-7) | Whitefish Lake North (LA-6) | Whitefish Lake Middle (LA-5 North) | Whitefish Lake South (LA-5 South) | McGowan Lake (LA-1) | Iceland River | Russell Lake Inlet | Screening Concentration | Source of Screening Concentration |
|--------------------|------|---|-----------------------------|------------------------------------|-----------------------------------|---------------------|---------------|--------------------|-------------------------|-----------------------------------|
| Chloride | mg/L | 0.32 | 0.32 | 6.14 | 6.11 | 4.20 | 4.16 | 3.26 | 120 | SEQG/CCME |
| Sulphate | mg/L | 0.69 | 0.69 | 38.66 | 38.49 | 26.03 | 25.75 | 19.88 | 128 | BC MOE |
| Arsenic | mg/L | 0.00012 | 0.00011 | 0.00015 | 0.00015 | 0.00013 | 0.00013 | 0.00012 | 0.01 | SEQG/CCME |
| Cadmium | mg/L | 0.000024 | 0.000023 | 0.000040 | 0.000039 | 0.000033 | 0.000033 | 0.000030 | 0.0003 | SEQG/CCME* |
| Chromium | mg/L | 0.000530 | 0.0005 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0006 | 0.001 | SEQG/CCME |
| Cobalt | mg/L | 0.000101 | 0.000101 | 0.000129 | 0.000128 | 0.000119 | 0.000119 | 0.000114 | 0.0003 | FEQG |
| Copper | mg/L | 0.00062 | 0.00062 | 0.00082 | 0.00082 | 0.00075 | 0.00075 | 0.00072 | 0.004 | SEQG/CCME* |
| Lead | mg/L | 0.000124 | 0.000114 | 0.000118 | 0.000130 | 0.000114 | 0.000114 | 0.000116 | 0.005 | CCME |
| Molybdenum | mg/L | 0.0001 | 0.0001 | 0.0243 | 0.0240 | 0.0158 | 0.0156 | 0.0118 | 0.07 | WHO |
| Nickel | mg/L | 0.00039 | 0.00038 | 0.00051 | 0.00050 | 0.00046 | 0.00046 | 0.00044 | 0.07 | WHO |
| Selenium | mg/L | 0.000034 | 0.00003 | 0.00043 | 0.00041 | 0.00026 | 0.00026 | 0.00020 | 0.001 | SEQG/CCME |
| Uranium | mg/L | 0.00003 | 0.00003 | 0.00057 | 0.00055 | 0.00034 | 0.00033 | 0.00025 | 0.02 | SEQG/CCME |
| Vanadium | mg/L | 0.00017 | 0.00015 | 0.00067 | 0.00056 | 0.00033 | 0.00033 | 0.00027 | 0.12 | FEQG |
| Zinc | mg/L | 0.00070 | 0.00069 | 0.00106 | 0.00103 | 0.00090 | 0.00090 | 0.00084 | 0.1 | FEQG** |
| Ammonia (as N) | mg/L | 0.01463 | 0.01463 | 0.05232 | 0.05215 | 0.03978 | 0.03950 | 0.03368 | 5.74 | SEQG/CCME |
| Un-ionized Ammonia | mg/L | 0.0000086 | 0.0000086 | 0.0000309 | 0.0000308 | 0.0000235 | 0.0000233 | 0.0000199 | 1.00 | MDMER Sched 4 |
| Thorium-230 | Bq/L | 0.01014 | 0.01012 | 0.01868 | 0.01854 | 0.01569 | 0.01563 | 0.01430 | 0.6 | HC |
| Radium-226 | Bq/L | 0.0057 | 0.0056 | 0.0069 | 0.0067 | 0.0063 | 0.0063 | 0.0061 | 0.11 | SEQG |
| Lead-210 | Bq/L | 0.0062 | 0.0057 | 0.0084 | 0.0083 | 0.0067 | 0.0067 | 0.0064 | 0.2 | HC |
| Polonium-210 | Bq/L | 0.0063 | 0.0058 | 0.0067 | 0.0072 | 0.0062 | 0.0062 | 0.0062 | 0.1 | HC |
| Mercury | mg/L | No background information or effluent concentration to model | | | | | | | | |
| Aluminum | | Monitoring required under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | MDMER Sched 5 |

| Constituent | Unit | Kratchkowsky Lake (LA-7) | Whitefish Lake North (LA-6) | Whitefish Lake Middle (LA-5 North) | Whitefish Lake South (LA-5 South) | McGowan Lake (LA-1) | Icelandic River | Russell Lake Inlet | Screening Concentration | Source of Screening Concentration |
|---|------|--|-----------------------------|------------------------------------|-----------------------------------|---------------------|-----------------|--------------------|-------------------------|-----------------------------------|
| TSS | | Will be mitigated through design and treatment and monitored as per CCME and MDMER Sched 4 criterion | | | | | | | | MDMER Sched 4 |
| Iron | | Monitoring required under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | MDMER Sched 5 |
| Thallium | | Monitoring required under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | MDMER Sched 5 |
| Manganese | | Monitoring required under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | MDMER Sched 5 |
| Phosphorus | | Monitoring required under MDMER Schedule 5 - no criteria stipulated under this regulation | | | | | | | | MDMER Sched 5 |
| Notes (1) Bolded values are those that exceed the screening concentrations * Hardness induced guideline, assuming hardness >250 mg/L ** Hardness induced guideline, assuming hardness >250 mg/L, pH=7.0, DOC = 5.26 mg/L Un-ionized ammonia represented by calculated values | | | | | | | | | | |

IR-114 Table 1: Total and Dissolved Mercury Concentrations in the LSA and RSA

| Parameter | Total Mercury, Dissolved | Total Mercury |
|------------------|-----------------------------|---------------|
| Units | mg/L | mg/L |
| Total Count | 40 | 59 |
| Count (<RDL) | 39 | 46 |
| Minimum | <1.00E-05 | <1.00E-07 |
| 5th Percentile | <1.00E-05 | <8.20E-07 |
| 50th Percentile | <1.00E-05 | <1.00E-05 |
| 95th Percentile | <1.00E-05 | <1.00E-05 |
| Maximum | <1.00E-05 | <1.00E-05 |
| Arithmetic Mean | <1.00E-05 | <7.63E-06 |
| StdDev | 2.76E-12 | 3.70E-06 |
| Std Error | 0 | 4.81E-07 |
| Geometric Mean | <1.00E-05 | <5.38E-06 |
| Geometric StdDev | 1. | 3.281 |

Notes:

1. The summary time is between 01-Jan-2010 and 31-Dec-2021.

2. The reporting locations are: "LA-1", "LA-1-Bottom", "LA-5", "LA-6", "LAB-1", "LAB-2", "SA-1", "SA-2", "SA-3", "SA-6".

ATTACHMENT IR-114 (included in Round 2 submission)

Denison’s Response:

The requested tables have been updated to include water quality thresholds derived from receiving environment parameters (background) as well as effluent induced concentrations for completeness. Please see the tables below and updated in Section 8 of the EIS.

Table Error! No text of specified style in document.-1: Predicted Effluent Water Quality

| Constituent | Unit | Predicted Discharge Concentrations (Max Expected) |
|---|-----------------|--|
| General Chemistry, Nutrients and Anions | | |
| Alkalinity | mg/L | 12.4 |
| Ammonia (as N) | mg/L | 3.9 |
| Un-Ionized Ammonia | mg/L | 4.74 |
| Hardness | mg/L (as CaCO3) | 250 |
| Conductivity | µS/cm | 21.7 |
| Nitrate | mg/L | 0.249 |
| pH | pH Unit | 7 |
| Phosphorus | mg/L | N/A |
| Sulphate | mg/L | 2600 |
| TDS | mg/L | 6420 |
| Temperature | deg C | 16.5 |
| TSS | mg/L | 6 |
| Chloride | mg/L | 600 |
| Metals | | |
| Aluminum | mg/L | 0.051 |
| Arsenic | mg/L | 0.006 |
| Cadmium | mg/L | 0.0018 |
| Chromium | mg/L | 0.025 |
| Cobalt | mg/L | 0.0027 |
| Copper | mg/L | 0.02 |
| Cyanide | mg/L | NA |
| Iron | mg/L | 0.0039 |
| Lead | mg/L | 0.0003 |
| Manganese | mg/L | 0.03 |
| Mercury | mg/L | 0.00001 |
| Molybdenum | mg/L | 2.5 |
| Nickel | mg/L | 0.0138 |
| Selenium | mg/L | 0.042 |
| Strontium | mg/L | 1.68 |
| Thallium | mg/L | 0.0006 |
| Uranium | mg/L | 0.057 |
| Vanadium | mg/L | 0.059 |
| Zinc | mg/L | 0.042 |
| Radiological | | |
| Lead-210 | Bq/L | 0.42 |
| Polonium-210 | Bq/L | 0.15 |
| Radium-226 | Bq/L | 0.15 |
| Thorium-230 | Bq/L | 0.9 |
| Uranium-238 | Bq/L | 0.7 |
| Uranium-234 | Bq/L | 0.7 |

Table Error! No text of specified style in document.-2: Near-field Receiving Water Quality Results

| Parameter | Units | Short-term Screening Criteria (background hardness) | Short-term Screening Criteria (Hardness induced [>250 mg/L]) | Source | Note | Long-term Screening Criteria (background hardness) | Long-term Screening Criteria (Hardness induced [>250 mg/L]) | Source | Note | Discharge Concentration (max predicted) | LA-5 Well Mixed (7Q10) | LA-5 Well Mixed (Monthly Low) | LA-5 Well Mixed (Average) |
|---|----------|---|--|------------------|------|--|---|-----------|------|---|------------------------|-------------------------------|---------------------------|
| General Chemistry, Nutrients and Anions | | | | | | | | | | | | | |
| Alkalinity | mg/L | -- | -- | -- | -- | -- | -- | -- | | 12.4 | 12.4 | 12.4 | 12.4 |
| Ammonia (as N) | mg/L | -- | -- | -- | -- | 5.74 | 5.74 | SEQG/CCME | (4) | 3.9 | 0.13 | 0.11 | 0.1 |
| Un-Ionized Ammonia | mg/L | -- | -- | -- | -- | 6.98 | 6.98 | SEQG/CCME | (4) | 4.74 | 0.08 | 0.05 | 0.03 |
| Hardness | mg/L | -- | -- | -- | -- | -- | -- | -- | -- | 250 | 9 | 8 | 7 |
| Conductivity | µS/cm | -- | -- | -- | -- | -- | -- | -- | -- | 21.7 | 21.7 | 21.7 | 21.7 |
| Nitrate | mg/L | 550 | 550 | CCME | | 3 | 3 | SEQG | -- | 0.249 | 0.249 | 0.249 | 0.249 |
| pH | pH units | -- | -- | -- | -- | 6.5-9.0 | 6.5-9.0 | SEQG/CCME | -- | 7 | 7 | 7 | 7 |
| Phosphorus | mg/L | -- | -- | -- | -- | 0.02 - 0.035 | 0.02 - 0.035 | CCME | (17) | 0.03 | 0.0103 | 0.0102 | 0.0101 |
| Sulphate | mg/L | -- | -- | -- | -- | 128 | 429 | BC MOE | (12) | 2600 | 43 | 26 | 19 |
| TDS | mg/L | -- | -- | -- | -- | 500 | 500 | SEQG | -- | 6420 | 131 | 90 | 74 |
| Temperature | °C | -- | -- | -- | -- | ambient temp | ambient temp | -- | -- | 16.5 | 15 | 15 | 15 |
| TSS | mg/L | 15 | 15 | MDMER Schedule 4 | (22) | background + 5 mg/L | background + 5 mg/L | CCME | -- | 6 | 4 | 4 | 4 |
| Chloride | mg/L | 640 | 640 | SEQG/CCME | (6) | 120 | 120 | SEQG/CCME | (6) | 600 | 10 | 6 | 5 |
| Metals | | | | | | | | | | | | | |
| Aluminum | mg/L | -- | -- | -- | -- | 0.1 | 0.1 | SEQG/CCME | (5) | 0.051 | 0.0 | 0.0 | 0.0 |
| Arsenic | mg/L | 0.1 | 0.1 | [| -- | 0.005 | 0.005 | SEQG/CCME | -- | 0.006 | 0.000 | 0.000 | 0.000 |
| Cadmium | mg/L | 0.00011 | 0.0053 | SEQG/CCME | (18) | 0.00004 | 0.00034 | SEQG/CCME | -- | 0.0018 | 0.00005 | 0.00004 | 0.00003 |
| Chromium | mg/L | -- | -- | -- | -- | 0.001 | 0.001 | SEQG/CCME | | 0.025 | 0.001 | 0.001 | 0.001 |
| Cobalt | mg/L | -- | -- | -- | -- | 0.000295 | 0.00149 | FEQG | (10) | 0.0027 | 0.000142 | 0.000125 | 0.000119 |
| Copper | mg/L | 0.0009 | 0.00004 | SEQG | (19) | 0.002 | 0.004 | CCME | -- | 0.02 | 0.001 | 0.000 | 0.000 |

| Parameter | Units | Short-term Screening Criteria (background hardness) | Short-term Screening Criteria (Hardness induced [>250 mg/L]) | Source | Note | Long-term Screening Criteria (background hardness) | Long-term Screening Criteria (Hardness induced [>250 mg/L]) | Source | Note | Discharge Concentration (max predicted) | LA-5 Well Mixed (7Q10) | LA-5 Well Mixed (Monthly Low) | LA-5 Well Mixed (Average) |
|--------------|-------|---|--|--------|---------|--|---|-----------|---------|---|------------------------|-------------------------------|---------------------------|
| Cyanide | mg/L | -- | -- | -- | -- | -- | -- | -- | -- | N/A | 0.0 | 0.0 | 0.0 |
| Iron | mg/L | -- | -- | -- | -- | 0.3 | 0.3 | SEQG/CCME | -- | 0.0039 | 0.178 | 0.179 | 0.180 |
| Lead | mg/L | -- | -- | -- | -- | 0.001 | 0.007 | SEQG/CCME | (8) | 0.0003 | 0.000 | 0.000 | 0.000 |
| Manganese | mg/L | 0.501 | 15 | CCME | (3) | 0.26 | 0.64 | SEQG/CCME | (3) | 0.03 | 0.020 | 0.020 | 0.020 |
| Mercury | mg/L | -- | -- | -- | -- | 0.000026 | 0.000026 | CCME | -- | 0.00001 | 0.000010 | 0.000010 | 0.000010 |
| Molybdenum | mg/L | -- | -- | -- | -- | 0.07 | 0.07 | WHO | (16) | 2.5 | 0.04 | 0.02 | 0.02 |
| Nickel | mg/L | -- | -- | -- | -- | 0.07 | 0.07 | WHO | (16) | 0.0138 | 0.00 | 0.00 | 0.00 |
| Selenium | mg/L | -- | -- | -- | -- | 0.001 | 0.001 | CCME | -- | 0.042 | 0.001 | 0.001 | 0.000 |
| Strontium | mg/L | -- | -- | -- | -- | 205 | 2.5 | FEQG | (11) | 1.68 | 0.04 | 0.03 | 0.03 |
| Thallium | mg/L | -- | -- | -- | -- | 0.0008 | 0.0008 | SEQG/CCME | -- | 0.0006 | 0.0002 | 0.0002 | 0.0002 |
| Uranium | mg/L | 0.033 | 0.033 | CCME | | 0.015 | 0.015 | SEQG/CCME | -- | 0.057 | 0.001 | 0.001 | 0.001 |
| Vanadium | mg/L | -- | -- | -- | -- | 0.12 | 0.12 | FEQG | (13) | 0.059 | 0.0011 | 0.0007 | 0.00 |
| Zinc | mg/L | 0.008 | 0.204 | CCME | (9)(20) | 0.007 | 0.058 | CCME | (9)(23) | 0.042 | 0.002 | 0.001 | 0.001 |
| Radiological | | | | | | | | | | | | | |
| Lead-210 | Bq/L | -- | -- | -- | -- | 0.2 | 0.2 | HC | -- | 0.42 | 0.026 | 0.024 | 0.023 |
| Polonium-210 | Bq/L | -- | -- | -- | -- | 0.1 | 0.1 | HC | -- | 0.15 | 0.007 | 0.006 | 0.006 |
| Radium-226 | Bq/L | -- | -- | -- | -- | 0.11 | 0.11 | SEQG | -- | 0.15 | 0.008 | 0.007 | 0.007 |
| Thorium-230 | Bq/L | -- | -- | -- | -- | 0.6 | 0.6 | HC | -- | 0.9 | 0.024 | 0.019 | 0.016 |
| Uranium-238 | Bq/L | -- | -- | -- | -- | 3 | 3 | HC | -- | 0.7 | 0.013 | 0.008 | 0.006 |
| Uranium-234 | Bq/L | -- | -- | -- | -- | 3 | 3 | HC | -- | 0.7 | 0.013 | 0.008 | 0.006 |

Notes:

- (1) Saskatchewan Water Quality Objectives, SEQG on-line (<https://envrbrportal.crmf.saskatchewan.ca/seqg-search/>), SEQG for the protection of aquatic life were selected, based on total concentrations, a temperature of 15°C and a pH of 7.0.
- (2) Hardness dependent WQOs are for very soft water (hardness <25 mg CaCO₃/L). Site-specific hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6).
- (3) Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life - Manganese, Appendix B - Canadian Water Quality Guidelines Calculator (pH = 7.5, hardness = 15 mg/L). Guideline is based on dissolved manganese. Benchmark = $\exp(0.878[\ln(\text{hardness})] + 4.76)$ where the benchmark is expressed in dissolved manganese concentration (µg/L), and hardness is measured as CaCO₃ equivalents in mg/L.
- (4) Total ammonia-N calculated from the total ammonia guideline for a temperature of 15°C and a pH of 7.0, Un-ionized Ammonia from Table 1 of temperature and pH Canadian Water Quality Guidelines for the Protection of Aquatic Life - Ammonia (<https://ccme.ca/en/res/ammonia-en-canadian-water-quality-guidelines-for-the-protection-of-aquatic-life.pdf>)
- (5) Based on a pH of >6.5.
- (6) Based on water hardness >0 to <17 mg/L.
- (7) Based on water hardness >0 to <82 mg/L.
- (8) Based on water hardness >0 to ≤60 mg/L equation used at hardness of 5.26. At hardness >180 mg/L, the CWQG is 7 µg/L
- (9) Guideline is based on dissolved zinc.
- (10) Environment Canada 2017. Federal Environmental Quality Guidelines, Cobalt, May. Based on equation and site-specific baseline hardness of 15 mg/L.
- (11) ECCC 2020. Federal Environmental Quality Guidelines Strontium. July.
- (12) BC MECCS 2021. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture. https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf
- (13) Environment Canada 2016. Federal Environmental Quality Guidelines, Vanadium. May.
- (14) Health Canada 2020. Guidelines for Canadian Drinking Water Quality Summary Table. September. https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/water-eau/sum_guide-res_recom/summary-table-EN-2020-02-11.pdf
- (15) BC MECCS 2020. Source Drinking Water Quality Guidelines, Guideline Summary Ministry of Environment & Climate Change Strategy Water Protection & Sustainability Branch .
- (16) WHO 2017. Guidelines for Drinking Water Quality. Fourth Edition Incorporating The First Addendum.
- (17) Framework - guideline for meso-eutrophic waterbody 20-35 µg/L
- (18) Based on water hardness of >0 to <5.3 mg/L
- (19) Based on hardness of 5 mg/L (Short-term equation is $(e^{(0.979123[\ln(\text{hardness})]-8.64497)}) * 1000$ (SEQG via AEP 1996b)
- (20) Based on benchmark = $\exp(0.833[\ln(\text{hardness mg} \cdot \text{L}^{-1})] + 0.240[\ln(\text{DOC mg} \cdot \text{L}^{-1})] + 0.526)$. Site-specific background hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6). Site-specific DOC is 2.2 (arithmetic mean for LA-5 and LA-6), induced hardness of 250.5 used as upper limit of extrapolation available.
- (21) based on water hardness of > 250 mg/L (CaCO₃) (251 mg/L)
- (22) MDMER Schedule 4 - maximum authorized montly mean concentration
- (23) Bold numbers indicate exceedance of long-term criteria
- SEQG – Saskatchewan Environmental Quality Guidelines – Water Quality Guidelines for Freshwater Aquatic Life.
- CWQG – Canadian Council of Ministers of the Environment – Canadian Water Quality Guidelines for the Protection of Aquatic Life.

SSWQO – Saskatchewan Surface Water Quality Objectives.

DOC – Dissolved organic carbon.

TDS – Total dissolved solids.

TKN – Total Kjeldahl
Nitrogen.

TOC – Total organic carbon.

TSS – Total suspended solids.

Table Error! No text of specified style in document.-3: Maximum Concentration of Surface Water Constituents of Potential Concern in Surface Water

| Constituent | Unit | Kratchkowsky Lake (LA-7) | Whitefish Lake North (LA-6) | Whitefish Lake Middle (LA-5 North) | Whitefish Lake South (LA-5 South) | McGowan Lake (LA-1) | Icelander River | Russell Lake Inlet | Screening Criteria | Source of Screening Concentration | Notes |
|---------------------------|------|--------------------------|-----------------------------|------------------------------------|-----------------------------------|---------------------|-----------------|--------------------|--------------------|-----------------------------------|-------|
| Alkalinity ⁽¹⁾ | mg/L | NE | NE | 12.4 | 12.4 | NE | NE | NE | -- | -- | |
| Aluminum | mg/L | 0.01766 | 0.01616 | 0.01835 | 0.02226 | 0.01500 | 0.01499 | 0.01614 | | MDMER Sched 5 | (5) |
| Ammonia (as N) | mg/L | 0.01463 | 0.01463 | 0.05232 | 0.05215 | 0.03978 | 0.0395 | 0.03368 | 5.74 | SEQG/CCME | (4) |
| Un-ionized Ammonia | mg/L | 0.01770 | 0.01770 | 0.06331 | 0.06310 | 0.04813 | 0.04780 | 0.04075 | 6.98 | SEQG/CCME | (4) |
| Arsenic | mg/L | 0.00012 | 0.00011 | 0.00015 | 0.00015 | 0.00013 | 0.00013 | 0.00012 | 0.005 | SEQG/CCME | |
| Cadmium | mg/L | 0.000024 | 0.000023 | 0.00004 | 0.000039 | 0.000033 | 0.000033 | 0.00003 | 0.0003 | SEQG/CCME* | |
| Chloride | mg/L | 0.32 | 0.32 | 6.14 | 6.11 | 4.2 | 4.16 | 3.26 | 120 | SEQG/CCME | (6) |
| Chromium | mg/L | 0.00053 | 0.0005 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0006 | 0.001 | SEQG/CCME | |
| Cobalt | mg/L | 0.000101 | 0.000101 | 0.000129 | 0.000128 | 0.000119 | 0.000119 | 0.000114 | 0.0003 | FEQG | (10) |
| Copper | mg/L | 0.00062 | 0.00062 | 0.00082 | 0.00082 | 0.00075 | 0.00075 | 0.00072 | 0.004 | SEQG/CCME* | |
| Iron | mg/L | 0.0467 | 0.0424 | 0.0470 | 0.0567 | 0.0400 | 0.0400 | 0.0425 | | MDMER Sched 5 | |
| Lead | mg/L | 0.000124 | 0.000114 | 0.000118 | 0.00013 | 0.000114 | 0.000114 | 0.000116 | 0.005 | CCME | (8) |
| Lead-210 | Bq/L | 0.0062 | 0.0057 | 0.0084 | 0.0083 | 0.0067 | 0.0067 | 0.0064 | 0.2 | HC | |
| Manganese | mg/L | 0.001674 | 0.001524 | 0.001722 | 0.001867 | 0.001593 | 0.001590 | 0.001593 | 0.64 | SEQG/CCME | (3) |
| Mercury | mg/L | 0.0000053 | 0.0000053 | 0.0000053 | 0.0000053 | 0.0000053 | 0.0000053 | 0.0000053 | 0.000026 | CCME | |
| Molybdenum | mg/L | 0.0001 | 0.0001 | 0.0243 | 0.024 | 0.0158 | 0.0156 | 0.0118 | 0.07 | WHO | (16) |
| Nickel | mg/L | 0.00039 | 0.00038 | 0.00051 | 0.0005 | 0.00046 | 0.00046 | 0.00044 | 0.07 | WHO | (16) |
| Nitrate ⁽¹⁾ | mg/L | NE | NE | 0.249 | 0.249 | NE | NE | NE | 3 | SEQG | |
| Phosphorus ⁽¹⁾ | mg/L | <0.01 | <0.01 | 0.01 | 0.01 | 0.01 | <0.01 | <0.01 | 0.02 - 0.035 | CCME | (17) |
| Polonium-210 | Bq/L | 0.0063 | 0.0058 | 0.0067 | 0.0072 | 0.0062 | 0.0062 | 0.0062 | 0.1 | HC | |
| Radium-226 | Bq/L | 0.0057 | 0.0056 | 0.0069 | 0.0067 | 0.0063 | 0.0063 | 0.0061 | 0.11 | SEQG | |
| Selenium | mg/L | 0.000034 | 0.00003 | 0.00043 | 0.00041 | 0.00026 | 0.00026 | 0.0002 | 0.001 | SEQG/CCME | |

| Constituent | Unit | Kratchkowsky Lake (LA-7) | Whitefish Lake North (LA-6) | Whitefish Lake Middle (LA-5 North) | Whitefish Lake South (LA-5 South) | McGowan Lake (LA-1) | Icelander River | Russell Lake Inlet | Screening Criteria | Source of Screening Concentration | Notes |
|--------------------|------|--------------------------|-----------------------------|------------------------------------|-----------------------------------|---------------------|-----------------|--------------------|---------------------|-----------------------------------|-------|
| Sulphate | mg/L | 0.69 | 0.69 | 38.66 | 38.49 | 26.03 | 25.75 | 19.88 | 128 | BC MOE | (12) |
| Thallium | mg/L | 9.97E-05 | 9.96E-05 | 1.04E-04 | 1.04E-04 | 1.03E-04 | 1.03E-04 | 1.02E-04 | 0.0008 | SEQG/CCME | |
| Thorium-230 | Bq/L | 0.01014 | 0.01012 | 0.01868 | 0.01854 | 0.01569 | 0.01563 | 0.0143 | 0.6 | HC | |
| TSS | mg/L | 1.60 | 1.60 | 1.65 | 1.65 | 1.63 | 1.63 | 1.63 | background + 5 mg/L | CCME | |
| Un-ionized Ammonia | mg/L | 0.0000086 | 0.0000086 | 0.0000309 | 0.0000308 | 0.0000235 | 0.0000233 | 0.0000199 | 1 | MDMER Sched 4 | |
| Uranium | mg/L | 0.00003 | 0.00003 | 0.00057 | 0.00055 | 0.00034 | 0.00033 | 0.00025 | 0.02 | SEQG/CCME | |
| Vanadium | mg/L | 0.00017 | 0.00015 | 0.00067 | 0.00056 | 0.00033 | 0.00033 | 0.00027 | 0.12 | FEQG | (13) |
| Zinc | mg/L | 0.0007 | 0.00069 | 0.00106 | 0.00103 | 0.0009 | 0.0009 | 0.00084 | 0.007 | FEQG | (9) |

Notes

Notes

Estimates of mercury concentration are based on 50% of the detection limit in both background and effluent.

(1) Estimated from near-field model

NE = No estimate for this lake for this parameter

Saskatchewan Water Quality Objectives, SEQG on-line (<https://envrbrportal.crm.saskatchewan.ca/seqg-search/>), SEQG for the protection of aquatic life were selected, based on total concentrations, a temperature of 15°C and a pH of 7.0.

Hardness dependent WQOs are for very soft water (hardness <25 mg CaCO₃/L). Site-specific hardness is 5.26 mg/L (95th percentile of LA-5 and LA-6).

(4) Total ammonia-N calculated from the total ammonia guideline for a temperature of 15°C and a pH of 7.0, Un-ionized Ammonia from Table 1 of temperature and pH Canadian Water Quality Guidelines for the Protection of Aquatic Life - Ammonia (<https://ccme.ca/en/res/ammonia-en-canadian-water-quality-guidelines-for-the-protection-of-aquatic-life.pdf>)

(5) Based on a pH of >6.5.

(6) Based on water hardness >0 to <17 mg/L.

(7) Based on water hardness >0 to <82 mg/L.

(8) Based on water hardness >0 to ≤60 mg/L equation used at hardness of 5.26. At hardness >180 mg/L, the CWQG is 7 µg/L

(9) Guideline is based on dissolved zinc.

(10) Environment Canada 2017. Federal Environmental Quality Guidelines, Cobalt, May. Based on equation and site-specific baseline hardness of 15 mg/L.

(11) ECCC 2020. Federal Environmental Quality Guidelines Strontium. July.

- (12) BC MECCS 2021. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture. https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf
- (13) Environment Canada 2016. Federal Environmental Quality Guidelines, Vanadium. May.
- (14) Health Canada 2020. Guidelines for Canadian Drinking Water Quality Summary Table. September. https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/pdf/pubs/water-eau/sum_guide-res_recom/summary-table-EN-2020-02-11.pdf
- (15) BC MECCS 2020. Source Drinking Water Quality Guidelines, Guideline Summary Ministry of Environment & Climate Change Strategy Water Protection & Sustainability Branch .
- (16) WHO 2017. Guidelines for Drinking Water Quality. Fourth Edition Incorporating The First Addendum.
- (17) Framework - guideline for meso-eutrophic waterbody 20-35 µg/L

- Department: ECCC
- Project Effects Link: Change to an environmental component due to hazardous contaminants
- Reference to EIS, appendices, or supporting documentation: Appendix 10-A (ERA), Section 3.1.2.1

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (Round 3, June 2024) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-------------------|---|---|--|---|---|--|---------------------------------------|--|--|--|--|-----------|-------------------|------------|-----------------------|----------------------|------------------------|-----------------------------|-----|------|-------|-------|------|----------------------|-----|------|--------|------|------|-----------------------|-----|------|--------|------|------|----------------------|-----|------|--------|------|------|--------------|-----|------|--------|-------|------|--------------------|-----|------|--------|-------|------|---|--|
| IR-195 | - | <p>Context: Figure 3-2 depicts modelled concentrations of COPCs in the receiving environment surface water during all Project phases. Effluent discharge rates during Operations and Decommissioning are not anticipated to differ significantly. However, COPC concentrations seem to decrease rapidly after the end of the operations period despite effluent releases continuing into the decommissioning phase.</p> <p>Rationale: There has been no information provided on predicted changes in effluent COPC concentrations and discharge rates during the decommissioning phase. It remains unclear how COPC concentrations would decrease so quickly following the end of operations.</p> | <p>1. Provide further information on modelled maximum COPC concentrations for each individual Project phase with estimated timing for peak concentrations to appear in the receiving environment.</p> <p>2. Provide further information on predicted effluent quality during the Project decommissioning phase.</p> <p>3. Update ERA figures and conclusions as needed.</p> | <p>1. Per the draft EIS effluent is conservatively assumed to be discharged to the Whitefish Lake Middle during the operations (15 years) and decommissioning (5 years) phases at the same constant discharge rate of 36.5 m³/hr (10.1 L/s) with the same stable effluent quality as shown in Table 3-2. Therefore, the modelled maximum COPC concentrations in water are the same for operations and decommissioning phases (which is considered conservative), the same peak concentrations appear annually due to the variation of the monthly local inflow. Since COPCs are accumulated in sediment, the modelled maximum COPC concentrations in sediment appear at the end of each individual Project phase, which are year 20 for the operations and year 25 for the decommissioning in Figure 3-3.</p> <p>2. The predicted effluent quality during the Project decommissioning phase is expected to be the same as those during the operations. Effluent was set to be released during operations but not during the decommissioning phase in the current model.</p> <p>3. The model has been updated to include effluent discharge during the decommissioning phase, and the ERA figures and result tables will be updated in the next submission accordingly. See attachment IR-195 for the updated Table 3-3 and Figure 3-2.</p> | <p>This response has not been accepted. Although the Proponent addressed items 2 and 3, further information on maximum predicted concentrations of COPCs in water quality during various Project stages and how hydrological processes affect COPC concentrations from Project effluent is required based on the information provided in the Proponent's response to validate the Proponent's predictions.</p> <p>The Proponent has provided updated tables with modelled maximum COPC concentrations in water and sediment by individual Project phase but did not include the environmental quality guidelines for COPCs which were included in the original tables. The Proponent's response confirmed the predicted effluent quality during the decommissioning phase. In their response the Proponent states: "Therefore, the modelled maximum COPC concentrations in water are the same for operations and decommissioning phases (which is considered conservative), the same peak concentrations appear annually due to the variation of the monthly local inflow. Since COPCs are accumulated in sediment, the modelled maximum COPC concentrations in sediment appear at the end of each individual Project phase, which are year 20 for the operations and year 25 for the decommissioning in Figure 3-3."</p> <p>The figures provided in the response support this statement, however, maximum predicted concentrations of COPCs in receiving water quality occur within a year of operations commencing. COPC concentrations in water also return to baseline within one year after decommissioning is complete. However, maximum predicted concentrations of COPCs in sediment quality do not occur until the end of the Project lifecycle due to accumulation over time, which is expected.</p> <p>Rationale: It is unclear how maximum predicted concentrations of COPCs in water quality occur so quickly and decrease so quickly after Project operations commencement and decommissioning respectively. Further information on the hydrological processes that facilitate this is necessary to validate predictions.</p> <p>Provide further information regarding maximum predicted concentrations of COPCs in water quality during various Project stages and how hydrological processes (i.e. flows, retention time, etc.) facilitate the fast increase and decrease of COPC concentrations from Project effluent. This information should be included in Appendix 10-A, Section 3.1.2.1.</p> | <p>The maximum predicted concentrations of COPCs in water are seen over a relatively short period on the scale shown in the relevant figures as noted by the reviewer due to the short water retention time of the modelled lakes. As shown in the table below, the modelled lakes (excluding the reference lake) are small in size, with lake areas ranging from 0.10 to 1.49 km² and with average depths ranging from 1.0 to 5.5 m. Based on the area, depth and outflow of the modelled exposure lakes, the calculated retention times of the lakes ranged from 0.88 to 51.61 days. These short retention times explain the relatively rapid increase and subsequent decrease in concentrations of COPCs in the lakes during periods of effluent discharge and periods where there is no effluent discharge, respectively.</p> <table><tr><th colspan="6">Waterbody Morphometry for Modelled Lakes</th></tr><tr><th>Waterbody</th><th>Average Depth (m)</th><th>Area (km²)</th><th>Average Outflow (L/s)</th><th>Retention Time (day)</th><th>Retention Time (month)</th></tr><tr><td>Reference Kratchkowsky Lake</td><td>2.9</td><td>0.80</td><td>331.2</td><td>80.66</td><td>2.69</td></tr><tr><td>Whitefish Lake North</td><td>1.6</td><td>0.26</td><td>1379.3</td><td>3.53</td><td>0.12</td></tr><tr><td>Whitefish Lake Middle</td><td>1.1</td><td>0.10</td><td>1398.5</td><td>0.88</td><td>0.03</td></tr><tr><td>Whitefish Lake South</td><td>1.0</td><td>0.32</td><td>1414.3</td><td>2.65</td><td>0.09</td></tr><tr><td>McGowan Lake</td><td>5.5</td><td>1.49</td><td>1832.3</td><td>51.61</td><td>1.72</td></tr><tr><td>Russell Lake Inlet</td><td>3.0</td><td>0.75</td><td>2390.3</td><td>10.92</td><td>0.36</td></tr></table> <p>Updated information has been added to Appendix 10-A, including Table 3-3, Table 3-5, Figure 3-2 and Figure 3-3, as well as Table 3-1 of Appendix A of Appendix 10-A.</p> <p>The revised text in Section 3.1.2.1 (Appendix 10-A) is as follows: "The modelled maximum COPC concentrations in water during decommissioning phase were the same as that during operations (Table 3 3). The peak concentrations of arsenic and polonium-210 appear annually in June, and the peak concentrations of all other COPCs appear annually in March due to the variation of the monthly local inflow during the effluent discharge period (Figure 3 2). It is noted that the maximum predicted concentrations of COPCs in water occurred over short periods of effluent discharge and subsequently decrease relatively quickly during periods when there is no effluent discharge. This is related to the short retention time of the modelled lakes. As shown in Table 3-1 in Appendix A, the modelled lakes (excluding the reference lake) are small, with lake areas ranging from 0.10 to 1.49 km² and with average depths ranging from 1.0 to 5.5 m. Based on the area, depth and outflow, the calculated retention times ranged from 0.88 to 51.61 days. As noted, the short retention times result in rapid increases and decreases of concentrations of COPCs in response to effluent discharge and then its cessation. Since COPCs accumulate in sediment, the peak concentrations of all COPCs in sediment appear at the end of each individual Project phase, which are year 20 for the operations and year 25 for the decommissioning phase, as shown in Figure 3 3."</p> <p>The revised text in Section 3.1.2.3 (Appendix 10-A) is as follows: "The maximum vanadium concentration in sediment is 37.2 mg/kg dw in Whitefish Lake (LA-5), which exceeds its sediment quality guideline of 35.1 mg/kg dw by approximately 6% (REF value from Burnett-Seidel and Liber, 2013). Therefore, vanadium was identified as a COPC in sediment."</p> | Waterbody Morphometry for Modelled Lakes | | | | | | Waterbody | Average Depth (m) | Area (km²) | Average Outflow (L/s) | Retention Time (day) | Retention Time (month) | Reference Kratchkowsky Lake | 2.9 | 0.80 | 331.2 | 80.66 | 2.69 | Whitefish Lake North | 1.6 | 0.26 | 1379.3 | 3.53 | 0.12 | Whitefish Lake Middle | 1.1 | 0.10 | 1398.5 | 0.88 | 0.03 | Whitefish Lake South | 1.0 | 0.32 | 1414.3 | 2.65 | 0.09 | McGowan Lake | 5.5 | 1.49 | 1832.3 | 51.61 | 1.72 | Russell Lake Inlet | 3.0 | 0.75 | 2390.3 | 10.92 | 0.36 | <p>Item one has been partially met. The corrections made to Table 3-3 of Appendix 10-A do not match the values which were submitted as the first round IR response (Tables IR195-1 and IR195-2 (Modelled Maximum COPC Concentrations in Sediment by Individual Project Phase)). The Proponent should confirm which table contains the correct information, and make any necessary corrections to the revised draft EIS with an explanation for the differences.</p> | <p>The corrections made to Table 3-3 of Appendix 10-A in Round 2 do match the values which were submitted in Round 1 in Tables IR195-1 and IR195-2. (Note that the Draft ERA (Appendix 10-A) erroneously used a higher predicted effluent quality for chloride (640 mg/L) and sulphate (5910 mg/L) which was reduced to 600 mg/L for chloride and 3915 mg/L for sulphate due to ability based on lab tests to meet these lower values.</p> <p>In the IR response the modelled maximum COPC concentrations in water and sediment were presented by individual project phase (operations phase and decommissioning phase, respectively) in Round 1 response in Tables IR195-1 and IR195-2, while in Table 3-3 of Appendix 10-A in Round 2, the maximum concentration of COPCs in water and sediment during All project phases (including both operations phase and decommissioning phase).</p> <p>Note that Table IR195-1 below has a mistake for chloride and sulphate for the concentrations in water during the Operations phase. These values should have been updated to the same values as the decommissioning phase. The figures are correct and no changes are required. Table 3-3 in Appendix 10-A is also correct and no changes are required. See updated Table IR195-1 below for the IR response.</p> |
| Waterbody Morphometry for Modelled Lakes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Waterbody | Average Depth (m) | Area (km²) | Average Outflow (L/s) | Retention Time (day) | Retention Time (month) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reference Kratchkowsky Lake | 2.9 | 0.80 | 331.2 | 80.66 | 2.69 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Whitefish Lake North | 1.6 | 0.26 | 1379.3 | 3.53 | 0.12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Whitefish Lake Middle | 1.1 | 0.10 | 1398.5 | 0.88 | 0.03 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Whitefish Lake South | 1.0 | 0.32 | 1414.3 | 2.65 | 0.09 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| McGowan Lake | 5.5 | 1.49 | 1832.3 | 51.61 | 1.72 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Russell Lake Inlet | 3.0 | 0.75 | 2390.3 | 10.92 | 0.36 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Attachment: IR-195 (included in Round 1 submission)

Table IR195-1: Modelled Maximum COPC Concentrations in Water by Individual Project Phase

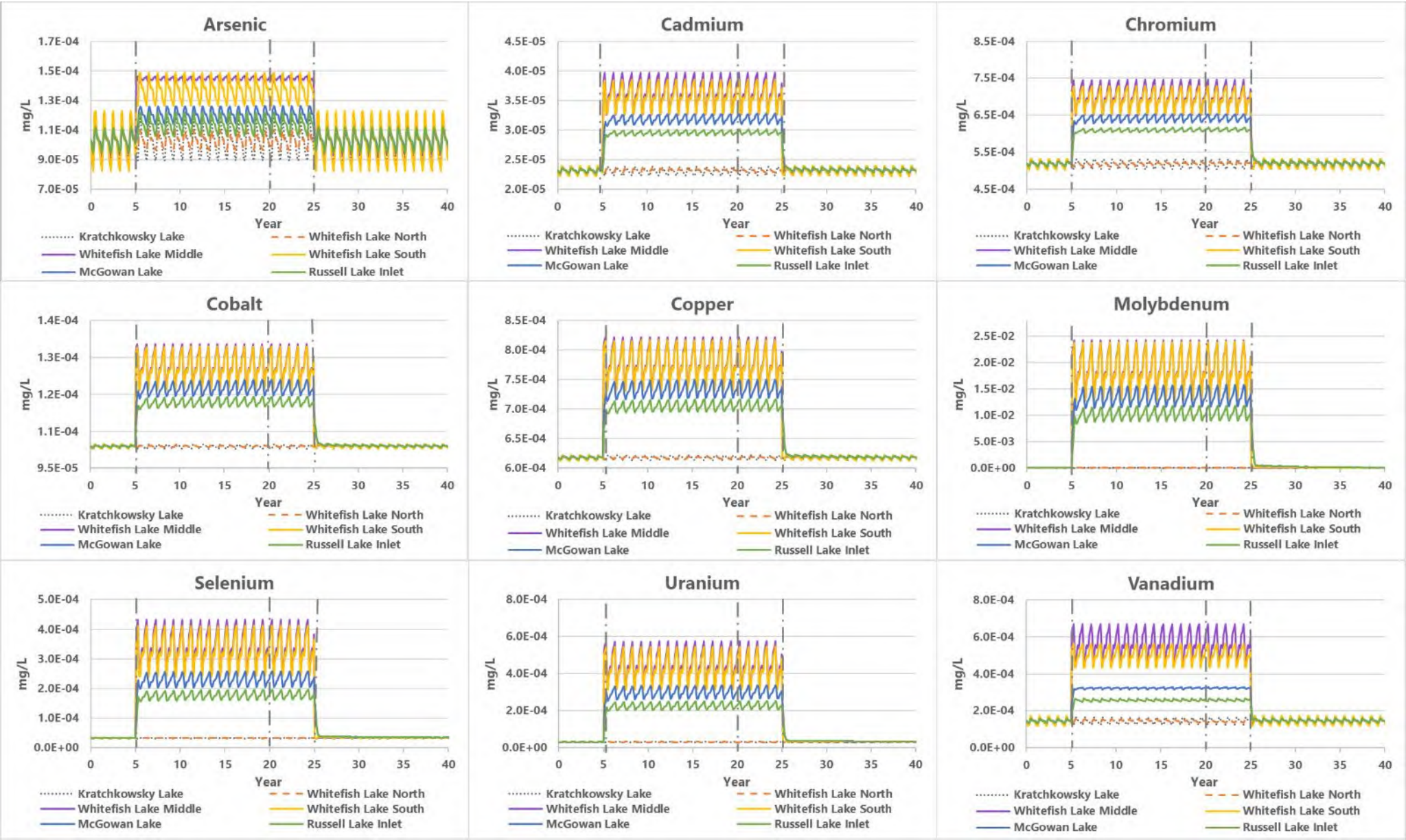
| | Non-radionuclides during Operations Phase (mg/L) | | | | | | | | | | | |
|-----------------------|---|----------|-------------|----------|-------------|----------|------------|----------|----------|----------|--------------|----------|
| Location | Arsenic | Cadmium | Chloride | Cobalt | Chromium | Copper | Molybdenum | Sulphate | Selenium | Uranium | Vanadium | Zinc |
| Kratchkowsky Lake | 1.19E-04 | 2.38E-05 | 3.22E-01 | 1.01E-04 | 5.30E-04 | 6.22E-04 | 1.07E-04 | 6.87E-01 | 3.35E-05 | 3.12E-05 | 1.67E-04 | 7.00E-04 |
| Whitefish Lake North | 1.10E-04 | 2.34E-05 | 3.22E-01 | 1.01E-04 | 5.24E-04 | 6.20E-04 | 1.07E-04 | 6.87E-01 | 3.28E-05 | 3.05E-05 | 1.55E-04 | 6.89E-04 |
| Whitefish Lake Middle | 1.46E-04 | 3.97E-05 | 6.53E+00 | 1.29E-04 | 7.46E-04 | 8.22E-04 | 2.43E-02 | 5.80E+01 | 4.33E-04 | 5.74E-04 | 6.70E-04 | 1.06E-03 |
| Whitefish Lake South | 1.49E-04 | 3.86E-05 | 6.50E+00 | 1.28E-04 | 7.30E-04 | 8.17E-04 | 2.39E-02 | 5.78E+01 | 4.12E-04 | 5.46E-04 | 5.64E-04 | 1.03E-03 |
| McGowan Lake | 1.26E-04 | 3.27E-05 | 4.46E+00 | 1.19E-04 | 6.53E-04 | 7.50E-04 | 1.57E-02 | 3.89E+01 | 2.58E-04 | 3.37E-04 | 3.28E-04 | 9.00E-04 |
| Icelander River | 1.26E-04 | 3.26E-05 | 4.42E+00 | 1.19E-04 | 6.52E-04 | 7.48E-04 | 1.56E-02 | 3.85E+01 | 2.56E-04 | 3.33E-04 | 3.26E-04 | 8.98E-04 |
| Russell Lake Inlet | 1.22E-04 | 3.01E-05 | 3.46E+00 | 1.14E-04 | 6.17E-04 | 7.17E-04 | 1.18E-02 | 2.97E+01 | 1.95E-04 | 2.51E-04 | 2.68E-04 | 8.40E-04 |
| Location | Non-radionuclides during Decommissioning Phase (mg/L) | | | | | | | | | | | |
| Kratchkowsky Lake | 1.19E-04 | 2.38E-05 | 3.22E-01 | 1.01E-04 | 5.30E-04 | 6.22E-04 | 1.07E-04 | 6.87E-01 | 3.35E-05 | 3.12E-05 | 1.67E-04 | 7.00E-04 |
| Whitefish Lake North | 1.10E-04 | 2.34E-05 | 3.22E-01 | 1.01E-04 | 5.24E-04 | 6.20E-04 | 1.07E-04 | 6.87E-01 | 3.28E-05 | 3.05E-05 | 1.55E-04 | 6.89E-04 |
| Whitefish Lake Middle | 1.46E-04 | 3.97E-05 | 6.14E+00 | 1.29E-04 | 7.46E-04 | 8.22E-04 | 2.43E-02 | 3.87E+01 | 4.33E-04 | 5.74E-04 | 6.70E-04 | 1.06E-03 |
| Whitefish Lake South | 1.49E-04 | 3.86E-05 | 6.11E+00 | 1.28E-04 | 7.30E-04 | 8.17E-04 | 2.40E-02 | 3.85E+01 | 4.12E-04 | 5.47E-04 | 5.64E-04 | 1.03E-03 |
| McGowan Lake | 1.26E-04 | 3.28E-05 | 4.20E+00 | 1.19E-04 | 6.54E-04 | 7.50E-04 | 1.58E-02 | 2.60E+01 | 2.59E-04 | 3.38E-04 | 3.28E-04 | 9.01E-04 |
| Icelander River | 1.26E-04 | 3.26E-05 | 4.16E+00 | 1.19E-04 | 6.52E-04 | 7.49E-04 | 1.56E-02 | 2.57E+01 | 2.56E-04 | 3.34E-04 | 3.26E-04 | 8.99E-04 |
| Russell Lake Inlet | 1.22E-04 | 3.01E-05 | 3.26E+00 | 1.14E-04 | 6.17E-04 | 7.17E-04 | 1.18E-02 | 1.99E+01 | 1.95E-04 | 2.52E-04 | 2.69E-04 | 8.40E-04 |
| | Radionuclides during Operations Phase (Bq/L) | | | | | | | | | | | |
| Location | Uranium-238 | | Uranium-234 | | Thorium-230 | | Radium-226 | | Lead-210 | | Polonium-210 | |
| Kratchkowsky Lake | 3.85E-04 | | 3.85E-04 | | 1.01E-02 | | 5.70E-03 | | 6.22E-03 | | 6.33E-03 | |
| Whitefish Lake North | 3.77E-04 | | 3.77E-04 | | 1.01E-02 | | 5.63E-03 | | 5.68E-03 | | 5.78E-03 | |
| Whitefish Lake Middle | 7.05E-03 | | 7.05E-03 | | 1.87E-02 | | 6.87E-03 | | 8.35E-03 | | 6.71E-03 | |
| Whitefish Lake South | 6.71E-03 | | 6.71E-03 | | 1.85E-02 | | 6.73E-03 | | 8.25E-03 | | 7.22E-03 | |
| McGowan Lake | 4.14E-03 | | 4.14E-03 | | 1.57E-02 | | 6.32E-03 | | 6.68E-03 | | 6.23E-03 | |
| Icelander River | 4.10E-03 | | 4.10E-03 | | 1.56E-02 | | 6.32E-03 | | 6.66E-03 | | 6.20E-03 | |
| Russell Lake Inlet | 3.08E-03 | | 3.08E-03 | | 1.43E-02 | | 6.14E-03 | | 6.41E-03 | | 6.16E-03 | |
| Location | Radionuclides during Decommissioning Phase (Bq/L) | | | | | | | | | | | |
| Kratchkowsky Lake | 3.85E-04 | | 3.85E-04 | | 1.01E-02 | | 5.70E-03 | | 6.22E-03 | | 6.33E-03 | |
| Whitefish Lake North | 3.77E-04 | | 3.77E-04 | | 1.01E-02 | | 5.63E-03 | | 5.68E-03 | | 5.78E-03 | |
| Whitefish Lake Middle | 7.05E-03 | | 7.05E-03 | | 1.87E-02 | | 6.87E-03 | | 8.36E-03 | | 6.71E-03 | |
| Whitefish Lake South | 6.72E-03 | | 6.72E-03 | | 1.85E-02 | | 6.73E-03 | | 8.25E-03 | | 7.22E-03 | |
| McGowan Lake | 4.15E-03 | | 4.15E-03 | | 1.57E-02 | | 6.33E-03 | | 6.68E-03 | | 6.23E-03 | |
| Icelander River | 4.11E-03 | | 4.11E-03 | | 1.56E-02 | | 6.32E-03 | | 6.66E-03 | | 6.20E-03 | |
| Russell Lake Inlet | 3.09E-03 | | 3.09E-03 | | 1.43E-02 | | 6.14E-03 | | 6.41E-03 | | 6.16E-03 | |

Table IR195-2: Modelled Maximum COPC Concentrations in Sediment by Individual Project Phase

| | Non-radionuclides during Operations Phase (mg/kg dw) | | | | | | | | | | |
|-----------------------|---|----------|-------------|----------|-------------|----------|------------|----------|----------|----------|--------------|
| Location | Arsenic | Cadmium | Chloride | Cobalt | Chromium | Copper | Molybdenum | Selenium | Uranium | Vanadium | Zinc |
| Kratchkowsky Lake | 8.35E+00 | 3.38E-01 | - | 2.52E-01 | 5.86E+00 | 1.85E+00 | 3.37E-01 | 6.22E-01 | 5.78E-01 | 1.12E+01 | 9.93E+00 |
| Whitefish Lake North | 8.35E+00 | 3.38E-01 | - | 2.52E-01 | 5.86E+00 | 1.85E+00 | 3.37E-01 | 6.22E-01 | 5.78E-01 | 1.12E+01 | 9.93E+00 |
| Whitefish Lake Middle | 1.07E+01 | 4.79E-01 | - | 3.02E-01 | 7.41E+00 | 2.28E+00 | 5.40E+01 | 4.90E+00 | 6.39E+00 | 3.40E+01 | 1.32E+01 |
| Whitefish Lake South | 1.03E+01 | 4.73E-01 | - | 3.02E-01 | 7.35E+00 | 2.28E+00 | 5.30E+01 | 4.70E+00 | 6.12E+00 | 3.06E+01 | 1.31E+01 |
| McGowan Lake | 9.33E+00 | 4.30E-01 | - | 2.88E-01 | 6.90E+00 | 2.16E+00 | 3.88E+01 | 3.33E+00 | 4.26E+00 | 2.08E+01 | 1.21E+01 |
| Russell Lake Inlet | 8.95E+00 | 4.06E-01 | - | 2.80E-01 | 6.63E+00 | 2.09E+00 | 2.95E+01 | 2.60E+00 | 3.26E+00 | 1.73E+01 | 1.15E+01 |
| | Non-radionuclides during Decommissioning Phase (mg/kg dw) | | | | | | | | | | |
| Kratchkowsky Lake | 8.35E+00 | 3.38E-01 | - | 2.52E-01 | 5.86E+00 | 1.85E+00 | 3.37E-01 | 6.22E-01 | 5.78E-01 | 1.12E+01 | 9.93E+00 |
| Whitefish Lake North | 8.35E+00 | 3.38E-01 | - | 2.52E-01 | 5.86E+00 | 1.85E+00 | 3.37E-01 | 6.22E-01 | 5.78E-01 | 1.12E+01 | 9.93E+00 |
| Whitefish Lake Middle | 1.10E+01 | 4.97E-01 | - | 3.05E-01 | 7.59E+00 | 2.31E+00 | 5.72E+01 | 5.48E+00 | 7.18E+00 | 3.72E+01 | 1.36E+01 |
| Whitefish Lake South | 1.05E+01 | 4.90E-01 | - | 3.04E-01 | 7.53E+00 | 2.30E+00 | 5.62E+01 | 5.26E+00 | 6.87E+00 | 3.33E+01 | 1.35E+01 |
| McGowan Lake | 9.47E+00 | 4.43E-01 | - | 2.90E-01 | 7.03E+00 | 2.18E+00 | 4.11E+01 | 3.71E+00 | 4.78E+00 | 2.22E+01 | 1.24E+01 |
| Russell Lake Inlet | 9.04E+00 | 4.15E-01 | - | 2.81E-01 | 6.73E+00 | 2.10E+00 | 3.13E+01 | 2.88E+00 | 3.64E+00 | 1.82E+01 | 1.17E+01 |
| | Radionuclides during Operations Phase (Bq/kg dw) | | | | | | | | | | |
| Location | Uranium-238 | | Uranium-234 | | Thorium-230 | | Radium-226 | | Lead-210 | | Polonium-210 |
| Kratchkowsky Lake | 7.14E+00 | | 7.14E+00 | | 2.32E+01 | | 6.51E+01 | | 3.74E+02 | | 3.80E+02 |
| Whitefish Lake North | 7.14E+00 | | 7.14E+00 | | 2.32E+01 | | 6.51E+01 | | 3.74E+02 | | 3.80E+02 |
| Whitefish Lake Middle | 7.85E+01 | | 7.85E+01 | | 3.77E+01 | | 7.46E+01 | | 5.41E+02 | | 5.42E+02 |
| Whitefish Lake South | 7.51E+01 | | 7.51E+01 | | 3.75E+01 | | 7.41E+01 | | 5.07E+02 | | 5.09E+02 |
| McGowan Lake | 5.23E+01 | | 5.23E+01 | | 3.36E+01 | | 7.15E+01 | | 4.36E+02 | | 4.41E+02 |
| Russell Lake Inlet | 4.01E+01 | | 4.01E+01 | | 3.11E+01 | | 6.98E+01 | | 4.11E+02 | | 4.16E+02 |
| | Radionuclides during Decommissioning Phase (Bq/kg dw) | | | | | | | | | | |
| Kratchkowsky Lake | 7.14E+00 | | 7.14E+00 | | 2.32E+01 | | 6.51E+01 | | 3.74E+02 | | 3.80E+02 |
| Whitefish Lake North | 7.14E+00 | | 7.14E+00 | | 2.32E+01 | | 6.51E+01 | | 3.74E+02 | | 3.80E+02 |
| Whitefish Lake Middle | 8.82E+01 | | 8.82E+01 | | 3.83E+01 | | 7.57E+01 | | 5.57E+02 | | 5.58E+02 |
| Whitefish Lake South | 8.44E+01 | | 8.44E+01 | | 3.80E+01 | | 7.52E+01 | | 5.19E+02 | | 5.22E+02 |
| McGowan Lake | 5.87E+01 | | 5.87E+01 | | 3.41E+01 | | 7.23E+01 | | 4.42E+02 | | 4.47E+02 |
| Russell Lake Inlet | 4.48E+01 | | 4.48E+01 | | 3.15E+01 | | 7.04E+01 | | 4.14E+02 | | 4.20E+02 |

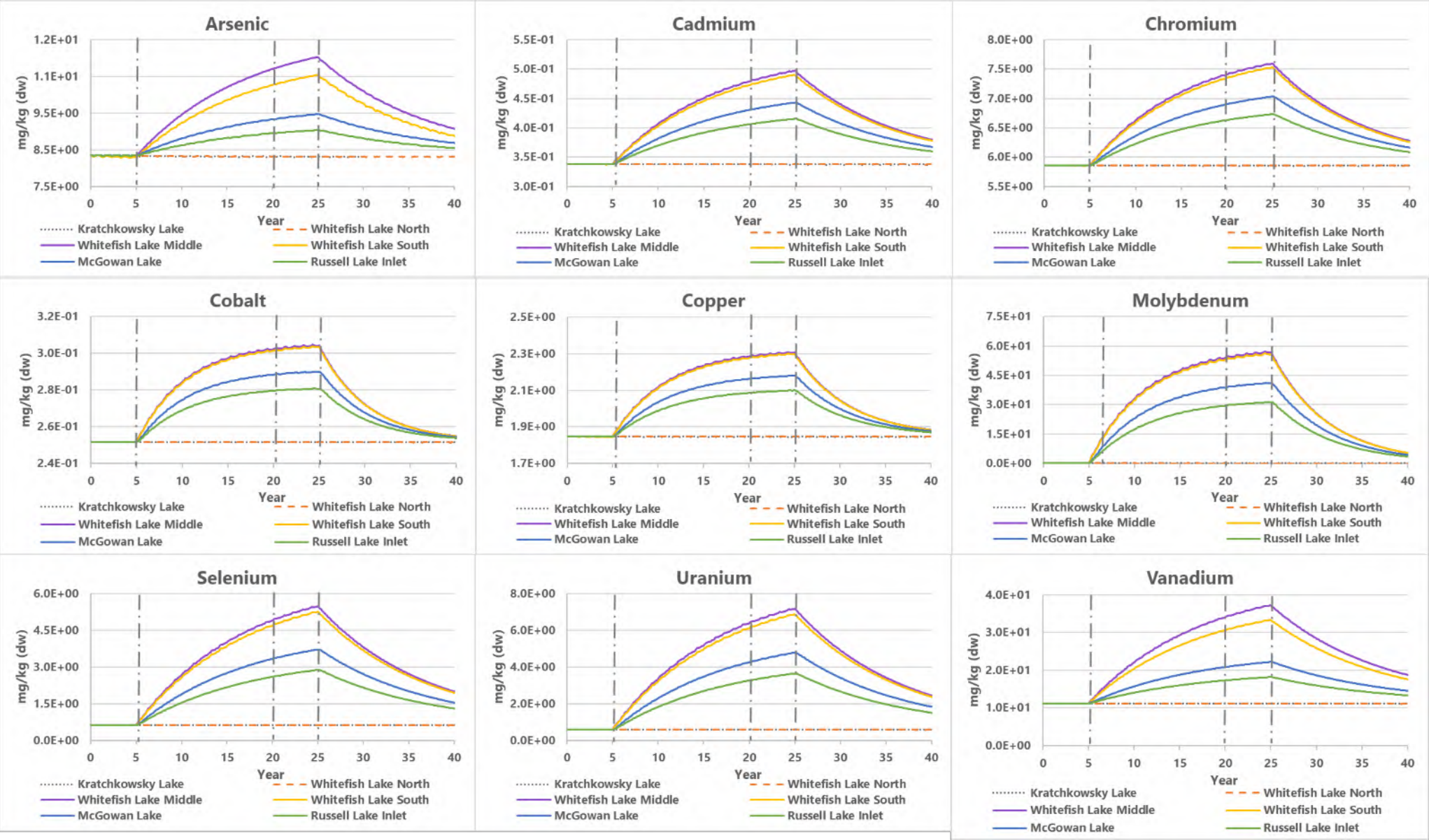
Table IR195-2: Summary of Effluent Quality for the Wheeler River Project during Operations and Decommissioning Phase

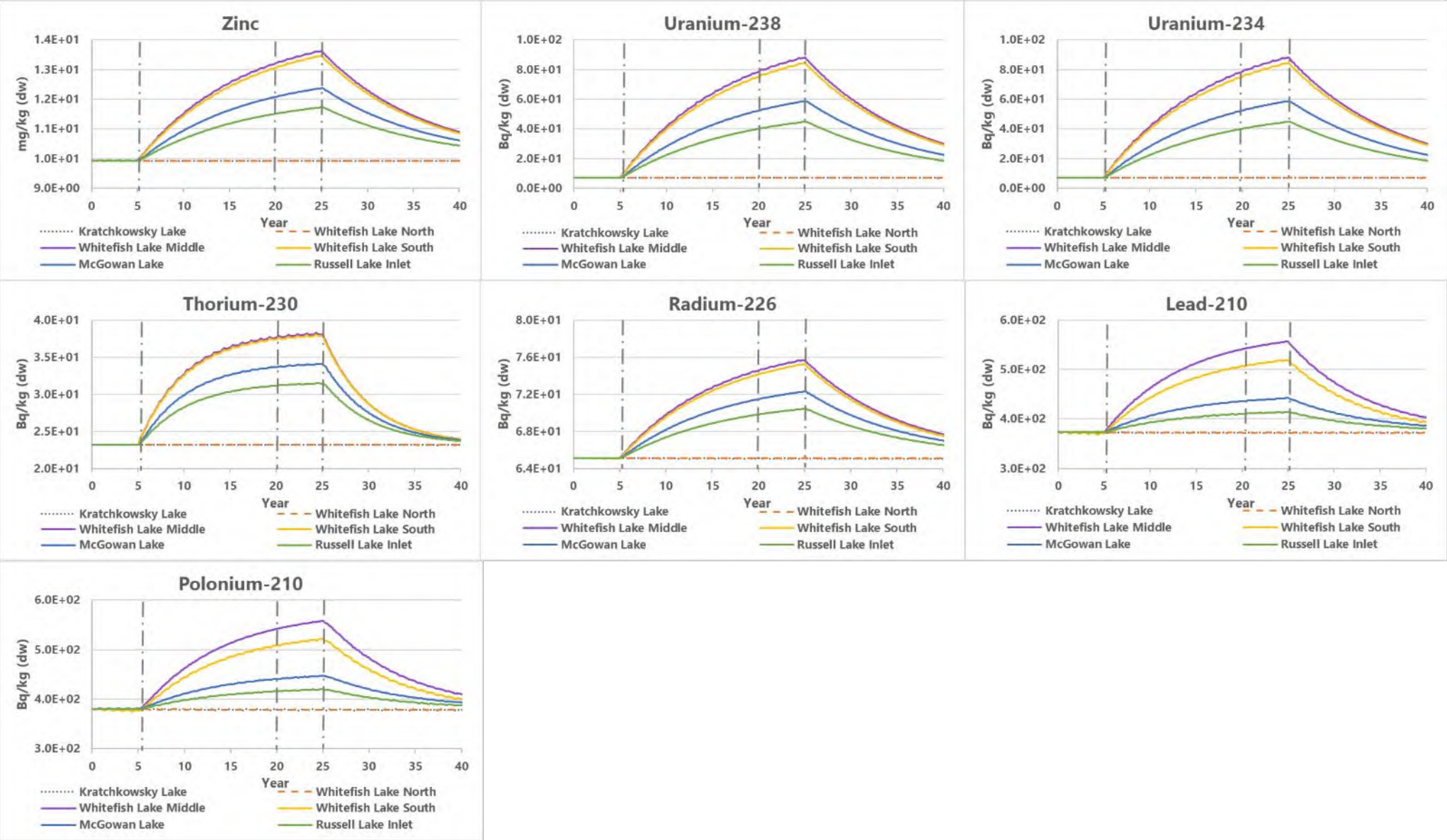
| Constituent of Potential Concern (COPC) | Unit | Effluent Quality |
|---|------|------------------|
| General Chemistry | | |
| Chloride | mg/L | 600 |
| Sulphate | mg/L | 3915 |
| Total Dissolved Solids | mg/L | 6420 |
| Metals and Metalloids | | |
| Arsenic | mg/L | 0.006 |
| Cadmium | mg/L | 0.0018 |
| Chromium | mg/L | 0.025 |
| Cobalt | mg/L | 0.003 |
| Copper | mg/L | 0.022 |
| Molybdenum | mg/L | 2.5 |
| Selenium | mg/L | 0.042 |
| Uranium | mg/L | 0.057 |
| Vanadium | mg/L | 0.059 |
| Zinc | mg/L | 0.042 |
| Radionuclides | | |
| Uranium-238 | Bq/L | 0.7 |
| Uranium-234 | Bq/L | 0.7 |
| Thorium-230 | Bq/L | 0.9 |
| Radium-226 | Bq/L | 0.15 |
| Lead-210 | Bq/L | 0.419 |
| Polonium-210 | Bq/L | 0.15 |



Long dash dot lines separate the time periods of project phases: 3 years baseline; 2 years construction; 15 years operations; 5 years decommissioning; first 15 years post-decommissioning

Figure IR195-1: Modelled Concentrations of COPCs in Water during Project Phases





Long dash dot lines separate the time periods of project phases: 3 years baseline; 2 years construction; 15 years operations; 5 years decommissioning; first 15 years post-decommissioning

Figure IR195-2: Modelled Concentrations of COPCs in Sediment during Project Phases

IR-195 Round 3 – table update

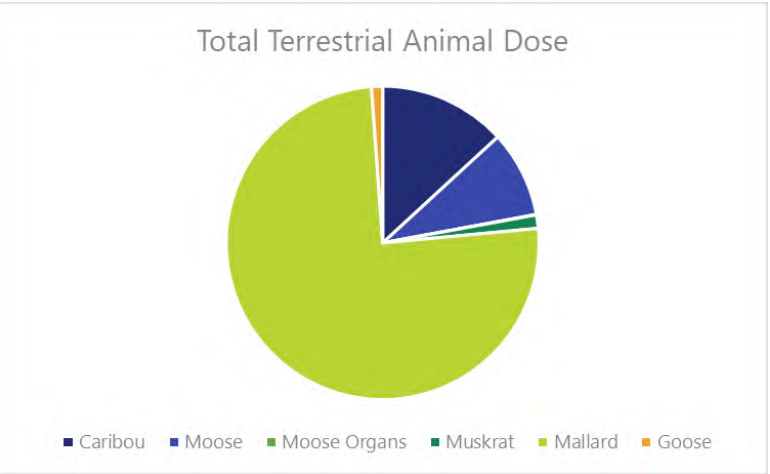
UPDATED Table IR195-1: Modelled Maximum COPC Concentrations in Water by Individual Project Phase

| | Non-radionuclides during Operations Phase (mg/L) | | | | | | | | | | | |
|-----------------------|---|----------|-------------|----------|-------------|----------|------------|----------|----------|----------|--------------|----------|
| Location | Arsenic | Cadmium | Chloride | Cobalt | Chromium | Copper | Molybdenum | Sulphate | Selenium | Uranium | Vanadium | Zinc |
| Kratchkowsky Lake | 1.19E-04 | 2.38E-05 | 3.22E-01 | 1.01E-04 | 5.30E-04 | 6.22E-04 | 1.07E-04 | 6.87E-01 | 3.35E-05 | 3.12E-05 | 1.67E-04 | 7.00E-04 |
| Whitefish Lake North | 1.10E-04 | 2.34E-05 | 3.22E-01 | 1.01E-04 | 5.24E-04 | 6.20E-04 | 1.07E-04 | 6.87E-01 | 3.28E-05 | 3.05E-05 | 1.55E-04 | 6.89E-04 |
| Whitefish Lake Middle | 1.46E-04 | 3.97E-05 | 6.14E+00 | 1.29E-04 | 7.46E-04 | 8.22E-04 | 2.43E-02 | 3.87E+01 | 4.33E-04 | 5.74E-04 | 6.70E-04 | 1.06E-03 |
| Whitefish Lake South | 1.49E-04 | 3.86E-05 | 6.11E+00 | 1.28E-04 | 7.30E-04 | 8.17E-04 | 2.39E-02 | 3.85E+01 | 4.12E-04 | 5.46E-04 | 5.64E-04 | 1.03E-03 |
| McGowan Lake | 1.26E-04 | 3.27E-05 | 4.20E+00 | 1.19E-04 | 6.53E-04 | 7.50E-04 | 1.57E-02 | 2.60E+01 | 2.58E-04 | 3.37E-04 | 3.28E-04 | 9.00E-04 |
| Icelander River | 1.26E-04 | 3.26E-05 | 4.16E+00 | 1.19E-04 | 6.52E-04 | 7.48E-04 | 1.56E-02 | 2.57E+01 | 2.56E-04 | 3.33E-04 | 3.26E-04 | 8.98E-04 |
| Russell Lake Inlet | 1.22E-04 | 3.01E-05 | 3.26E+00 | 1.14E-04 | 6.17E-04 | 7.17E-04 | 1.18E-02 | 1.99E+01 | 1.95E-04 | 2.51E-04 | 2.68E-04 | 8.40E-04 |
| Location | Non-radionuclides during Decommissioning Phase (mg/L) | | | | | | | | | | | |
| Kratchkowsky Lake | 1.19E-04 | 2.38E-05 | 3.22E-01 | 1.01E-04 | 5.30E-04 | 6.22E-04 | 1.07E-04 | 6.87E-01 | 3.35E-05 | 3.12E-05 | 1.67E-04 | 7.00E-04 |
| Whitefish Lake North | 1.10E-04 | 2.34E-05 | 3.22E-01 | 1.01E-04 | 5.24E-04 | 6.20E-04 | 1.07E-04 | 6.87E-01 | 3.28E-05 | 3.05E-05 | 1.55E-04 | 6.89E-04 |
| Whitefish Lake Middle | 1.46E-04 | 3.97E-05 | 6.14E+00 | 1.29E-04 | 7.46E-04 | 8.22E-04 | 2.43E-02 | 3.87E+01 | 4.33E-04 | 5.74E-04 | 6.70E-04 | 1.06E-03 |
| Whitefish Lake South | 1.49E-04 | 3.86E-05 | 6.11E+00 | 1.28E-04 | 7.30E-04 | 8.17E-04 | 2.40E-02 | 3.85E+01 | 4.12E-04 | 5.47E-04 | 5.64E-04 | 1.03E-03 |
| McGowan Lake | 1.26E-04 | 3.28E-05 | 4.20E+00 | 1.19E-04 | 6.54E-04 | 7.50E-04 | 1.58E-02 | 2.60E+01 | 2.59E-04 | 3.38E-04 | 3.28E-04 | 9.01E-04 |
| Icelander River | 1.26E-04 | 3.26E-05 | 4.16E+00 | 1.19E-04 | 6.52E-04 | 7.49E-04 | 1.56E-02 | 2.57E+01 | 2.56E-04 | 3.34E-04 | 3.26E-04 | 8.99E-04 |
| Russell Lake Inlet | 1.22E-04 | 3.01E-05 | 3.26E+00 | 1.14E-04 | 6.17E-04 | 7.17E-04 | 1.18E-02 | 1.99E+01 | 1.95E-04 | 2.52E-04 | 2.69E-04 | 8.40E-04 |
| | Radionuclides during Operations Phase (Bq/L) | | | | | | | | | | | |
| Location | Uranium-238 | | Uranium-234 | | Thorium-230 | | Radium-226 | | Lead-210 | | Polonium-210 | |
| Kratchkowsky Lake | 3.85E-04 | | 3.85E-04 | | 1.01E-02 | | 5.70E-03 | | 6.22E-03 | | 6.33E-03 | |
| Whitefish Lake North | 3.77E-04 | | 3.77E-04 | | 1.01E-02 | | 5.63E-03 | | 5.68E-03 | | 5.78E-03 | |
| Whitefish Lake Middle | 7.05E-03 | | 7.05E-03 | | 1.87E-02 | | 6.87E-03 | | 8.35E-03 | | 6.71E-03 | |
| Whitefish Lake South | 6.71E-03 | | 6.71E-03 | | 1.85E-02 | | 6.73E-03 | | 8.25E-03 | | 7.22E-03 | |
| McGowan Lake | 4.14E-03 | | 4.14E-03 | | 1.57E-02 | | 6.32E-03 | | 6.68E-03 | | 6.23E-03 | |
| Icelander River | 4.10E-03 | | 4.10E-03 | | 1.56E-02 | | 6.32E-03 | | 6.66E-03 | | 6.20E-03 | |
| Russell Lake Inlet | 3.08E-03 | | 3.08E-03 | | 1.43E-02 | | 6.14E-03 | | 6.41E-03 | | 6.16E-03 | |
| Location | Radionuclides during Decommissioning Phase (Bq/L) | | | | | | | | | | | |
| Kratchkowsky Lake | 3.85E-04 | | 3.85E-04 | | 1.01E-02 | | 5.70E-03 | | 6.22E-03 | | 6.33E-03 | |
| Whitefish Lake North | 3.77E-04 | | 3.77E-04 | | 1.01E-02 | | 5.63E-03 | | 5.68E-03 | | 5.78E-03 | |
| Whitefish Lake Middle | 7.05E-03 | | 7.05E-03 | | 1.87E-02 | | 6.87E-03 | | 8.36E-03 | | 6.71E-03 | |
| Whitefish Lake South | 6.72E-03 | | 6.72E-03 | | 1.85E-02 | | 6.73E-03 | | 8.25E-03 | | 7.22E-03 | |
| McGowan Lake | 4.15E-03 | | 4.15E-03 | | 1.57E-02 | | 6.33E-03 | | 6.68E-03 | | 6.23E-03 | |
| Icelander River | 4.11E-03 | | 4.11E-03 | | 1.56E-02 | | 6.32E-03 | | 6.66E-03 | | 6.20E-03 | |
| Russell Lake Inlet | 3.09E-03 | | 3.09E-03 | | 1.43E-02 | | 6.14E-03 | | 6.41E-03 | | 6.16E-03 | |

- SME: ECCC
- Aquatic species
- Appendix 10-A (ERA), Section 3.2

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (Round 3, June 28 2024) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|-----------------------------------|---|---|---|--|--|----------------------------|--|--|--|----|----------------------------|----------------------------|----------------|-------|--------------------------|---------------|----------------|-----|------------------------|---------------------------|--|--------------|--|--|--|----|------------------------------|---------------|-------------------|-------|---------------------------|---------------|--|-----|--------------------------|--------------|--|---|--|--|--|----|---------------------------------|-----------|--------|------|------|----------------------|----------------------------|--------|------|----------|---|--------------------------|--|--|--|----|--------------------------|---------------|---------------------|---|---------------------------|-----------|--------|----|-----------------------|------------|--------|----|----------------------------------|--------------------------|--|---------------------|--|--|--|---|------------------|-------------------------|----------------------------|---|----------------|-----------------------|------------|----|-----------------------------------|--------------------------|--|---|--|--|--|---------------------------------------|--|---------------|--|--|--|---------------|--|----------------------------------|--|----|--|--|--|
| IR-197 | - | <p>Context: It remains unclear if atmospheric deposition from Project related emissions has been incorporated into modelling for the ERA and surface water and sediment quality assessments.</p> <p>Rationale: While expected Project air emissions are unlikely to have direct impacts on the aquatic receiving environment and aquatic biota, this Project effect pathway may have indirect effects through accumulation of COPCs over time or deposition of contaminants that are not expected in effluent, which should be evaluated with predicted emissions data incorporated into water quality modelling predictions.</p> | Incorporate atmospheric deposition from Project-related emissions into water quality modelling and assess any Project related effects to aquatic receptors from this pathway. | <p>Consistent with CSA N288.1-20, Clause 5.1.5, atmospheric depositions to large water bodies such as lakes, are considered negligible; therefore, the air to surface water pathway has been excluded for the ecological risk assessment. The rationale for exclusion of atmospheric deposition to lakes and rivers is explained in detail in Section G9, Appendix G of the COG DRL Guidance Document (Hart, 2019). Typical transfer parameters from source to air and source to water are on a similar magnitude to each other. The transfer parameter from air to water is orders of magnitude lower indicating that atmospheric deposition to the lake would have a negligible effect. Rationale on the exclusion of the air to water pathway can be included in the ERA in Appendix 10-A. The following statement will be added to Section 2.2 in Appendix A to Appendix 10-A "Atmospheric deposition to Whitefish Lake is considered negligible. This is consistent with the COG DRL guidance (COG, 2019) which shows (assuming a modest flow rate for a lake of 0.1 m/s and an assumed water depth of 10 m) that the transfer of constituents from the atmosphere to large bodies of water (including lakes and rivers) is considered negligible."</p> <p>References: Hart, D. 2019. Derived Release Limits Guidance. COG-06-3090R4-I</p> | <p>This response has not been accepted, as the Proponent has not provided a valid explanation for not incorporating atmospheric deposition from Project-related air emissions into water quality modelling and assessing Project-related effects to aquatic receptors from this pathway.</p> <p>In the Proponent's response it is stated: "Consistent with CSA N288.1-20, Clause 5.1.5, atmospheric depositions to large water bodies such as lakes, are considered negligible; therefore, the air to surface water pathway has been excluded for the ecological risk assessment. The rationale for exclusion of atmospheric deposition to lakes and rivers is explained in detail in Section G9, Appendix G of the COG DRL Guidance Document (Hart, 2019)." However, both of these documents explicitly apply to human dose rate calculations and models for human endpoints from radiation effects of radionuclides; they do not cover non- human biota nor non-radionuclide COPCs or chemical toxicity of radionuclides. Atmospheric deposition rates to large water bodies may be negligible for dose rates to human biota as they are not likely to be directly impacted or in the near-field vicinity. However, this may not be the case for aquatic receptors directly within the receiving environment.</p> <p>A sufficient explanation for exclusion of atmospheric deposition of COPCs to surface water from Project activities has not been provided from an ecological perspective. This Project effect pathway may have effects on the aquatic receiving environment through accumulation of COPCs over time or deposition of contaminants that are not expected in effluent, which should be evaluated with predicted emissions data incorporated into water quality modelling predictions. ECCC requires atmospheric deposition from Project-related emissions to be incorporated into water quality modelling and that the Proponent assess any Project-related effects to aquatic receptors from this pathway in order to assess potential effects on the aquatic receiving environment.</p> <p>Incorporate atmospheric deposition from Project-related emissions into water quality modelling and assess any Project-related effects to aquatic receptors from this pathway. Review CSA N288.6, otherwise, provide valid rationale from an ecological perspective for the elimination of this potential Project effects pathway.</p> | <p>Atmospheric deposition to large waterbodies is explicitly excluded in the CSA N288.1 model. This assumption is valid for both human and ecological assessments. The N288.1 standard indicates in Section 1.5 of the Scope that the models can be used to support dose calculations for non-human biota.</p> <p>The N288.1 rationale is that atmospheric input to water is very small relative to direct input to water. This conclusion applies to assessment for both human and ecological assessments, as well as radionuclides and non-radionuclides. The rationale in the IR response applies. However, calculations have been done for the Project to confirm the expectation that atmospheric input to water will be negligible.</p> <p>The following calculation shows for the Project that the atmospheric input of uranium to Whitefish Lake (LA-5) is very small relative to the direct input to water via effluent.</p> <table><tr><td colspan="4">P01=X1/X0(a)</td></tr><tr><td>X1</td><td>Air Concentration (LA-5) U</td><td>3.45E-05 mg/m³</td><td>EIS Appendix 6</td></tr><tr><td>X0(a)</td><td>Atmospheric Release Rate</td><td>6.83E+01 mg/s</td><td>EIS Appendix 6</td></tr><tr><td>P01</td><td>Transfer source to air</td><td>5.05E-07 s/m³</td><td></td></tr><tr><td colspan="4">P02=X2/X0(w)</td></tr><tr><td>X2</td><td>Water Concentration (LA-5) U</td><td>5.74E-04 mg/L</td><td>From IMPACT Model</td></tr><tr><td>X0(w)</td><td>Effluent Release Rate (U)</td><td>5.78E-01 mg/s</td><td>U Effluent Concentration x Effluent Flowrate</td></tr><tr><td>P02</td><td>Transfer source to water</td><td>9.93E-04 s/L</td><td></td></tr><tr><td colspan="4">P12 = Vg (A/V)10⁻³/(λs+λw)</td></tr><tr><td>Vg</td><td>Atmospheric deposition velocity</td><td>0.003 m/s</td><td>N288.1</td></tr><tr><td>Area</td><td>LA-5</td><td>96940 m²</td><td>site-specific (Appendix A)</td></tr><tr><td>Volume</td><td>LA-5</td><td>106634 m</td><td>site-specific (Appendix A) (Area*Depth)</td></tr><tr><td colspan="4">λs = DR • ρ • Kd • (A/V)</td></tr><tr><td>DR</td><td>Sediment deposition rate</td><td>6.34E-08 mm/s</td><td>Assumption (2mm/yr)</td></tr><tr><td>ρ</td><td>sediment dry bulk density</td><td>0.11 kg/L</td><td>N288.1</td></tr><tr><td>Kd</td><td>partition coefficient</td><td>20000 L/kg</td><td>N288.1</td></tr><tr><td>λs</td><td>sedimentation loss rate constant</td><td>1.27E-07 s⁻¹</td><td></td></tr><tr><td colspan="4">λw = U • CA/V = Q/V</td></tr><tr><td>Q</td><td>Inflow into LA-5</td><td>1.379 m³/s</td><td>site-specific (Appendix A)</td></tr><tr><td>V</td><td>Volume of LA-5</td><td>106634 m³</td><td>Area*Depth</td></tr><tr><td>λw</td><td>loss via water flow rate constant</td><td>1.29E-05 s⁻¹</td><td></td></tr><tr><td colspan="4">P12 = Vg (A/V)10⁻³/(λs+λw)</td></tr><tr><td colspan="2">Water conc'n from air = X0(a)*P01*P12</td><td>7.20E-06 mg/L</td><td></td></tr><tr><td colspan="2">Water conc'n from effluent = X0(w)*P02</td><td>5.74E-04 mg/L</td><td></td></tr><tr><td colspan="2">% Contribution to Water from Air</td><td>1%</td><td></td></tr></table> <p>The following statement has been added to Section 2.2 in Appendix A to Appendix 10-A</p> <p>"Atmospheric deposition to Whitefish Lake is considered negligible. This is consistent with the COG DRL guidance (COG, 2019) which shows that the transfer of constituents from the atmosphere to large bodies of water (including lakes and rivers) is considered negligible."</p> <p>The calculation has also been added to Section 2.2 of Appendix A for reference.</p> <p>References:</p> <p>Hart, D. 2019. Derived Release Limits Guidance. COG-06-3090R4-I</p> | P01=X1/X0(a) | | | | X1 | Air Concentration (LA-5) U | 3.45E-05 mg/m ³ | EIS Appendix 6 | X0(a) | Atmospheric Release Rate | 6.83E+01 mg/s | EIS Appendix 6 | P01 | Transfer source to air | 5.05E-07 s/m ³ | | P02=X2/X0(w) | | | | X2 | Water Concentration (LA-5) U | 5.74E-04 mg/L | From IMPACT Model | X0(w) | Effluent Release Rate (U) | 5.78E-01 mg/s | U Effluent Concentration x Effluent Flowrate | P02 | Transfer source to water | 9.93E-04 s/L | | P12 = Vg (A/V)10 ⁻³ /(λs+λw) | | | | Vg | Atmospheric deposition velocity | 0.003 m/s | N288.1 | Area | LA-5 | 96940 m ² | site-specific (Appendix A) | Volume | LA-5 | 106634 m | site-specific (Appendix A) (Area*Depth) | λs = DR • ρ • Kd • (A/V) | | | | DR | Sediment deposition rate | 6.34E-08 mm/s | Assumption (2mm/yr) | ρ | sediment dry bulk density | 0.11 kg/L | N288.1 | Kd | partition coefficient | 20000 L/kg | N288.1 | λs | sedimentation loss rate constant | 1.27E-07 s ⁻¹ | | λw = U • CA/V = Q/V | | | | Q | Inflow into LA-5 | 1.379 m ³ /s | site-specific (Appendix A) | V | Volume of LA-5 | 106634 m ³ | Area*Depth | λw | loss via water flow rate constant | 1.29E-05 s ⁻¹ | | P12 = Vg (A/V)10 ⁻³ /(λs+λw) | | | | Water conc'n from air = X0(a)*P01*P12 | | 7.20E-06 mg/L | | Water conc'n from effluent = X0(w)*P02 | | 5.74E-04 mg/L | | % Contribution to Water from Air | | 1% | | <p>The Proponent is not using the correct CSA standard to address this information requirement. The response refers to guidance from CSA N288.1 (i.e., <i>Guidelines for modelling radionuclide environmental transport, fate and exposure associated with the normal operation of nuclear facilities</i>), however, the information requirement specifies CSA N288.6, which is a different standard. In lieu of requesting information on atmospheric deposition of all contaminants of potential concern (COPC) to surface water and associated effects, the Proponent should:</p> <ol style="list-style-type: none">1. Provide an estimate of atmospheric deposition of mercury (all species) from Project-related emissions. Include a sensitivity analysis as well as expected seasonal variations in the deposition rate with an emphasis on accumulated deposition for the lake ice breakup period.2. Update water quality mercury predictions (all species) for Whitefish Lake using scenario(s) that incorporate atmospheric deposition from Project-related emissions. Based on the findings, assess any Project-related effects to aquatic receptors from mercury (all species). Discuss potential effects on sediment quality.3. Discuss how the response was informed by the CSA N288.6 standard (i.e., <i>Environmental risk assessments at class I nuclear facilities and uranium mines and mills</i>. CSA Group; February 2022). | <ol style="list-style-type: none">1. There are no Project-related emissions of mercury to air therefore the request to estimate atmospheric deposition of mercury from Project-related emissions is not applicable. The Round 2 IR response provided an example for uranium to show how atmospheric deposition to lakes is considered minor.2. There are no Project-related emissions of mercury to air therefore the request to estimate atmospheric deposition of mercury from Project-related emissions is not applicable.3. The CSA N288.6 standard provides guidance on conducting environmental risk assessment, but does not provide detailed guidance on fate and transport models. The CSA N288.6 standard refers to other documents for the details. This includes CSA N288.1. For example, Clause 1.4 of N288.6 states "An understanding of the fate and transport of contaminants in the environment is necessary for performing an ERA; however, a detailed discussion of fate and transport models is outside the scope of this Standard. The risk assessor should consult CSA N288.1 for information on these concepts. Examples of additional models are provided in Clause 6.3.7." The examples of models provided include N288.1 as well as the IMPACT model which implements the equations in N288.1. |
| P01=X1/X0(a) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| X1 | Air Concentration (LA-5) U | 3.45E-05 mg/m ³ | EIS Appendix 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| X0(a) | Atmospheric Release Rate | 6.83E+01 mg/s | EIS Appendix 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| P01 | Transfer source to air | 5.05E-07 s/m ³ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| P02=X2/X0(w) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| X2 | Water Concentration (LA-5) U | 5.74E-04 mg/L | From IMPACT Model | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| X0(w) | Effluent Release Rate (U) | 5.78E-01 mg/s | U Effluent Concentration x Effluent Flowrate | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| P02 | Transfer source to water | 9.93E-04 s/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| P12 = Vg (A/V)10 ⁻³ /(λs+λw) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Vg | Atmospheric deposition velocity | 0.003 m/s | N288.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Area | LA-5 | 96940 m ² | site-specific (Appendix A) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Volume | LA-5 | 106634 m | site-specific (Appendix A) (Area*Depth) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| λs = DR • ρ • Kd • (A/V) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DR | Sediment deposition rate | 6.34E-08 mm/s | Assumption (2mm/yr) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ρ | sediment dry bulk density | 0.11 kg/L | N288.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Kd | partition coefficient | 20000 L/kg | N288.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| λs | sedimentation loss rate constant | 1.27E-07 s ⁻¹ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| λw = U • CA/V = Q/V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Q | Inflow into LA-5 | 1.379 m ³ /s | site-specific (Appendix A) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| V | Volume of LA-5 | 106634 m ³ | Area*Depth | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| λw | loss via water flow rate constant | 1.29E-05 s ⁻¹ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| P12 = Vg (A/V)10 ⁻³ /(λs+λw) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Water conc'n from air = X0(a)*P01*P12 | | 7.20E-06 mg/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Water conc'n from effluent = X0(w)*P02 | | 5.74E-04 mg/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| % Contribution to Water from Air | | 1% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

- Department: HC
- Project Effects Link: Change to an environmental component due to radiological contaminants
- Reference to EIS, appendices, or supporting documentation: Appendix 10-A (ERA) Appendix B, Tables B.7 and B.8 Ref. 19-2638 Appendix 10-A (ERA), Table 4-3 Ref. 19-2638 (p. 4.17)

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, June 28, 2024) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|----------------|---|---|---|--|--|---|---|-------|-------|--------|--------|--------|--------|-------|----------------------------|-------|----------|----------|----------|----------|----------|----------|--|----------------------------|-------|----------|----------|----------|----------|----------|----------|--|---|-------|----------|----------|----------|----------|----------|----------|--|------------------------|-------|----------|----------|----------|----------|----------|----------|--|-------------------------------|-------|----------|----------|----------|----------|----------|----------|----------|---|-------|----------|----------|----------|----------|----------|----------|----------|---------------------------------|-------|----------|----------|----------|----------|----------|----------|----------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|-----|-----|
| IR-198 | - | <p>Context: Section 10 Appendix 10-A (ERA) contains Table 4-3 (p. 4.17), which lists ingestion rates for traditional foods and includes the category “organs” for Mammals.</p> <p>Tables B.7 and Table B.8 in Section 10 Appendix 10-A (ERA) Ref. 19-2638 provide the predicted concentrations of radionuclides for ecological receptors during the project phases and during future centuries, respectively. They list the concentrations of radionuclides in moose and in moose organs, which is presented as a single cumulative organ value. Other terrestrial and aquatic animals (such as the black bear and woodland caribou) that are a part of the traditional diet of nearby Indigenous communities have higher concentrations of radionuclides than moose, yet concentrations are not provided for organs of these species.</p> <p>Rationale: While Health Canada is not aware of transfer factors to individual organs, or to organs in animals that are not ruminants, it would be beneficial to have a better understanding of radionuclide concentrations in the organs of other animals that may be consumed by local Indigenous communities.</p> | <p>1. Provide more clarification on how the mammalian organ ingestion rates are calculated (which animals and relative contribution percentages).</p> <p>2. Provide a rationale for why concentrations of radionuclides were not assessed in organs of animals (other than moose) that are consumed as country foods by Indigenous people harvesting in the area.</p> | <p>The response to IR-198 is provided in Attachment IR-198.</p> | <p>This response has not been accepted, as the assessment should consider organ meats from different animals if these are consumed by local population, and estimated consumption rates should be confirmed.</p> <p>The response to IR-198 presents the estimated radionuclide concentrations in moose and caribou organ meats (as mass concentrations), where the concentrations of certain radionuclides (U-238, U-234, Pb-210 and Po-210) in caribou organ meat are indeed estimated to be higher than in moose organ meat. However, the response also indicates that moose organ meat consumption represents the large majority of organ meat consumption (~80%), roughly offsetting the higher concentrations in caribou organs. When calculating tissue concentrations of radionuclides, the higher consumption rate of moose organ meat in comparison to caribou organ meat appears insufficient to compensate for the higher estimated concentrations of U-238, U-234, Pb-210 and Po-210 in caribou meat and as a result, exposures to these radionuclides from organ meat consumption may be underestimated. Health Canada recommends assessing moose and caribou organ meat separately (rather than using moose as a proxy) to confirm that COPCs including radionuclides from organ meat consumption have not been underestimated.</p> <p>IR-198 also includes additional information on organ meat consumption rates for the La Plonge and Patuanak communities to estimate dietary exposure via organ consumption, but it is unclear how these relate to the values used in the Draft EIS and ERA (Appendix 10-A). Specifically, Page 4.16 of Appendix 10-A: Environmental Risk Assessment for Wheeler River (September 9, 2022) states:</p> <p>“As a conservative approach for this assessment, the Patuanak diet was selected to represent the average traditional foods consumer in the HHRA”</p> <p>However, Table 4-4 (p. 4.19) reports an annual organ meat consumption rate of 4.49 kg for the adult average traditional food consumer while the reported daily Patuanak consumption rate for organ meat is 16.2 g (Table 4-3; p.4.17), which equates to an annual rate of 5.91 kg. Health Canada recommends a rationale be provided for this discrepancy, and if necessary, the correct estimated rate and associated assessment calculations.</p> <p>See also follow-up IR-198-R1.</p> | <p>Consistent with the requirements in CSA N288.6:22, the ERA undergoes a periodic review process every 5 years to ensure the assumptions are still valid and to improve modelling and reduce uncertainty. Based on current understanding of the ERFN diet, there is no need to include caribou organs as a separate organ. As indicated in the original IR Response in Attachment IR-198 (See Annex 1), approximately 80% of the organs consumed by ERFN is moose organs, and 20% is caribou organs. Note, that there was a units error in IR-198 Table 3: Estimated Tissue Concentrations of Moose Organs and Woodland Caribou Organs at McGowan Lake. The unit is Bq/kg fw, not mg/kg fw as shown in the table. The numbers in IR-198 Table 3 are correct for Bq/kg fw. The reviewer is asking for clarification on the discrepancy between the annual organ meat consumption rate of 4.49 kg for the adult average traditional food consumer (Table 4-4) versus the reported Patuanak consumption rate for organ meat of 5.91 kg/yr (16.2 g/d) (Table 4-3; p.4.17). The ingestion rates that represent the Patuanak consumption rates from the ERFN study were modified as follows:</p> <ul style="list-style-type: none">- Based on the ERFN study, the total Patuanak organ meat consumption rate was 5.91 kg/year which includes all organs. The ingestion rate was modified to remove organs that were not moose resulting in a moose organ ingestion rate of 4.49 kg/year.- The total large mammal meat consumption rate was 12.95 kg/year (35.5 g/d). The ingestion rate for large mammals was increased to 14.38 kg/year to account for caribou organs in the caribou meat ingestion rate (caribou meat = 1.2 kg/year, caribou organ = 1.4 kg/year).- The total ingestion rate for all country foods is 72.5 kg/year (199 g/d as per Table 4-3 in Appendix 10-A) which is consistent with the total Patuanak ingestion rate from the ERFN study.- Based on the rationale in the above bullets no changes are needed to the diet. <p>As illustrated in the bullets above, caribou organ ingestion was not ignored, but was assessed as part of caribou meat ingestion.</p> <p>To illustrate that the current assumptions used in the HHRA of ingestion of moose organs and caribou as meat only, a comparison is provided in the table below of human dose from moose organs, caribou assessed as meat, and caribou assessed as organs. The total dose to a person eating moose organs is the same order of magnitude as the total dose to a person eating caribou organs (note that this represents total dose, not incremental dose as shown in the ERA and is used for illustrative purposes only). Additionally, there is limited difference in the results whether caribou organ intake is assessed as meat or as organs. For some radionuclides (Ra-226, Po-210) the dose for caribou assessed as meat is higher and for other radionuclides (U-238, U-234, Th-230, Pb-210) the dose for caribou assessed as organs is higher.</p> <table><tr><th>Parameter</th><th>Unit</th><th>U-238</th><th>U-234</th><th>Th-230</th><th>Ra-226</th><th>Pb-210</th><th>Po-210</th><th>Total</th></tr><tr><td>Moose organs Concentration</td><td>Bq/kg</td><td>6.13E-02</td><td>6.13E-02</td><td>3.04E+00</td><td>8.77E-02</td><td>7.15E+00</td><td>1.30E-02</td><td></td></tr><tr><td>Caribou meat Concentration</td><td>Bq/kg</td><td>1.41E-01</td><td>1.41E-01</td><td>1.11E-02</td><td>1.13E-01</td><td>1.80E+00</td><td>8.58E+00</td><td></td></tr><tr><td>Caribou organs Concentration (scaled from meat based on TF)</td><td>Bq/kg</td><td>2.49E-01</td><td>2.49E-01</td><td>3.04E+00</td><td>6.31E-02</td><td>5.66E+01</td><td>8.58E-02</td><td></td></tr><tr><td>Dose Coefficient (DCF)</td><td>Sv/Bq</td><td>4.90E-08</td><td>4.90E-08</td><td>2.10E-07</td><td>2.80E-07</td><td>6.70E-07</td><td>1.20E-06</td><td></td></tr><tr><td>Human Dose - Moose Organs (a)</td><td>mSv/a</td><td>1.35E-05</td><td>1.35E-05</td><td>2.87E-03</td><td>1.10E-04</td><td>2.16E-02</td><td>7.04E-05</td><td>2.47E-02</td></tr><tr><td>Human Dose - Caribou Organs as Meat (b)</td><td>mSv/a</td><td>9.84E-06</td><td>9.84E-06</td><td>3.32E-06</td><td>4.50E-05</td><td>1.72E-03</td><td>1.47E-02</td><td>1.64E-02</td></tr><tr><td>Human Dose - Caribou Organs (b)</td><td>mSv/a</td><td>1.74E-05</td><td>1.74E-05</td><td>9.10E-04</td><td>2.51E-05</td><td>5.40E-02</td><td>1.47E-04</td><td>5.51E-02</td></tr><tr><td colspan="9">a) based on moose organ ingestion rate of 4.5 kg/a</td></tr><tr><td colspan="9">b) based on caribou organ ingestion rate of 1.4 kg/a</td></tr></table> <p>Overall, caribou ingestion is not ignored in the HHRA, and whether or not they are assessed as meat or as organs makes little difference to the total dose from terrestrial animal ingestion, as the dose is dominated by ingestion of mallard as shown in the pie chart below. The caribou contribution to total dose is minimal since the total dose is well below the dose limit of 1 mSv/year; therefore, no changes are made to the ERA at this time.</p>  | Parameter | Unit | U-238 | U-234 | Th-230 | Ra-226 | Pb-210 | Po-210 | Total | Moose organs Concentration | Bq/kg | 6.13E-02 | 6.13E-02 | 3.04E+00 | 8.77E-02 | 7.15E+00 | 1.30E-02 | | Caribou meat Concentration | Bq/kg | 1.41E-01 | 1.41E-01 | 1.11E-02 | 1.13E-01 | 1.80E+00 | 8.58E+00 | | Caribou organs Concentration (scaled from meat based on TF) | Bq/kg | 2.49E-01 | 2.49E-01 | 3.04E+00 | 6.31E-02 | 5.66E+01 | 8.58E-02 | | Dose Coefficient (DCF) | Sv/Bq | 4.90E-08 | 4.90E-08 | 2.10E-07 | 2.80E-07 | 6.70E-07 | 1.20E-06 | | Human Dose - Moose Organs (a) | mSv/a | 1.35E-05 | 1.35E-05 | 2.87E-03 | 1.10E-04 | 2.16E-02 | 7.04E-05 | 2.47E-02 | Human Dose - Caribou Organs as Meat (b) | mSv/a | 9.84E-06 | 9.84E-06 | 3.32E-06 | 4.50E-05 | 1.72E-03 | 1.47E-02 | 1.64E-02 | Human Dose - Caribou Organs (b) | mSv/a | 1.74E-05 | 1.74E-05 | 9.10E-04 | 2.51E-05 | 5.40E-02 | 1.47E-04 | 5.51E-02 | a) based on moose organ ingestion rate of 4.5 kg/a | | | | | | | | | b) based on caribou organ ingestion rate of 1.4 kg/a | | | | | | | | | n/a | n/a |
| Parameter | Unit | U-238 | U-234 | Th-230 | Ra-226 | Pb-210 | Po-210 | Total | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Moose organs Concentration | Bq/kg | 6.13E-02 | 6.13E-02 | 3.04E+00 | 8.77E-02 | 7.15E+00 | 1.30E-02 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Caribou meat Concentration | Bq/kg | 1.41E-01 | 1.41E-01 | 1.11E-02 | 1.13E-01 | 1.80E+00 | 8.58E+00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Caribou organs Concentration (scaled from meat based on TF) | Bq/kg | 2.49E-01 | 2.49E-01 | 3.04E+00 | 6.31E-02 | 5.66E+01 | 8.58E-02 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dose Coefficient (DCF) | Sv/Bq | 4.90E-08 | 4.90E-08 | 2.10E-07 | 2.80E-07 | 6.70E-07 | 1.20E-06 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Human Dose - Moose Organs (a) | mSv/a | 1.35E-05 | 1.35E-05 | 2.87E-03 | 1.10E-04 | 2.16E-02 | 7.04E-05 | 2.47E-02 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Human Dose - Caribou Organs as Meat (b) | mSv/a | 9.84E-06 | 9.84E-06 | 3.32E-06 | 4.50E-05 | 1.72E-03 | 1.47E-02 | 1.64E-02 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Human Dose - Caribou Organs (b) | mSv/a | 1.74E-05 | 1.74E-05 | 9.10E-04 | 2.51E-05 | 5.40E-02 | 1.47E-04 | 5.51E-02 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| a) based on moose organ ingestion rate of 4.5 kg/a | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| b) based on caribou organ ingestion rate of 1.4 kg/a | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IR-198 | IR-198-R1 | Environmental Risk Assessment for Wheeler River (September 9, 2022) does not include an assessment of radionuclides based on their mass concentrations in country foods (the | | | 1. Provide a rationale on why radionuclide mass concentrations were not assessed for their impact to human health. | 1. Uranium was assessed as both a chemical constituent and a radionuclide constituent. The other radionuclides in the U-238 decay chain were assessed for their radiotoxicity and not their chemical toxicity. This is consistent with the PSL2 Assessment Report which indicates that because of uranium’s relatively low specific activity, uranium is the only radionuclide (in the uranium and thorium decay chains) with greater potential to be more chemotoxic than radiotoxic; therefore, it is important to assess its chemical toxicity (GC & EC, 2006). To illustrate, the effluent quality of Pb-210 | Note To Denison: This IR is being conditionally accepted. If Denison commits to monitoring lead and mercury in country foods, as well as including these in any further assessment conducted to determine their | See response to IR-100 (round 3) and updated commitment 8-44. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Original IR# | Follow-Up IR # | Context and Rationale | IR (ROUND 1, March 2023) | Denison Response (ROUND 1, August 2023) | IR (ROUND 2, December 2023) | Denison Response (ROUND 2, Feb. 2024) | IR (ROUND 3, May 31, 2024) | Denison Response (ROUND 3, June 28, 2024) |
|--------------|----------------|---|--------------------------|---|---|---|---|---|
| | | <p>assessment is only based on radionuclide concentrations).</p> <p>Context: As part of the response to IR-198 estimated Pb-210 concentrations in moose organ and caribou organ of 7.15 and 49.4 mg/kg (ww) are reported, respectively. However, Appendix 10-A: Environmental Risk Assessment for Wheeler River (September 9, 2022) does not include an assessment of lead among the non-radionuclide COPCs.</p> <p>Using the organ meat consumption figure from the Patuanak community (16.2 g/day), exposure to Pb-210 from caribou organ meat is estimated at over 11 ug/kg bw per day (based on the response to IR-198) which would be close to 10 times greater than the 95th percentile dietary lead exposure estimates for the general Canadian population consuming retail foods.</p> <p>Rationale: While the abundance of radionuclides may pose a health risk with respect to radioactivity, their presence as chemical contaminants may also have an impact on health. This is demonstrated by the case of Pb-210 described above.</p> <p>Due to their potential toxicological significance to human health, Health Canada recommends assessing arsenic, cadmium, lead and mercury as part of country food assessment, regardless of the method employed to determine COPCs.</p> | | | <p>2. Provide an assessment of Lead (Pb) as a chemical contaminant (non-radionuclide) COPC to better understand potential health risks and inform management, mitigation, monitoring and/or follow-up planning.</p> | <p>(as per Table 3-1 in Appendix 10-A) is 4.19E-01 mg/L. Using a specific activity of 2.86E+12 Bq/g for Pb-210 (www.wise-uranium.org/nucv.html), the mass concentration is 1.48E-10 mg/L. This is significantly lower than the lead concentration in the effluent of 3.00E-04 mg/L (as per Table 3-1 in Appendix 10-A) which is based on pilot tests with a safety factor added. As such, consideration of the mass concentration of Pb-210 is not needed.</p> <p>2. The response to IR-198 (Attachment IR-198) erroneously provided the concentrations of Pb-210 in moose organ and caribou organ in units of mg/kg (ww). The corrected units that should have been provided for Pb-210 in moose organ and caribou organ tissues are in Becquerel per kilogram wet weight (Bq/kg ww); that is, the concentrations of Pb-210 in moose and caribou organs are 7.15 Bq/kg ww and 49.4 Bq/kg ww, respectively.</p> <p>The following illustrates that chemical lead (from Pb-210) in organs is not a health concern. The concentrations of Pb-210 in moose organs is 7.15 Bq/kg ww. Using a specific activity of 2.86E+12 Bq/g for Pb-210 (www.wise-uranium.org/nucv.html), the lead concentration in moose organs would be 2.5E-09 mg/kg ww. The daily dose for moose organ consumption would be 4.4E-10 µg/kg bw/day.</p> <p>Dose = 4.5kg/yr*yr/365d*2.5E-09mg/kg/70.7kg*1000ug/mg. The estimated lead exposure dose from Pb-210 in moose organs is far below the 95th percentile dietary lead exposure estimate for the general Canadian population consuming retail foods, and also well below the provisional lead TRV recommended by Health Canada of 0.5 µg/kg bw/day.</p> <p>Therefore, Pb-210 is expected to contribute a negligible amount of lead metal to total lead exposure. Lead as a non-radiological contaminant was considered in Table 3-1 in the ERA (Appendix 10-A) did not screen into the assessment and therefore it is concluded that the potential risks to consumers of country foods due to lead (and Pb-210) are negligible.</p> <p>The project includes an environmental monitoring program which will include analysis of country foods for trace metals, including lead.</p> <p>References: Government of Canada, Environment Canada. 2006. Priority Substances List Assessment Report. Releases of radionuclides from nuclear facilities (Impact on Non-human Biota). September.</p> | <p>potential risk to human health from consumption of country foods, this IR can be resolved.</p> <p>This commitment would include:</p> <ol style="list-style-type: none"> 1. Establishing/confirming baseline concentrations of Hg in water, sediment, and fish tissues before construction; 2. Regular monitoring during construction, operation and post-closure; and, 3. Undertaking an HHRA should monitoring results exceed established/confirmed baseline levels, to inform decisions on adaptive management and mitigation measures. <p><i>The Proposed rationale text for posting: Denison has captured their commitment related to monitoring lead and mercury in country foods, as well as including arsenic, cadmium, lead, and mercury in any further assessment conducted to determine their potential risk to human health from consumption of country foods. This commitment includes (would include):</i></p> <ol style="list-style-type: none"> 1. Establishing/confirming baseline concentrations of Hg in water, sediment, and fish tissues before construction; 3[sic]. Regular monitoring during construction, operation and post-closure; and, 4. Undertaking an HHRA should monitoring results exceed established/confirmed baseline levels, to inform decisions on adaptive management and mitigation measures <p><i>This IR has been accepted for the purposes of the current EA process, and the aforementioned issues will be further assessed as part of licensing technical reviews, prior to the granting of a license.</i></p> | |

ATTACHMENT IR-198 (Round 1 submission)

1. Mammalian Organ Ingestion Rates

The derivation of the Traditional Foods diet is explained in detail in Section 4.2.4.2 of Appendix 10-A (ERA), which states: “A dietary study was performed for residents of Patuanak and La Plonge to understand which traditional foods were consumed by each community and the approximate amounts consumed. The results of the survey were summarized in CanNorth (2017) by average daily intake in grams (fresh weight) of country foods by species and season, for Patuanak, La Plonge, and an average. A summary of the ERFN traditional food ingestion rates by food type is shown in Table 4-3 and the proportions of food types are shown in Figure 4-3.”

As shown in Table 4-3 in Appendix 10-A the mammalian organ ingestion rate was 6.2 g/d for La Plonge, and 16.2 g/d for Patuanak, and the average was 12.8 g/d for both areas combined. A more detailed breakdown of organ types is provided in IR-198 Table 1 below which indicates that organs are consumed from moose, woodland caribou, and barren-ground caribou. As shown in IR-198 Table 1 below, the greatest contribution to the total organ ingestion rate is from moose organs. Looking at the total organ ingestion rate, approximately 80% of the contribution is from moose liver, kidney, and other parts (see IR-198 Figure 1 below); therefore, it was decided for the ERA to assign the total organ ingestion rate to moose organs.

2. Rationale for Concentrations of Radionuclides in Moose Organs Only

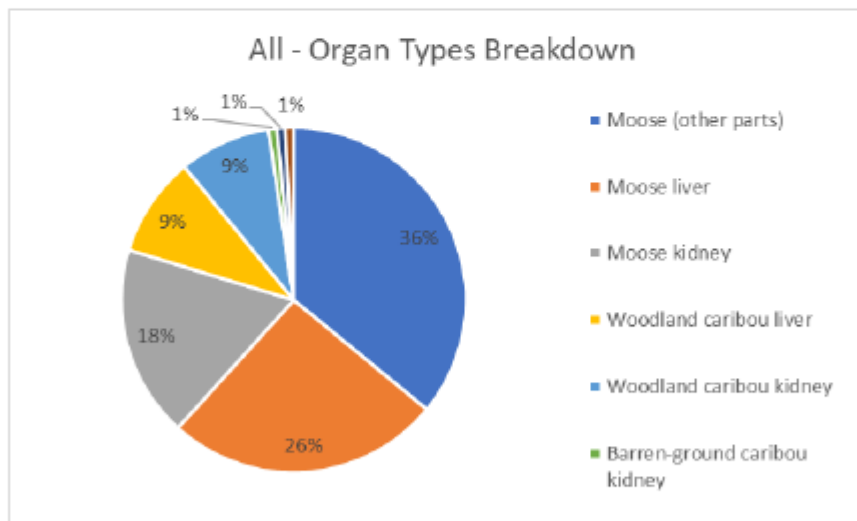
The reviewer also requested rationale for why concentrations of radionuclides are not provided for organs of animals other than moose. The reviewer acknowledges that they are “not aware of transfer factors to individual organs or to organs that are not ruminants, it would be beneficial to have a better understanding of radionuclide concentrations in the organs of other animals that may be consumed by local Indigenous communities.” The transfer factor for moose organs was scaled based on the beef organs transfer factor from CSA N288.1-20 (see Table 3-15 in Appendix A to Appendix 10-A). Limited literature data is available for transfer factors for organs. It was decided to represent organs with moose organs based on the results from the ERFN diet explained above.

Denison acknowledges that the ingestion transfer factors for woodland caribou organs would be higher than the transfer factors for moose. These ingestion transfer factors are summarized in IR-198 Table 2 below for the relevant radionuclides, and the resulting tissue concentrations based on predicted concentrations at McGowan Lake are summarized in IR-198 Table 3. The predicted tissue concentrations for woodland caribou organs ranges from about 0.6 to 6.9 times higher than the predicted tissue concentrations for moose organs for radionuclides in the U-238 decay chain. However, based on the breakdown of organ ingestion rates shown in IR-198 Table 1 below, the caribou organ intake rate is ¼ of the moose organ intake rate, which roughly offsets the higher concentrations in caribou organs. Therefore, representing the organ intake as 100% moose organs is a reasonable approximation.

No changes to the EIS or ERA (Appendix 10-A) were made based on the response to this IR.

IR-198 Table 1: Breakdown of Contribution of Organ Types to Total Organ Ingestion Rate

| Organ Types | La Plonge g/d | Patuanak g/d | All g/d | La Plonge % of Organs | Patuanak % of Organs | All % of Organs |
|---------------------------------|------------------|-----------------|-------------|-----------------------------|----------------------------|-----------------------|
| Moose (other parts) | 2.4 | 5.7 | 4.6 | 39% | 35% | 36% |
| Moose liver | 1.8 | 4.1 | 3.3 | 29% | 25% | 26% |
| Moose kidney | 1.8 | 2.5 | 2.3 | 29% | 15% | 18% |
| Woodland caribou liver | 0.1 | 1.7 | 1.2 | 2% | 10% | 9% |
| Woodland caribou kidney | 0.05 | 1.7 | 1.1 | 1% | 10% | 9% |
| Barren-ground caribou kidney | | 0.2 | 0.1 | 0% | 1% | 1% |
| Barren-ground caribou liver | | 0.2 | 0.1 | 0% | 1% | 1% |
| Caribou (other parts) | 0.02 | 0.1 | 0.1 | 0% | 1% | 1% |
| Total Organs | 6.2 | 16.2 | 12.8 | 100% | 100% | 100% |



IR-198 Figure 1: Breakdown of Organ Types for ERFN Traditional Foods Diet

IR-198 Table 2: Ingestion Transfer Factors (d/kg fw) for Mammalian Organs

| Radionuclide | Beef Organs | Moose Organs | Woodland Caribou Organs |
|------------------|-------------|--------------|-------------------------|
| Body Weight (kg) | 600 | 400 | 180 |
| Uranium-238 | 6.90E-04 | 9.35E-04 | 1.70E-03 |
| Uranium-234 | 6.90E-04 | 9.35E-04 | 1.70E-03 |
| Thorium-230 | 6.30E-02 | 8.54E-02 | 1.55E-01 |
| Radium-226 | 9.50E-04 | 1.29E-03 | 2.34E-03 |
| Lead-210 | 2.20E-02 | 2.98E-02 | 5.43E-02 |
| Polonium-210 | 5.00E-05 | 6.78E-05 | 1.23E-04 |

IR-198 Table 3: Estimated Tissue Concentrations of Moose Organs and Woodland Caribou Organs at McGowan Lake

| Tissue Type | Units | U-238 | U-234 | Th-230 | Ra-226 | Pb-210 | Po-210 |
|-------------------------|----------|----------|----------|----------|----------|----------|----------|
| Moose organs | mg/kg fw | 7.84E-02 | 7.84E-02 | 3.04E+00 | 8.76E-02 | 7.15E+00 | 1.31E-02 |
| Woodland caribou organs | mg/kg fw | 3.31E-01 | 3.31E-01 | 3.30E+00 | 5.46E-02 | 4.94E+01 | 7.50E-02 |